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The Material Light: Exploring The Relationship Between Contained and Container

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THE
MATERIAL
LIGHT

The Material Light

Exploring The Relationship Between Contained and Container

Request for Approval of Thesis Research
Project Book Presented to:

Tim Frank

and to the
Faculty of the Department of Architecture
College of Architecture and Construction Management

by

Oliver Brown

In partial fulfillment of the requirements for the Degree

Bachelor of Architecture

Kennesaw State University
Marietta, Georgia

May 1, 2020

Dedication

I would like to dedicate this book to my family, who has always been there for me.

Acknowledgment

I would like to thank Kennesaw State University and all the faculty that have helped me throughout the years.

I would also like to thank Professor Tim Frank for believing in my ideas and always pushing me to do better.

For higher quality images, email obrown505@gmail.com

THE MATERIAL LIGHT
EXPLORING THE RELATIONSHIP BETWEEN
CONTAINED AND CONTAINER

“Well, the light in Greece is very, very intense. Greece is very rocky, and I heard scientist’s discussing it once. They said there’s a lot of calcium in the rock and somehow that [the calcium] gets in the air and it causes some sort of electro-magnetic zing. It’s a very brilliant light. And if you go to an island with a lot of pine trees the light is very different because there’s a lot of resin in the air from the trees. It’s all in the air and has this effect on the light because the light is hitting all those little pieces of pollen and refracting off of it. But the light is just clear and brilliant, and you can tell why there was all this clarity in their art.”

-Brice Marden

ABSTRACT

Many buildings around us use the same ubiquitous boundary materials that fall short in directly influencing the disposition of the space it defines. There are many different opportunities to explore myriad material compositions to present the ambient qualities of space in a manner the puts the constructed boundary to the task to acclimatize the interior it envelopes. This thesis will explore a series of material compositions, with a focus on natural light, and how the articulation of the spatial boundary can bring out the strong qualities of daylight for visually sensitive activities. With this exploration, I will examine ways to define the contained ambient daylight through the nuances of the material boundary itself, developing and testing the possibilities made possible by careful material selection and composition. By exploring these different material assemblages, it will contribute to the boundary – space dialog, expanding the possibilities with careful experimentation using state-of-the-art tools and techniques. It also brings an increased awareness of how building materials can contribute to the intensive shaping of interior environments without the use of high-grade energy sources.

RESEARCH CONTEXT

Many of the buildings around us use the same wood frame construction with gypsum board and curtain wall systems without consideration for how these material assemblages will influence the ambient environment they define. This design methodology has led to buildings that rely heavily on high-grade energy sources to ‘condition’ the interior environment. With electric lighting accounting for approximately 1/5th of the energy use for commercial structures, exploring and implementing effective material technologies can result in significant energy savings for buildings. Many of the aforementioned examples do not consider light itself a physical substance that interacts and draws influence from the material elements that constitute a work of architecture. This thesis, its systematic work flow, and its affiliated outcomes aim to change that.

RESEARCH QUESTION

- How can light be considered a physical substance, working in concert with the material enclosure to acclimatize interior space?

- How can the material enclosure propagate its influence to become a spatial concern in addition to a concern of the surface?

- How can the disposition of daylight within a building inform the user’s perception of low, moderate, and high illuminance levels?

METHOD OF INQUIRY

The highlight of my design undertaking will be to look at how to create spaces that will alter occupant perception. For the first half of the period of study, I investigated different ways spatial enclosures change the experience for the user and how the different materials may play a crucial role in this. Then for the second half of the study period, I conducted a series of tests that disclosed how different material modifications and compositions played a role in altering the perceived and absolute lighting behavior within each space. The primary question was how an architect could create different atmospheric qualities through sole manipulation of the tectonic aspects for the physical building elements.

PROJECTIONS / ANTICIPATED RESULTS

That staging light and dark areas in the building helps adjust the eye to make even low levels of light be perceived as adequate. Doing more with less light.

The positioning of light source and receiver in the space also aids in perceiving light levels as adequate: making the most of source light available.

Computer modeling and simulation tools will aid in identifying where the light falls on specific areas of the enclosure, year-round, so they can be articulated concerning those gains, such that the enclosure develops consciousness of the tracking of the sun in the sky.

That the following material strategies, endowing the raw material with new properties through design, are most effective in shaping the luminous environment:

-Glass

That the following material strategies, endowing the raw material with new properties through design, are least effective in shaping the luminous environment:

-Gypsum white wall

The physical operation or modification, punching and embedding, is the most effective in shaping the luminous environment.

The physical operation or modification, cutting, is the least effective in shaping the luminous environment.

That digital technology and computer-aided fabrication contribute to these objectives in the following ways:

-They help create ways to accurately create a pattern or manipulate a material in a controlled way.

That computer simulation and modeling aids in the process in the following ways:

-They create multiple ways to test the model and allow for multiple variations of the model to be tested against one another.

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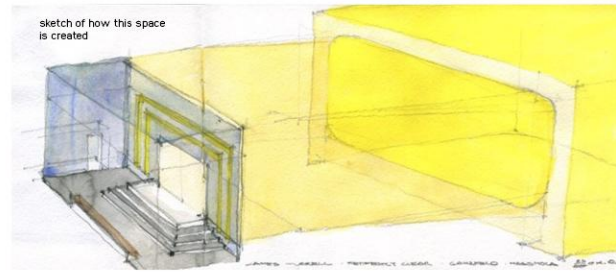
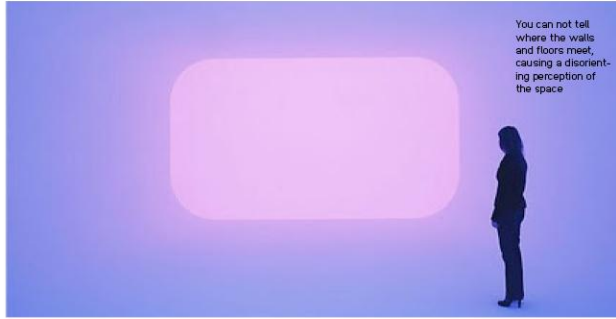
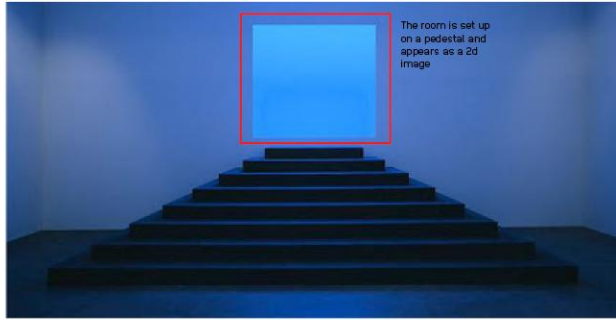
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PRECEDENTS

I choose four buildings that I took inspiration from. These buildings show a unique way at using materials to shape the built environment in an intuitive way

Dhatu

By: James Turrell

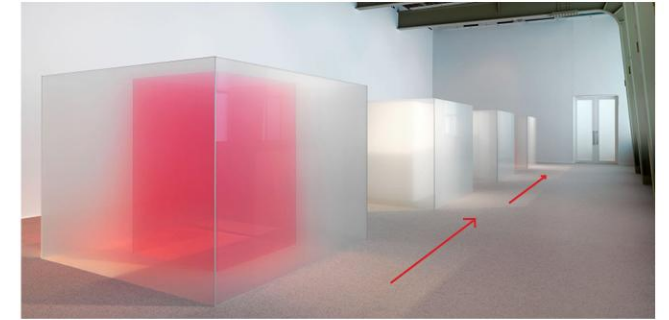


These images are showing how the spaces can change color

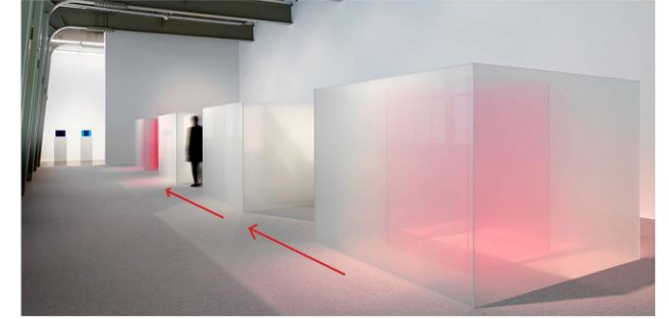
In this exhibit you enter in a room with a staircase that seems to be leading up into a 2d image. You do not realize that there is another room you can venture into. Once you are in the room the atmosphere and color make you loose you sense of reality, and your senses are gone. The room itself has no corners connecting the walls and floors, and makes you perceive this space as an abyss. To create this space, Turrell created a large room in the back that is lit up with ambient lighting, and creates a picture frame like view from one room. By softening all of the edges, and changing the perception of the viewer, he was allowed to create this experiential space. This exhibit is using light as a medium and is able to achieve this through the shape and environment that he creates in each room

Venice Fog

By: Larry Bell



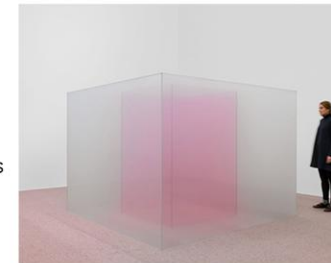
both images are displaying a range of different conditions that you can achieve



This installation is composed of multiple large glass boxes that use translucent and colored glass to create a space that looks like the morning fog in the coast of California. Although this is an installation, it shows the different characteristics, and qualities that light and glass can transform into. Bell said, "Although we tend to think of glass as a window, it is a solid liquid that has at once three distinctive qualities: it reflects, absorbs, and transmits light all at the same time". It is also important to think about light as a material, and how it can form an experiential quality.

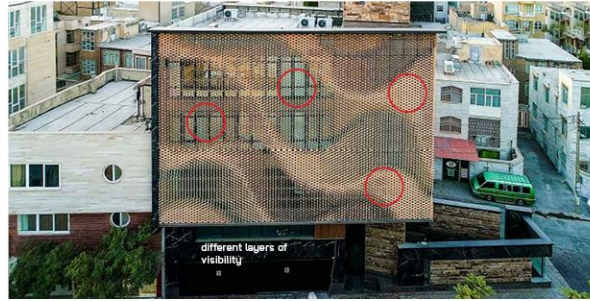
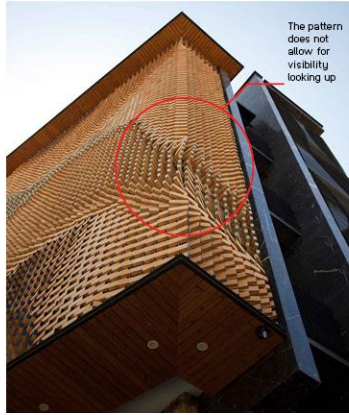


These images are displaying the different levels of transparency that the boxes are creating. The glass allows the object to appear that it is in fog

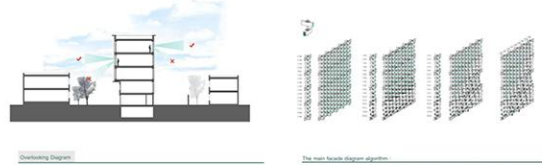


Revolving Bricks Serai

By: A.P.P. ARCHITECTS & ASSOCIATES



This building utilizes bricks in its facade to create a dynamic facade. With the variety in the placement of the brick, it displays a pattern that allows for an experiential architecture. The facade offers views from the interior, but only looking straight forward. There are residential buildings around the site so they created it in such a way that one could not look down into other homes. With the use of rotating bricks that are painted, they were able to achieve a building facade that provides privacy, as well as great daylighting. This facade shows us the use of simple material, and how it was able to break away from its norm, and allowed to be created into something that has a different experience from its predecessors.



Mask House

By: WOJR



This house is designed for someone who lost his brother in the lake the house overlooks. The house is created to help rehabilitate the ones that are suffering and show great experiential experiences that one would not think would come. The buildings show us both the light and the dark in the world and the qualities of the materials they use help bring that out. The charred wooden planks on the front of the house act as a mask. Inside the house, it is composed of a wooden paneled interior that is bright and warm. Despite its intentionally insecure facade, the house is sparse but cozy, open but private, and provides a quiet and secluded place. This building truly shows us that everything may not be as it seems from the outside. The use of contrasting materials and their properties shows us that many different experiences can be displayed by them.



RESEARCH PROCESS

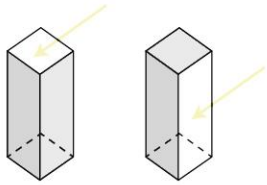
The next chapter shows my five principles that I used to measure and study the lighting qualities of the container and how it affects the contained

FIVE PRINCIPLES

For this thesis my research process consisted of 5 different principles that I would study to help get a better understanding on how the container effects the contained. These principles are light sourcing, solar ray tracing, material influence, fabrication and construction, and composite assembly.

Light Sourcing

north, south, east, west, overhead, side, direct, indirect



Depending on orientation of the opening it affects the lighting values inside the container. The lighting also changes with the time of day.

Solar Ray Tracing

static solar ray path and number of reflections from the source to the receivers



The shape of the container affects the solar ray path the light takes to reach it's target point. The more the light reflects off the surface, the more diffused the light becomes.

Material Influence

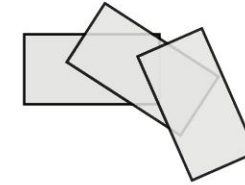
looking at how light behaves with different materials



Material's and their texture can also influence how the light will reflect off the surface. With a rougher material, the light is more diffused, while a smooth surface allows the light to reflect of the surface.

Fabrication and Construction

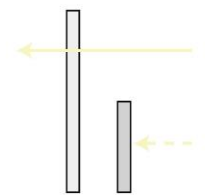
finding opportunities to articulate the surface of select material types in fabrication or construction process



Articulating the surface of the material can change the influence it has on light. This can be changed by applying a finish, or manipulating the surface of the container.

Composite Assembly

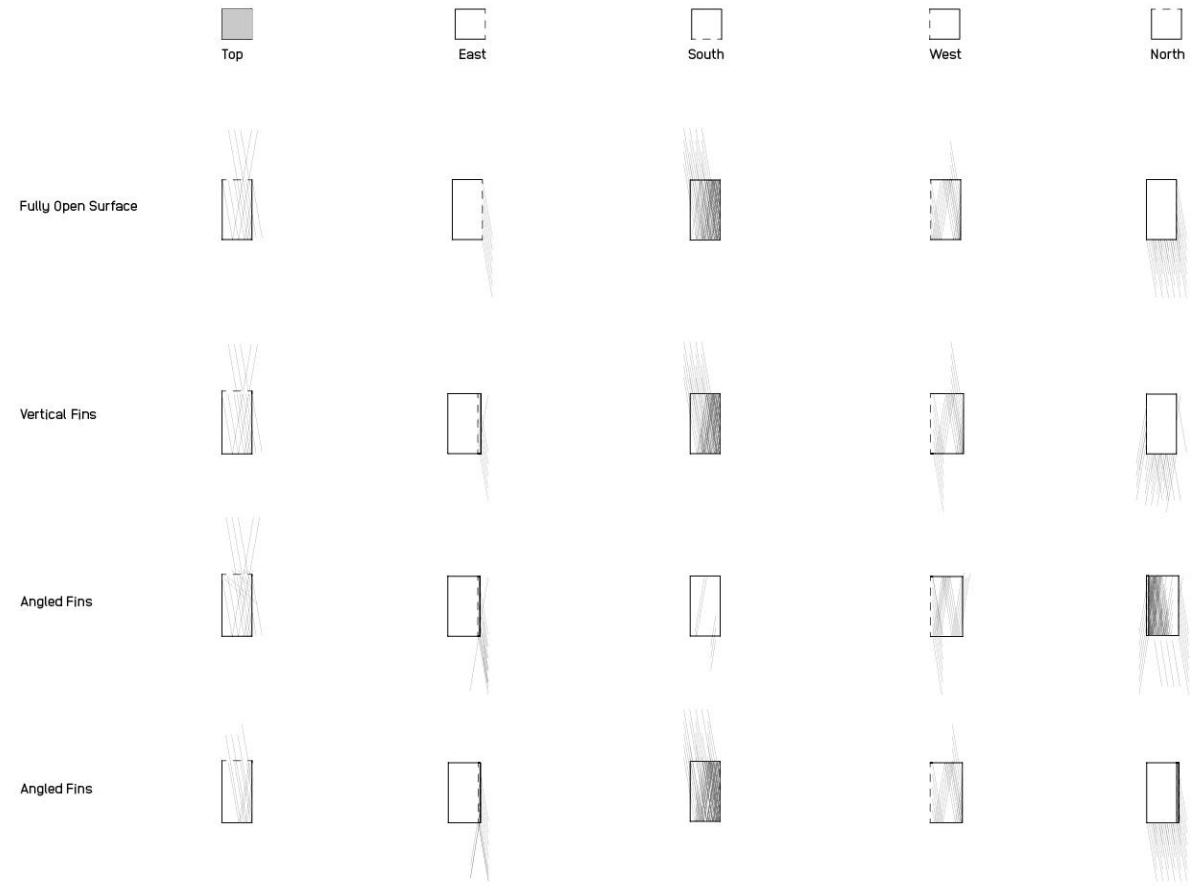
looking at using multiple treatments of materials along a surface to alter the source to receiver dynamic



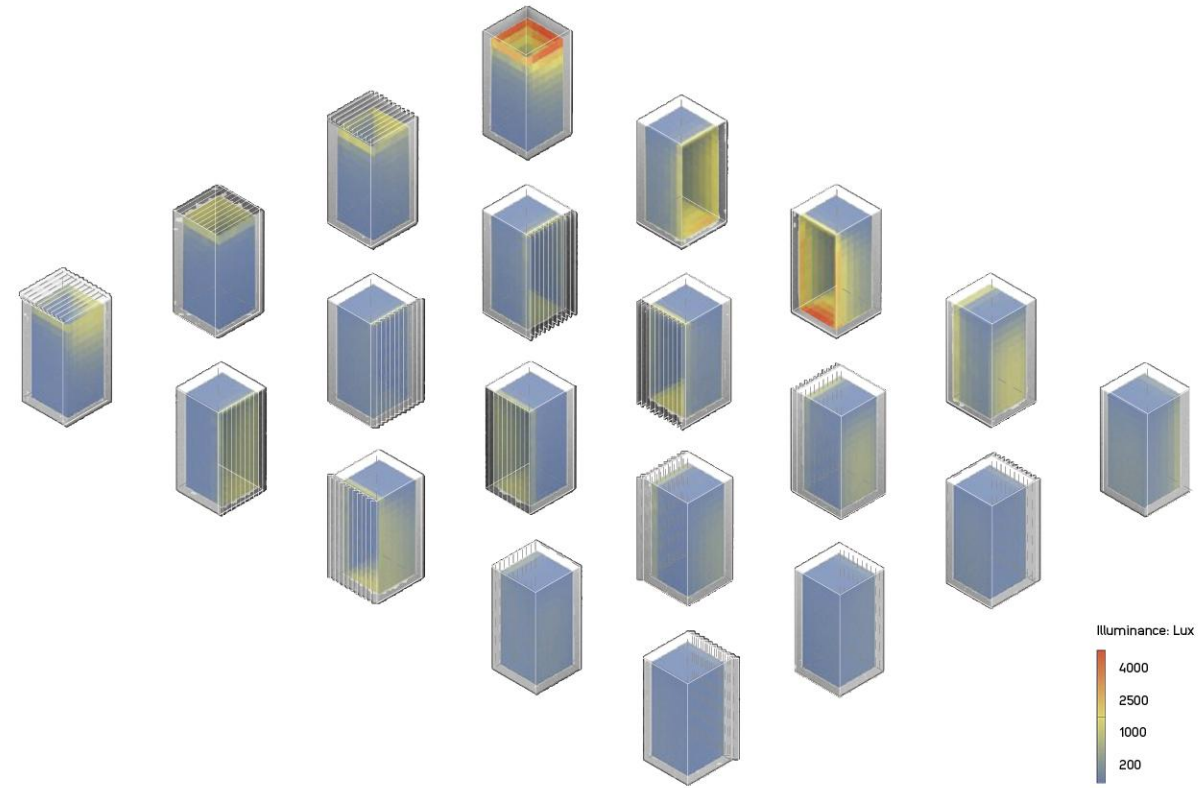
Using multiple materials allows for an endless possibility of how the two materials can intertwine to change the property of light.

LIGHT SOURCING

These studies show the basic ways light can enter a space.



Light Sourcing diagram



Light Sourcing diagram

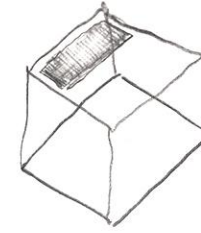
The light sourcing diagrams show that the main contributor for how much sun enters the space is the orientation of the opening. Manipulating the opening also allows for light to become diffused.

LIGHT SOURCING

From these studies, I discovered that there are many different ways to treat the light before it enters the space.



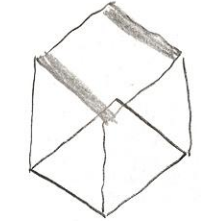
Ambient Light



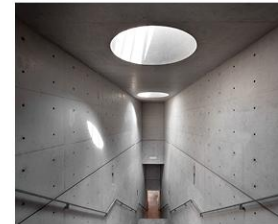
Direct Light



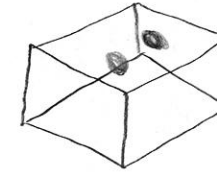
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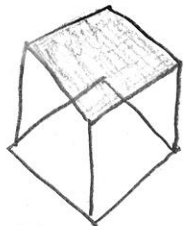
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Direct Light



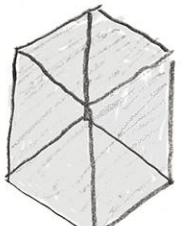
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Ambient Light



Ambient Light

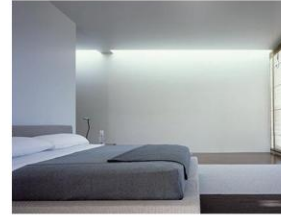
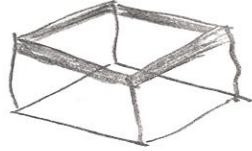




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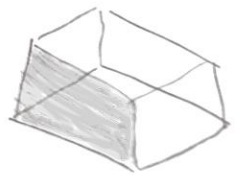
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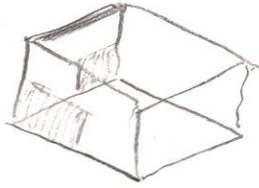
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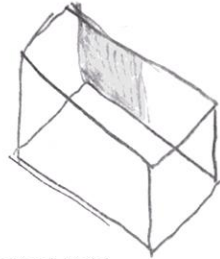
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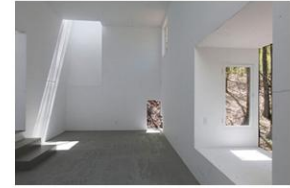
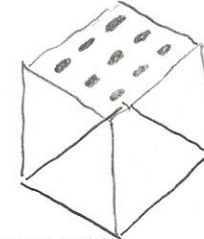
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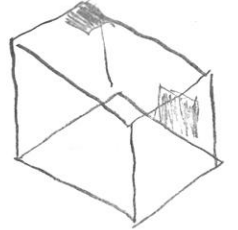
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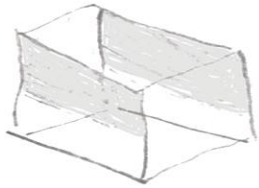
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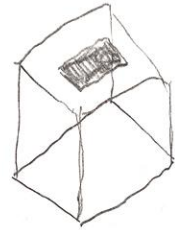
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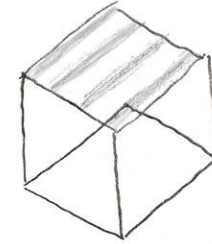
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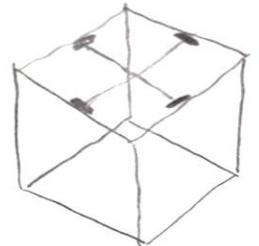
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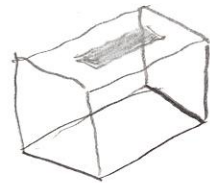
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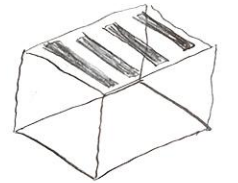
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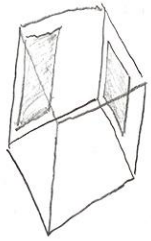


Ambient Light





Ambient Light



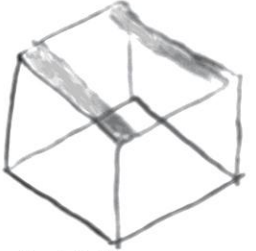
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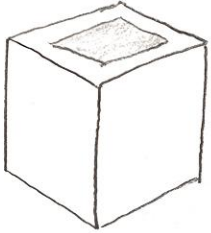
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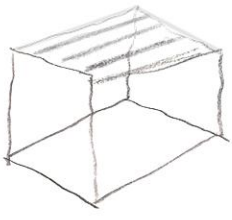
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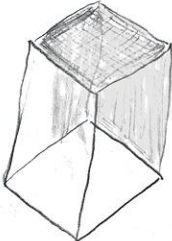
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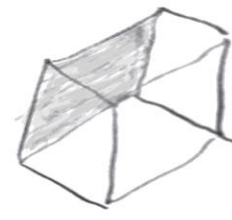
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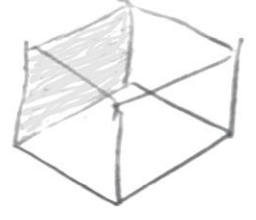
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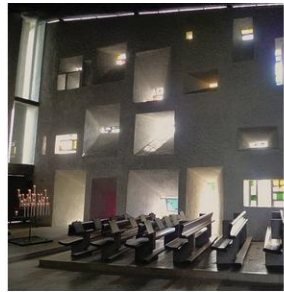
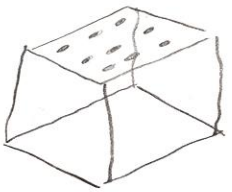
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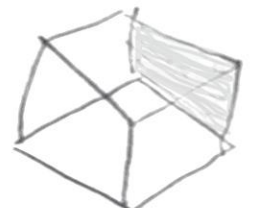
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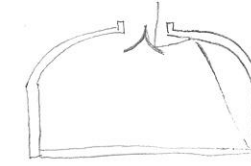


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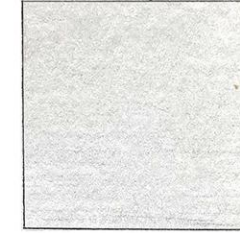


SOLAR RAY TRACING

From these diagrams I discovered that how the light is treated at the opening and what the container itself does to change the light.

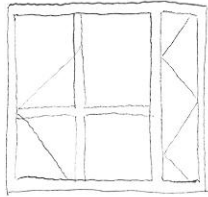


Solar Ray Sketch

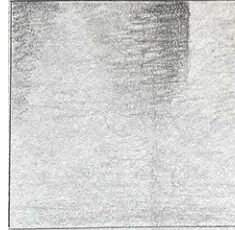


Ground Condition Sketch

The light bounces off the mechanism on the room and is diffused throughout the space.

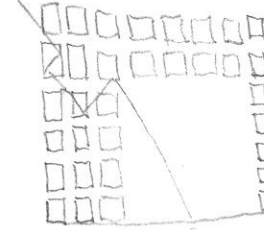


Solar Ray Sketch

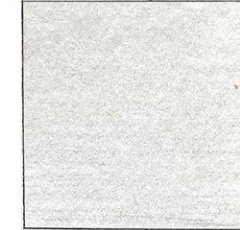


Ground Condition Sketch

There are two different openings where light enters the space. On the left side there is a harsh light through the cross. On the right side the light is a softer gradient as it washes on the wall.

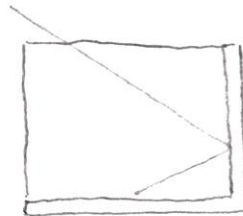


Solar Ray Sketch

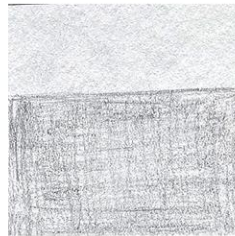


Ground Condition Sketch

The light is diffused by the grid structure. The light is a soft ambient light because of how the light will bounce off the wooden structure

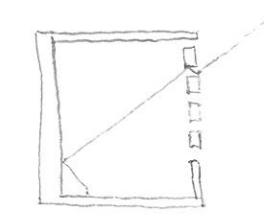
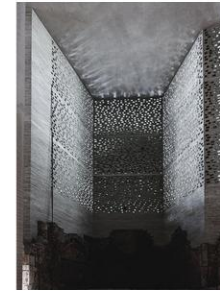


Solar Ray Sketch

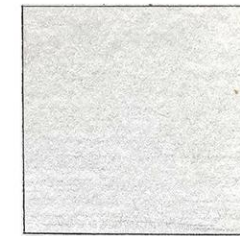


Ground Condition Sketch

The openings in this space allow for the wall to be illuminated by the light and for the direct light to not enter the space.

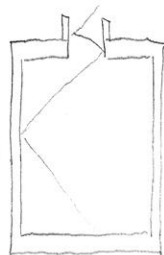


Solar Ray Sketch

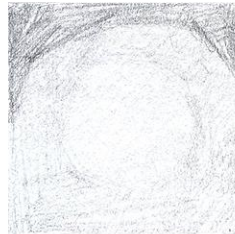


Ground Condition Sketch

The brick openings create a soft glow of light that allows the small openings in the wall to be illuminated.

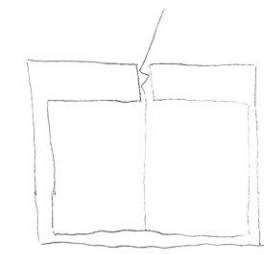


Solar Ray Sketch

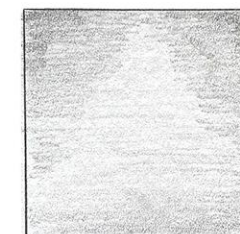


Ground Condition Sketch

The light illuminates the opening reflected onto the wall. The center of the light is direct but then there is an outer layer of ambient light.



Solar Ray Sketch

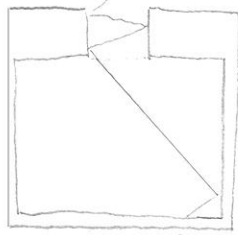


Ground Condition Sketch

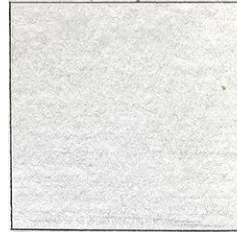
The depth of these openings create a linear project light



Solar Ray Sketch



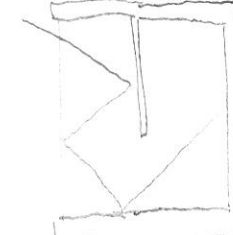
Ground Condition Sketch



The material that is being used allows for the light to be diffused as it enters the space.



Solar Ray Sketch



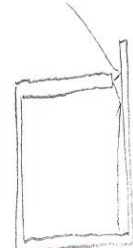
Ground Condition Sketch



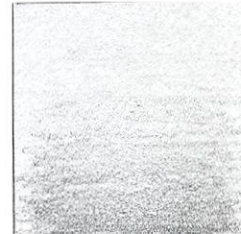
The light enters the rooms but becomes more ambient in the hallways. The light is bright but not direct.



Solar Ray Sketch



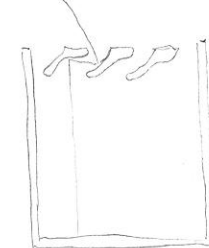
Ground Condition Sketch



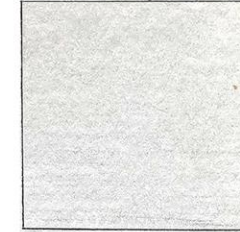
There is an ambient glow along the wall with the opening.



Solar Ray Sketch



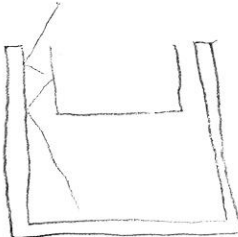
Ground Condition Sketch



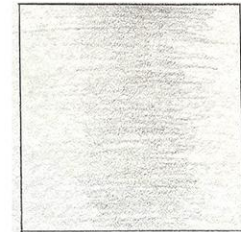
The light bounces off the mechanism and creates an ambient light.



Solar Ray Sketch



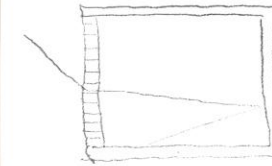
Ground Condition Sketch



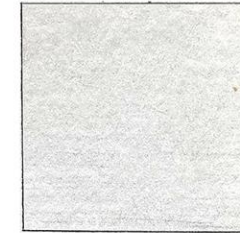
The diffused light is coming from both sides of the space, and the object hanging above allows for there to be a contrast in light.



Solar Ray Sketch



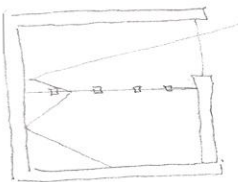
Ground Condition Sketch



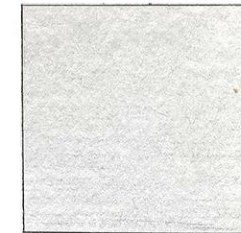
The glass blocks create ambient lighting.



Solar Ray Sketch



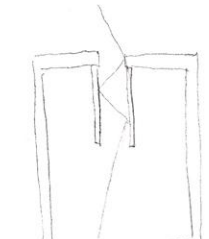
Ground Condition Sketch



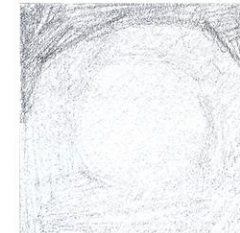
Light enters the space and then gets diffused through the material.



Solar Ray Sketch



Ground Condition Sketch



The light well creates a spotlight effect on the ground. It is achieved through the geometry of the opening and depth of it.

MATERIAL INFLUENCE

In these materials, I explore and get a better understanding of how the material interacts with light and how it creates a unique atmosphere.



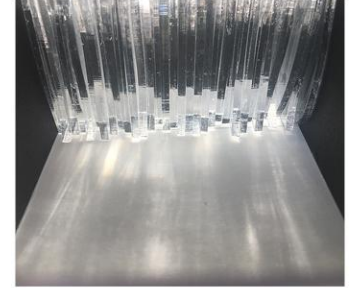
Plywood



Glass



Rough Concrete



Textured Glass



Smooth Concrete



Black Wall



White Wall

These material swatches are showing how light interacts with the material in a controlled manner.

MATERIAL INFLUENCE

In these materials, I explore and get a better understanding of how the material interacts with light and the properties of the material itself.

Wood

Texture: Medium
Surface Reflectance: Low
Color: Warm
Light Transmission: None
Solar Absorptivity: .40

Grain causes light to disperse.

Concrete

Texture: Med/High
Surface Reflectance: Low/Med
Color: Cold
Light Transmission: None
Solar Absorptivity: .60

Light is diffused from rough texture, but the surface can be reflective on smooth parts.

Glass

Texture: None
Surface Reflectance: High
Color: None
Light Transmission: High
Solar Absorptivity: .10

Light gets reflected and refracted.

Metal

Texture: Low/Med
Surface Reflectance: Med/High
Color: Cold
Light Transmission: None
Solar Absorptivity: aluminum
.15-.30
steel
.75-.80

Smooth surface reflects light

Stone

Texture: High
Surface Reflectance: Medium
Color: Cold
Light Transmission: None
Solar Absorptivity: .5-.7

Rough surface diffuses light

Plaster

Texture: Medium
Surface Reflectance: Low
Color: Variety
Light Transmission: None
Solar Absorptivity: .25-.40

Smooth texture creates a base line for lighting properties

FABRICATION AND CONSTRUCTION

In this section, I manipulate each material and see the affects it has on the contained environment.

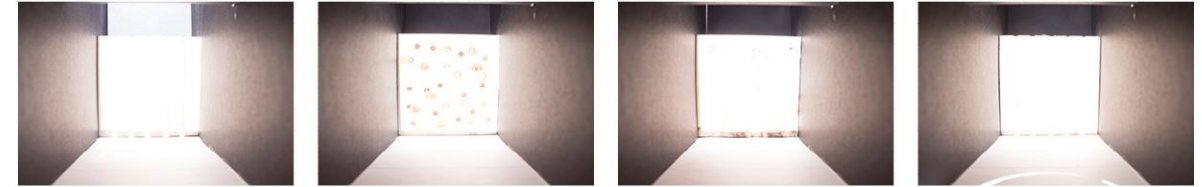
South Facing

Shutter 1/10
Aperture f/8
ISO 100
Time 3:30



North Facing

Shutter 1/30
Aperture f/8
ISO 100
Time 3:30



The wood reflects the direct south sunlight and makes the walls appear very bright, while the north sun allows for you to see the wood and it's properties.

FABRICATION AND CONSTRUCTION

South Facing

Shutter 1/10
Aperture f/8
ISO 100
Time 3:30



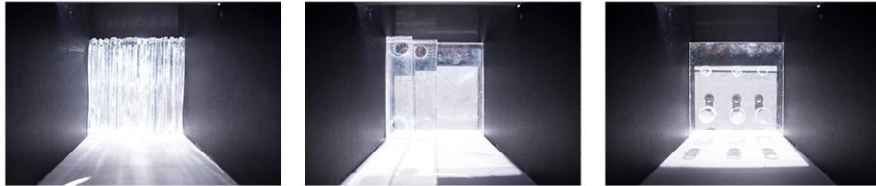
North Facing

Shutter 1/30
Aperture f/8
ISO 100
Time 3:30



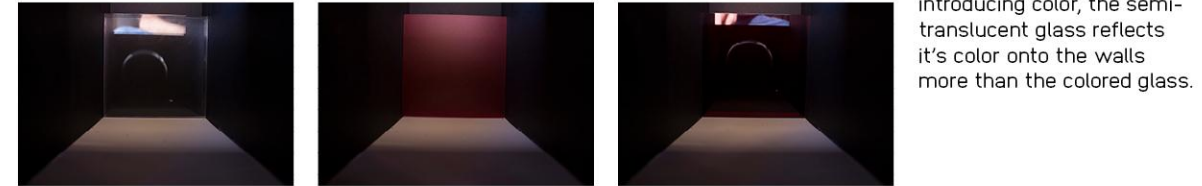
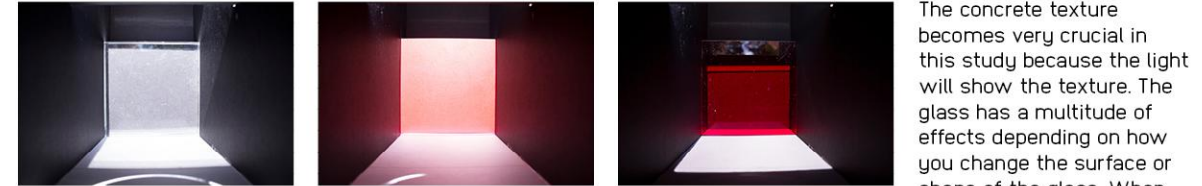
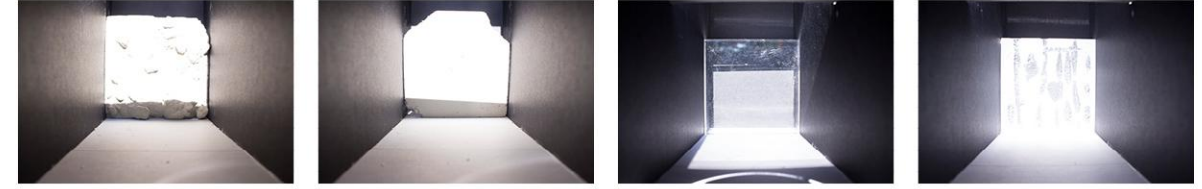
South Facing

Shutter 1/10
Aperture f/8
ISO 100
Time 3:30



North Facing

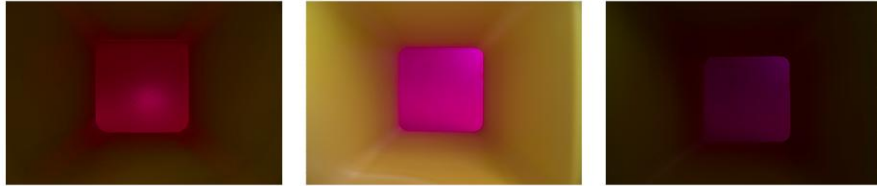
Shutter 1/30
Aperture f/8
ISO 100
Time 3:30



The concrete texture becomes very crucial in this study because the light will show the texture. The glass has a multitude of effects depending on how you change the surface or shape of the glass. When introducing color, the semi-transparent glass reflects its color onto the walls more than the colored glass.

COMPOSITE ASSEMBLY

In this section, I combine materials and challenge how the container affects the contained



This model is composed of a white hallway that has rounded edges to help have a more consistent lighting conditions on the walls. By using red and yellow translucent glass, you are able to achieve a variety of lighting and color conditions. By changing the orientation and if its direct light or sunlight also affects the space dramatically



This model is a white room that has an opening on the ceiling. Adding a red translucent material allows for the room to change color dramatically. When there is nothing to filter the light, the light becomes a spotlight that moves around in the room as the sun's orientation changes.

COMPOSITE ASSEMBLY

In this section, I combine materials and challenge how the container affects the contained



This model is a room that has a single opening. This opening has a lot of depth and bounces the solar rays to diffuse the light and wash the ambient light onto the wall.



This room is a white wall room that has a texture applied to it in a gradient going from one side of the room to the other. There is one opening that has translucent glass on it, and depending on the orientation of the room, it changes the affects dramatically. Looking at the textured material, you can tell that the more rough a material is, the darker the space around it will be.

MODEL EXPLORATION

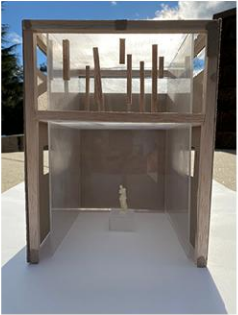
Throughout the thesis process, one of the main ways I would design and learn about how the container affects the contained is through model making. Model making is an integrative way to design with light in mind and how it interacts with the materials. Using a lux meter, I was able to then take my models and have the correct lux readings in different areas of the model.

I would usually take models outside and study how the light reacts to the container, although there are certain times that the sun was not out. I then used the heliodom, which would replicate how the sun would react with the model.

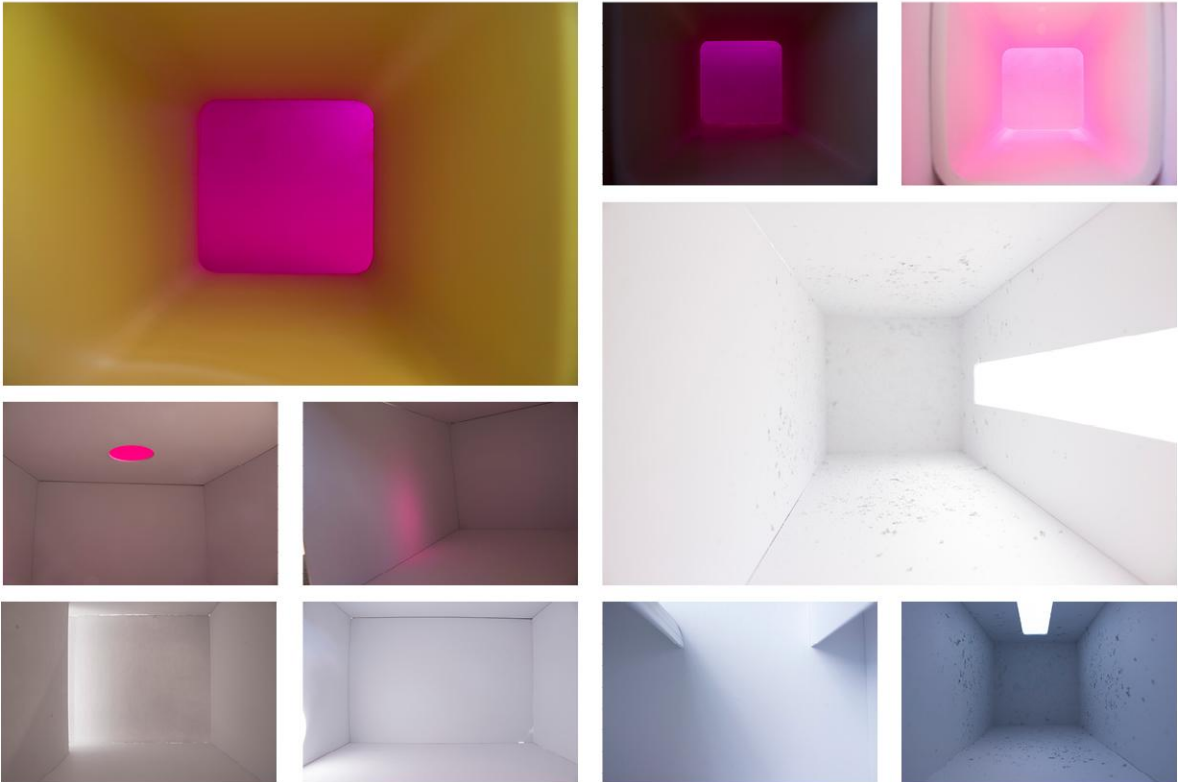
Through model making, I was able to create real world results that are not as achievable in digital models. Trying to recreate these results in a digital model and rendering software is difficult and will give you a close result, but not completely accurate.



Model with Heliodom



Model with Sunlight



SITE CONTEXT

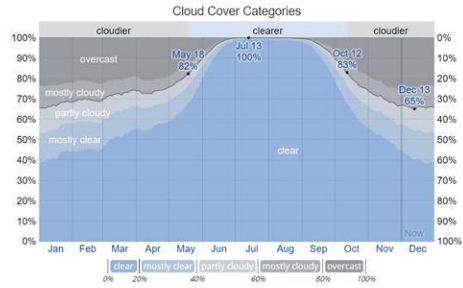


Location Diagram
Cyprus was chosen as my site because of the constant clear skies and vivid bright light. It is also a wealthy area that can support a museum.



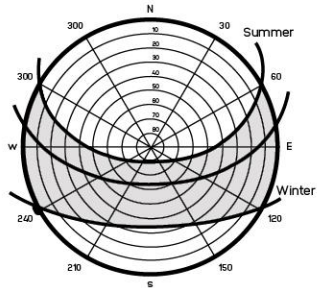
Location Diagram
This site is located on the perimeter of the city and is located on a hill that provides a great view towards the city.

SITE CONTEXT



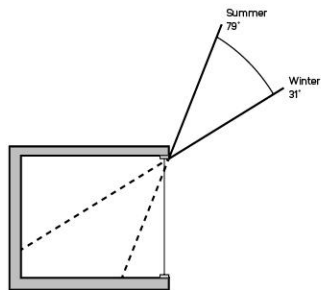
Cloud Cover Diagram

The sun path diagram shows that the sun's range is between 31 degrees in the winter and 79 degrees in the summer



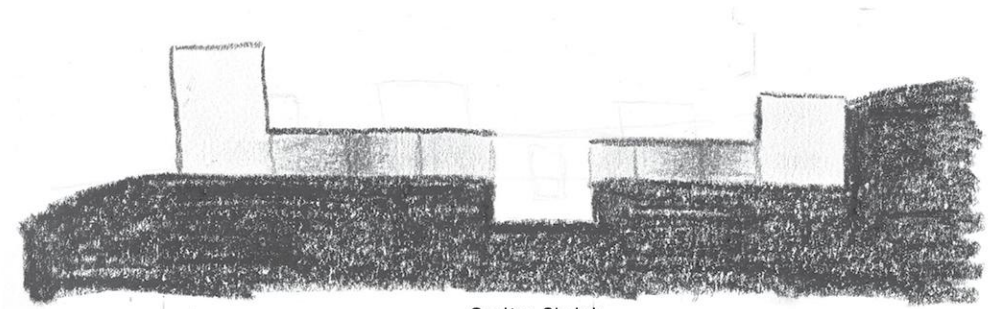
Sun Path Diagram

The Cloud cover diagram shows that from may to october, the sky is mostly clear, while the other months have a 70 percent chance of being sunny. Cyprus skies are very sunny compared to other parts of the world. This was one of the major reasons to pick this site.



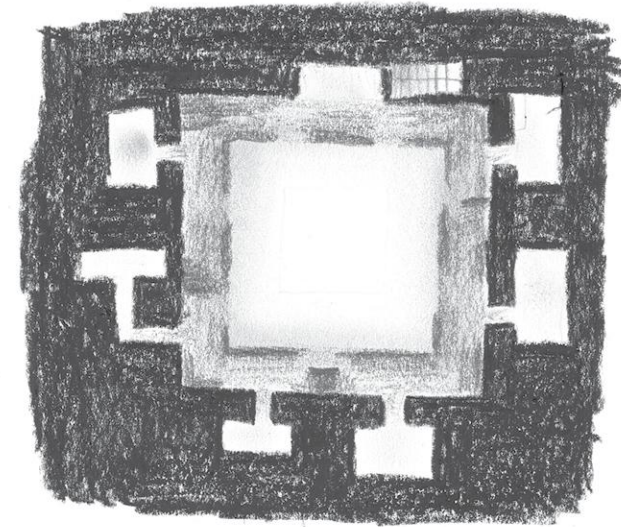
Sun Path Diagram

The sun path diagram shows that the sun's range is between 31 and 79 degrees. The equinox is around 64 degrees. This shows us that the sun will remain relatively high in the sky compared to other locations.



Section Sketch

The section shows that the north side is underground while the south side is above ground. It also shows the progression from light to dark spaces



Plan Sketch

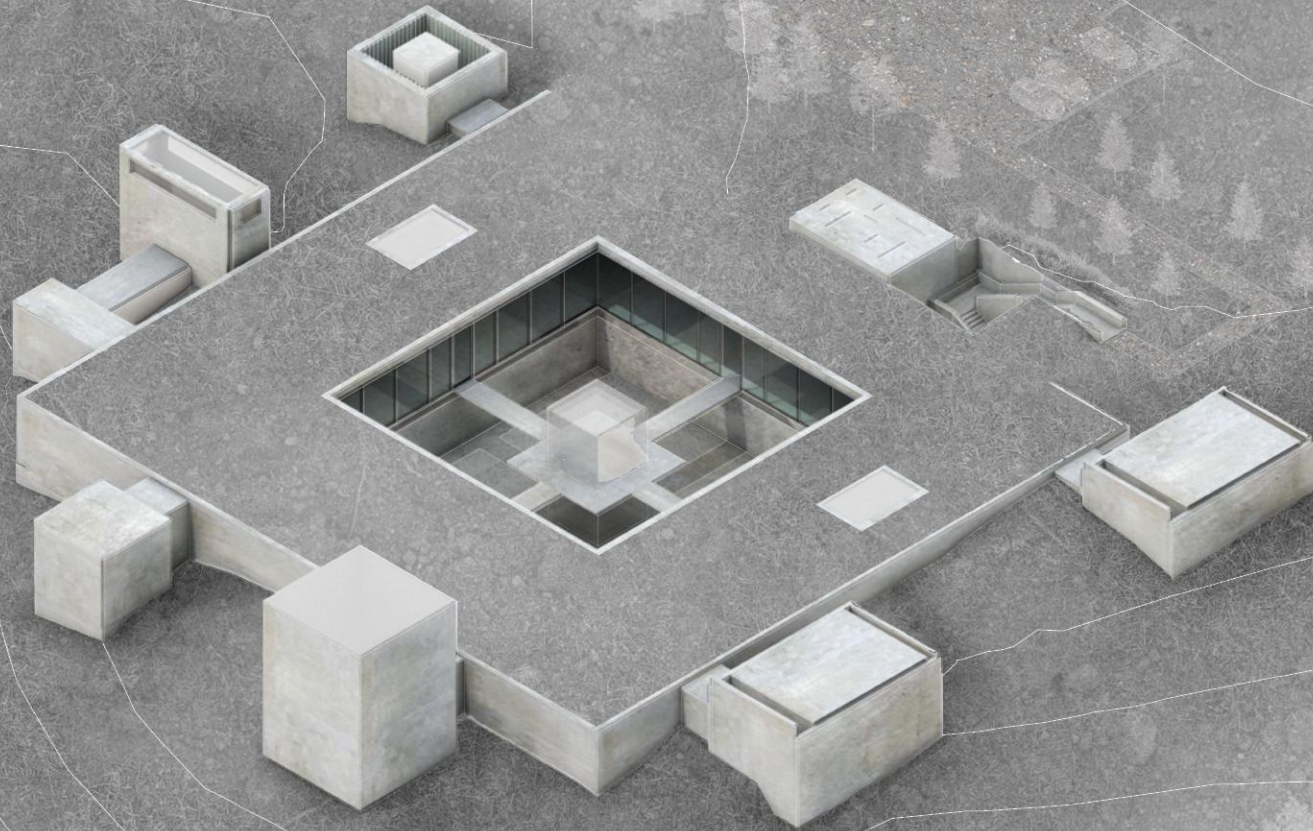
The plan was designed in a way to where the bright rooms are located on the exterior where you have to progress through a labyrinth of different lightings to reach it.

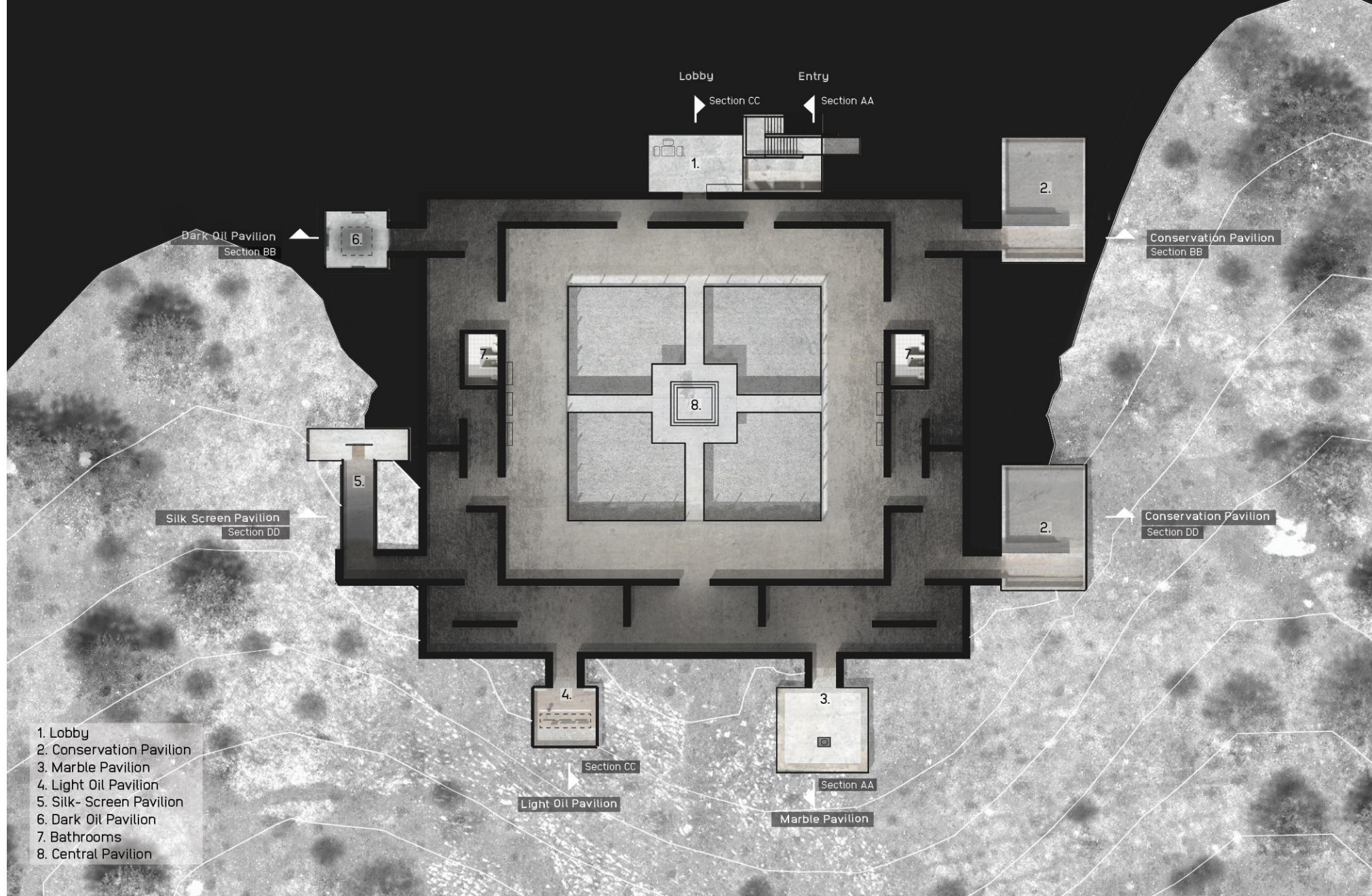
BUILDING DESIGN

The next chapter shows the design of the overall building

CYPRUS NATURAL LIGHT MUSEUM

For this museum design, the building layout is a square design with the exhibits on the perimeter. The center is the brightest and open to the sun, and as you traverse to the exterior, it becomes darker. Once you reach the end of darkness you are welcomed with the exhibits unique quality of light.





- 1. Lobby
- 2. Conservation Pavilion
- 3. Marble Pavilion
- 4. Light Oil Pavilion
- 5. Silk- Screen Pavilion
- 6. Dark Oil Pavilion
- 7. Bathrooms
- 8. Central Pavilion

First Floor Plan



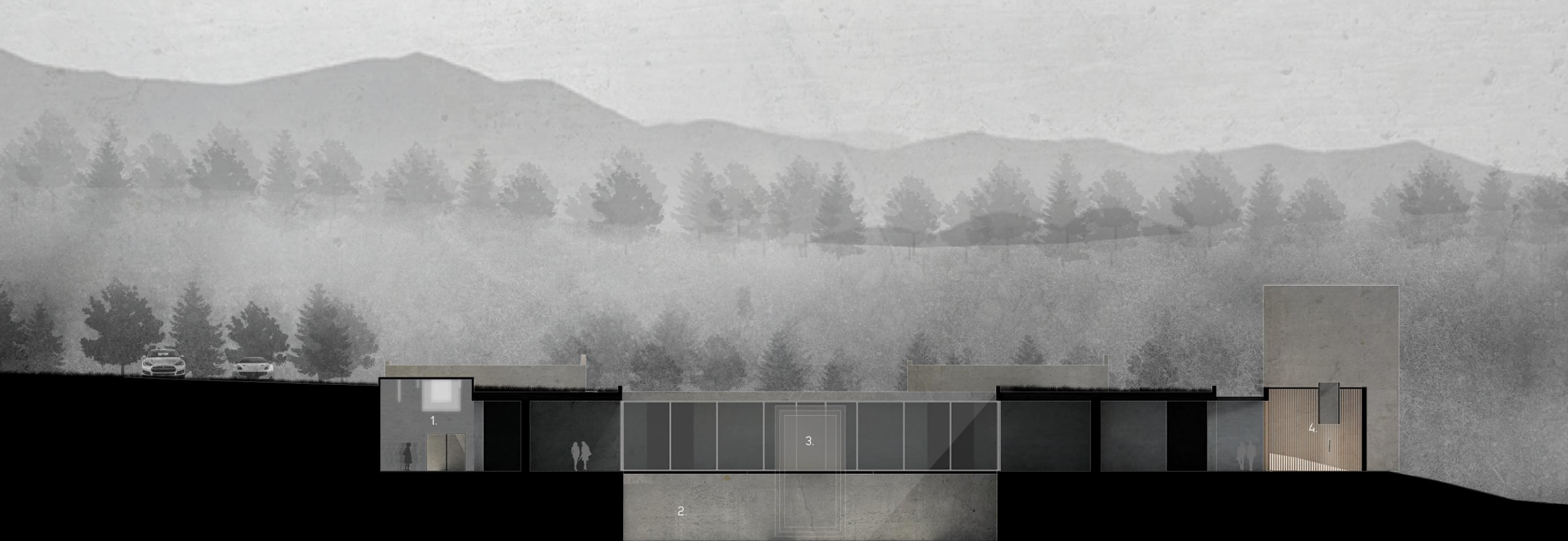
1. Marble Pavilion
2. The Void
3. The Pavilion
4. Entry

Entry and Marble Pavilion Section AA



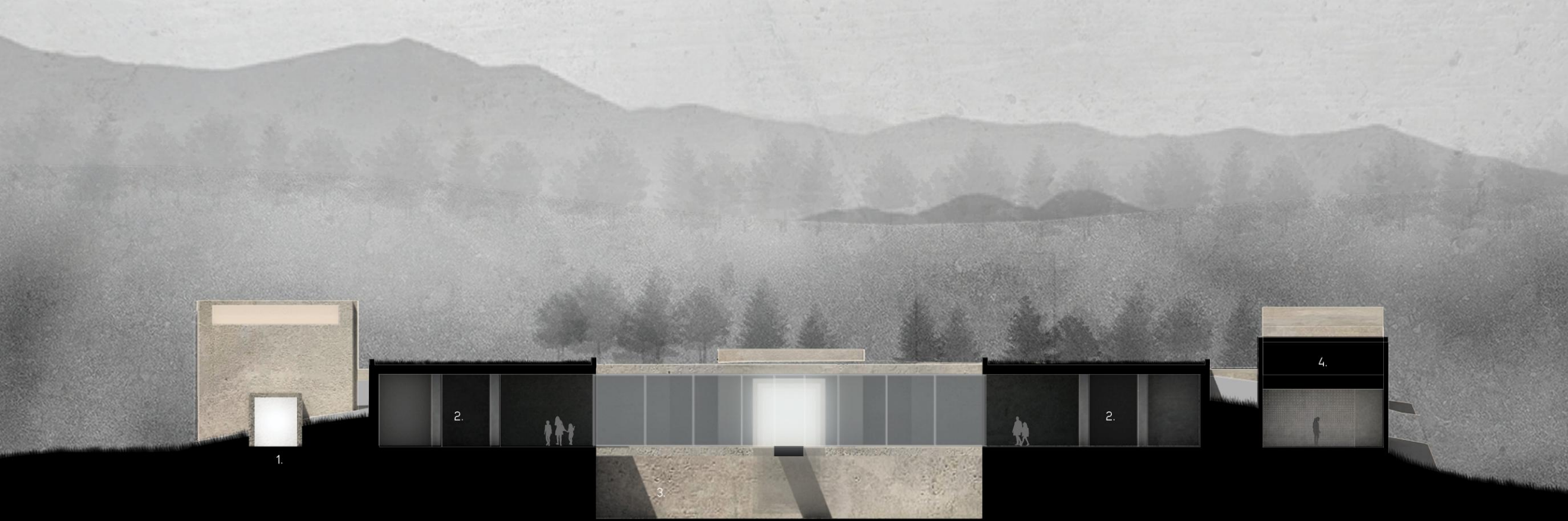
- 1. Dark Oil Pavilion
- 2. Labyrinth Hallway
- 3. Conservation Pavilion

Dark Oil Pavilion and Light Oil Pavilion Section BB



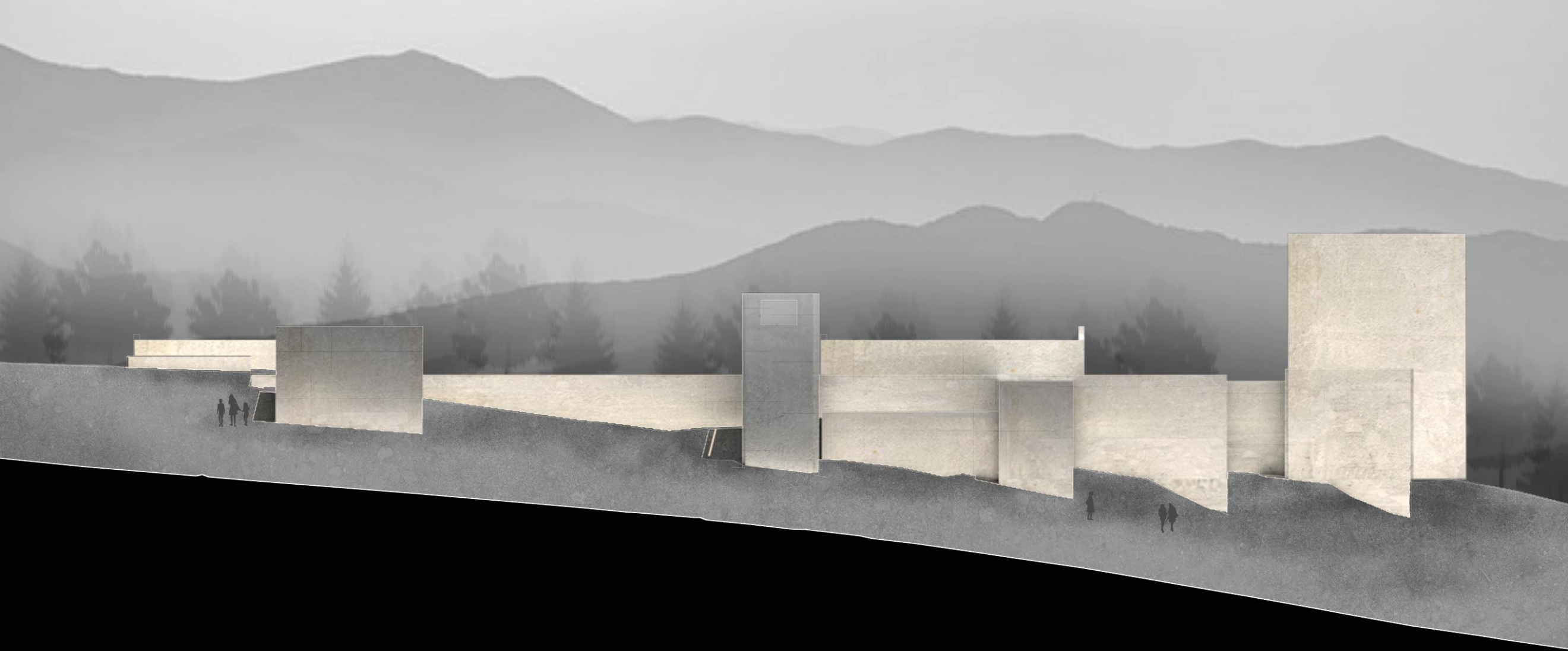
- 1. Lobby
- 2. The Void
- 3. The Pavilion
- 4. Room 2

Lobby and Light Oil Pavilion Section CC

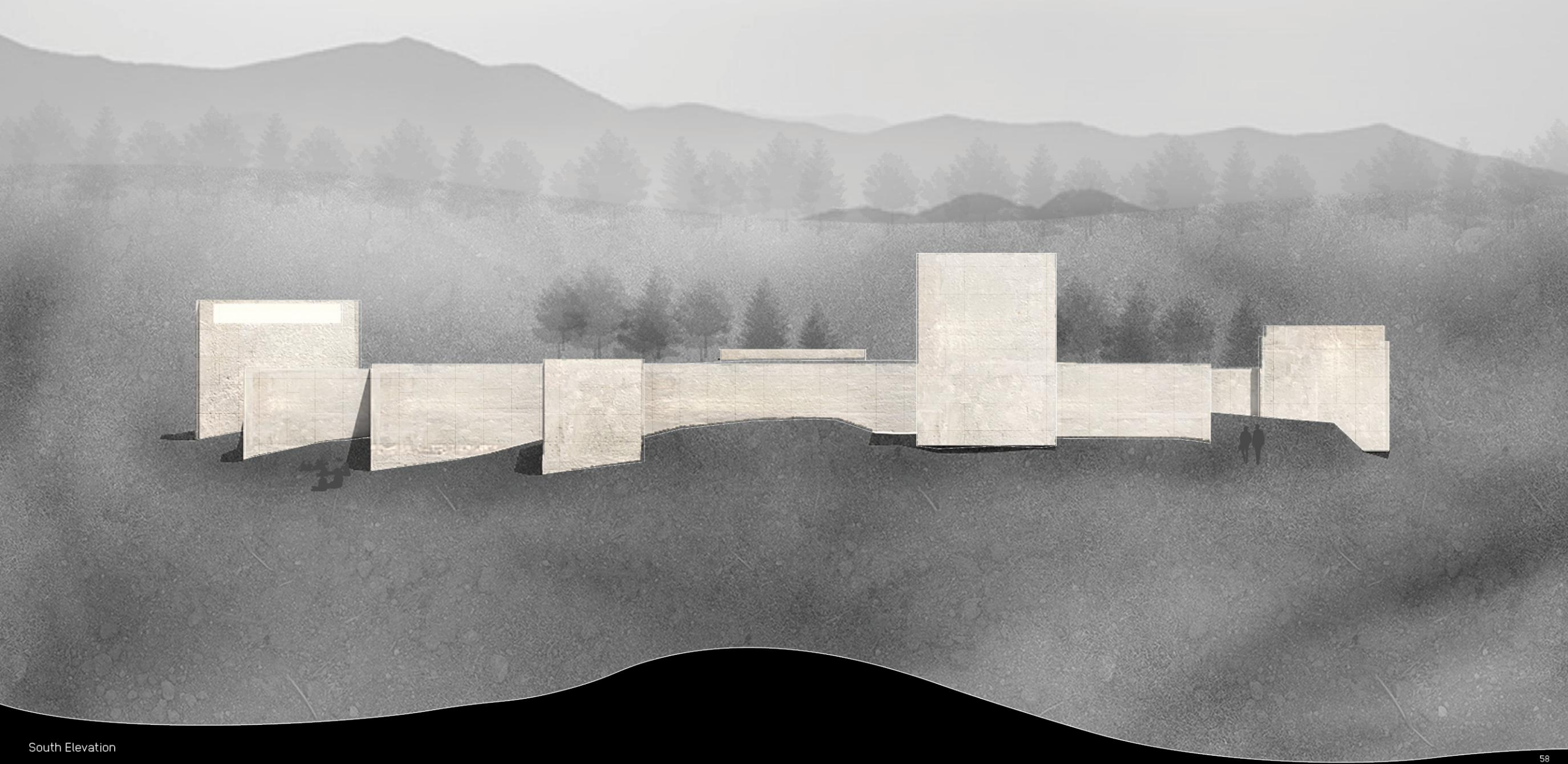


1. Silk Screen Pavilion
2. Labyrinth Hallway
3. The Void
4. Conservation Pavilion

Silk Screen Pavilion and Conservation Pavilion Section DD



West Elevation



South Elevation

PAVILION DESIGN

The next chapter shows the design of the individual pavilions and the iterative process used to design them

MARBLE PAVILION



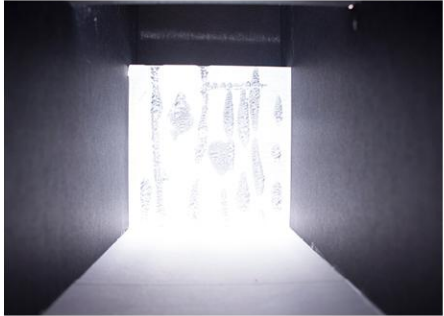
Artist: Giovanni Strazza
Year: year unknown
Type: Carrara marble
Dimensions: 48 cm (19 in)
Lux value: 3900



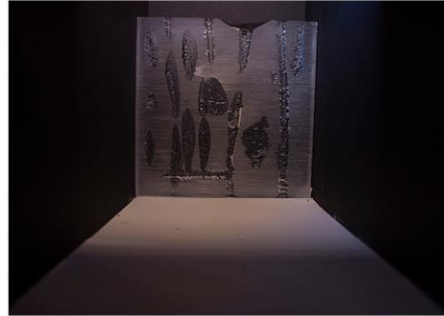
Artist: Alexandros of Antioch
Year: Between 130 and 100 BC
Type: Marble
Dimensions: 203 cm (80 in)
Lux value: 3900

The Marble Pavilion holds two famous marble sculptures that show great detail textures of the human body and the fabrics. These sculptures require ambient lighting at a high lux value. The pavilion envelope creates a vibrant ambient light that houses the sculptures.

MATERIAL EXPLORATION



Sanded Glass in South Light



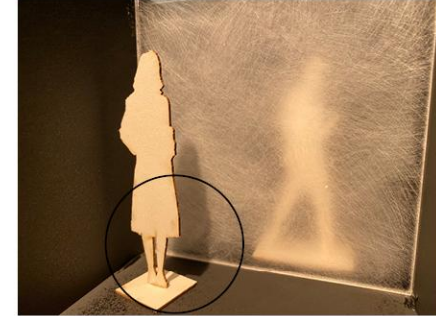
Sanded Glass in North Light

In direct daylight the treated glass glows while in north ambient light, it appears foggy and loses its reflectivity.

How do you achieve this effect but keep the surface highly reflective



One Side Sanded



Both Sided Sanded

The first image shows the glass sanded on one side. The reflective side is facing the front.

The second image shows the glass sanded on both sides. It is no longer reflective but remains very cloudy.

ITERATION PROCESS

FIRST ITERATION

In this pavilion, the container is separated into two layers that help filter the light to create an ambient affect.



Overall Model



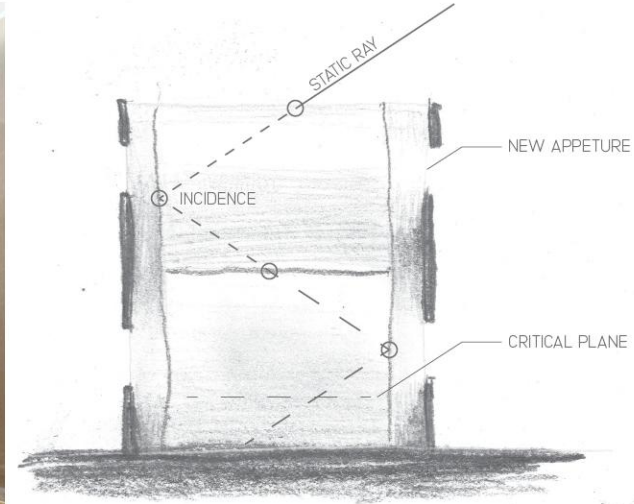
Interior Perspective



Interior Perspective Showing Corrections

1 Sculpture needs more light coming from above, with a softer light coming from the sides.

2 Space appears to dark and needs more ambient light coming from different directions



Iteration Sketch

Openings allow for more light to come in and wash the surface of the sculpture. Need to create more of a contrast between heavy sculpture and light room. Need to test with actual sculpture to see if the lux values are best fit for the sculpture

SECOND ITERATION

The correct lighting levels are achieved but there is no way to show how the space above appears as a cloud.



Overall Model



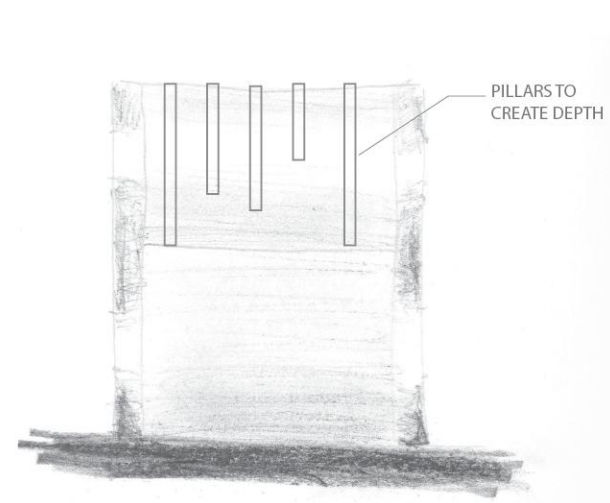
Interior Perspective



Interior Perspective Showing Corrections

1 Need to create more contrast between heavy sculpture and light space above. space needs to conceptualize a cloud

Desired Light levels are achieved.



Iteration Sketch

Create pillars coming from sky to create depth in the cloud atmosphere above

FINAL ITERATION

The lighting levels are created by two different enclosures in this pavilion. With the exterior enclosure blocking out the light except for openings in the top and very few on the sides. Then the light passes through the second enclosure that takes that direct light and transforms it to a soft and bright ambient light.



Overall Model



Interior Perspective

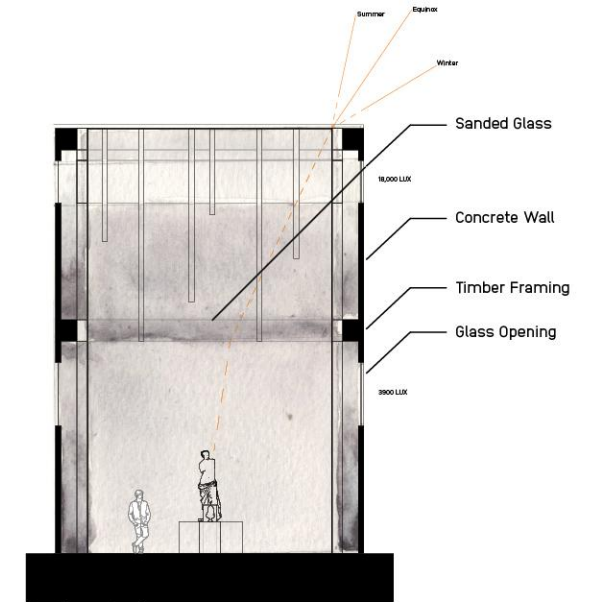


Interior Perspective

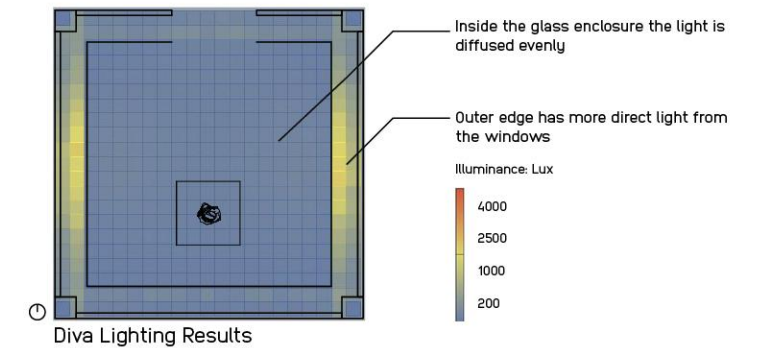
The Marble Pavilion houses marble sculptures that appear to be very heavy. This room focuses on the contrast of the container and the contained sculpture itself. The heavy sculpture is juxtaposed with the light cloud like room, and the sculpture also appears to be sitting on this clouded box. The lumber hanging from the cloud ceiling brings a heavenly contrast as it insist they are reaching down from the sky to contact the sculptures.



Interior Perspective



Pavilion Section



Diva Lighting Results

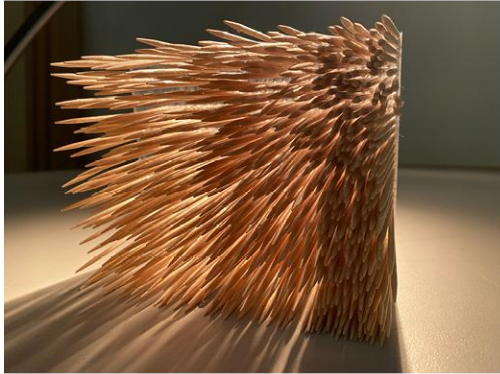


CONSERVATION PAVILION



The Conservation Pavilion is a place where pieces are either held when not on display or when curators need to touch up a piece of work. This room requires different types of lighting conditions that can light up a piece of work to their required lux levels.

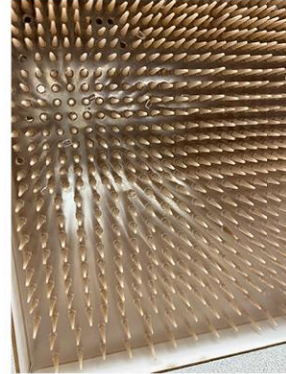
MATERIAL EXPLORATION



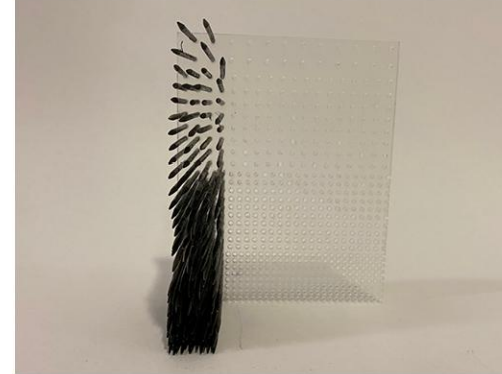
Material Exploration Perspective
Overhead
light creates
warm glow
coming from
toothpicks



Material Exploration Perspective
When creating a
room out of the
wall, it filters light
while providing an
aesthetically
pleasing wall.

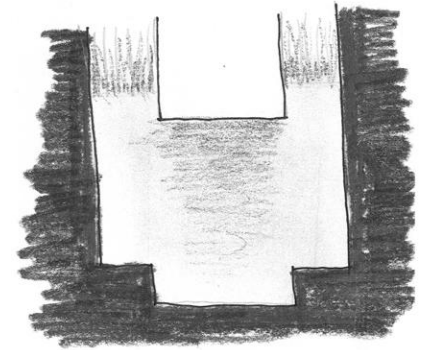


Material Exploration Perspective
When looking from
the other side,
toothpicks appear to
fade away



Material Exploration Perspective

Painting
toothpicks
black creates
very dark
void but does
not keep the
warmth from
the
materials

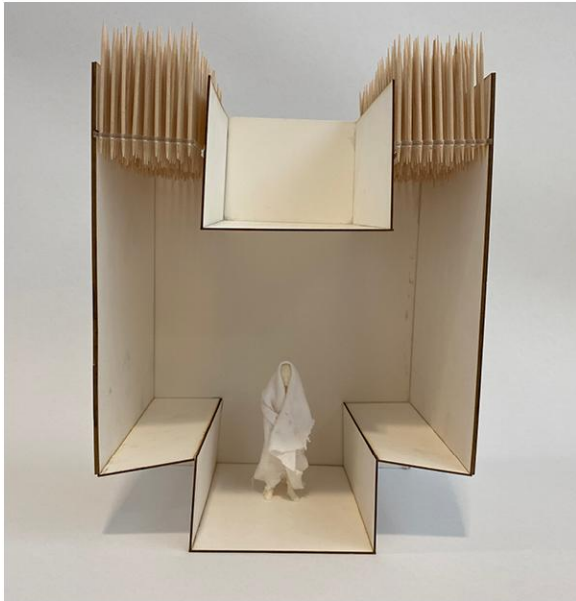


Iteration Sketch

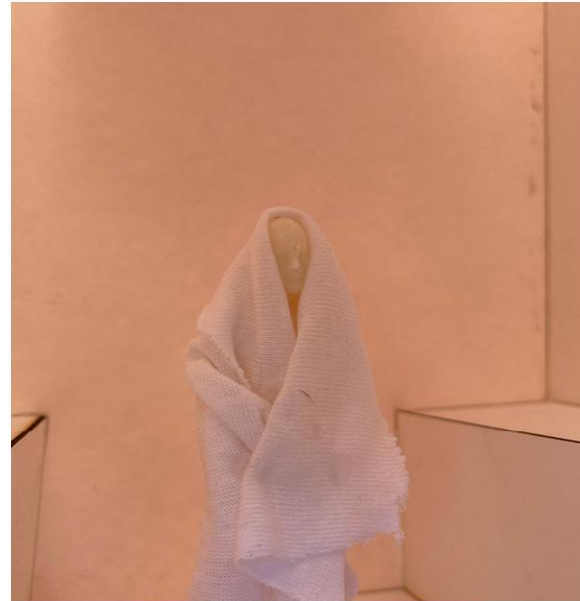
ITERATION PROCESS

FIRST ITERATION

This room is using toothpicks to filter the light into the space



Overall Model



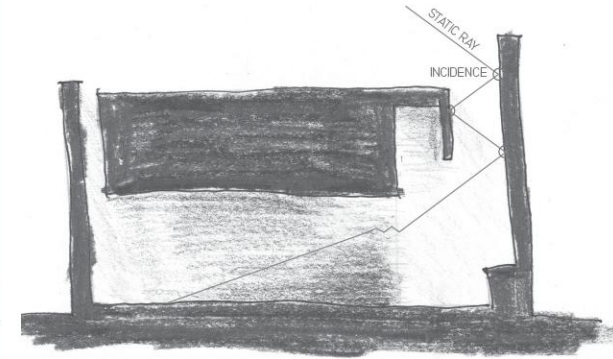
Interior Perspective



Interior Perspective Showing Corrections

① Sculpture needs more ambient light

② Space does not have enough lighting shift between spaces

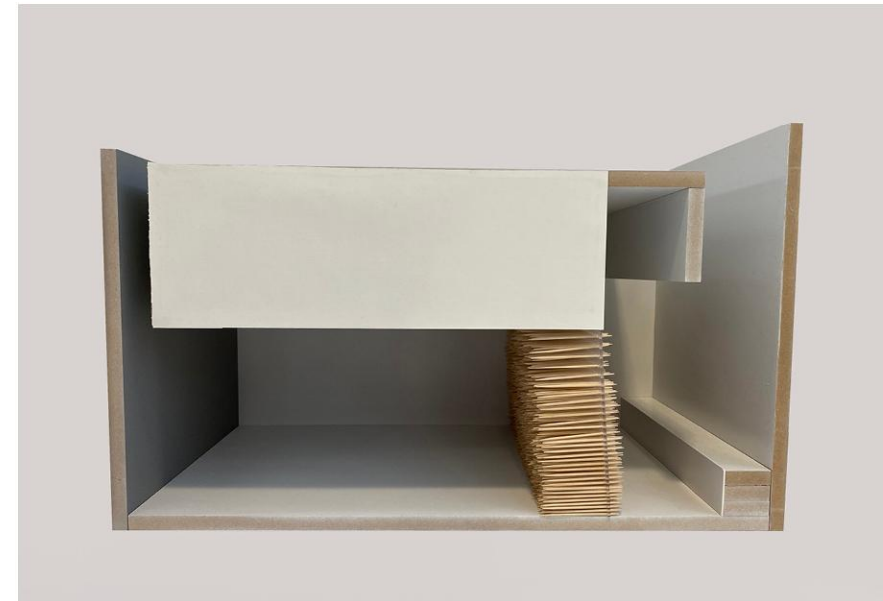


Iteration Sketch

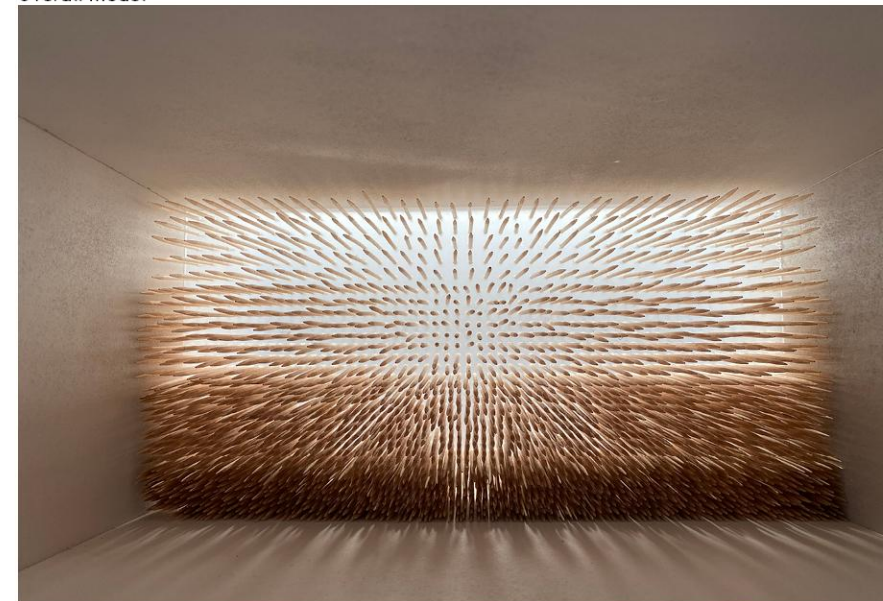
Create room with light coming from two sides. One side has larger opening and reflective surfaces. The other side has smaller opening and concrete

FINAL ITERATION

The use of different materials allows the enclosure to transform the light in a way where the user can choose what lighting conditions they want. When they enter the room, there is high-gloss materials that help create a brightly lit space. Then this light is diffused through the wooden dowel walls that control the light. Finally there is a concrete wall that allows low lighting levels to cascade down the wall



Overall Model

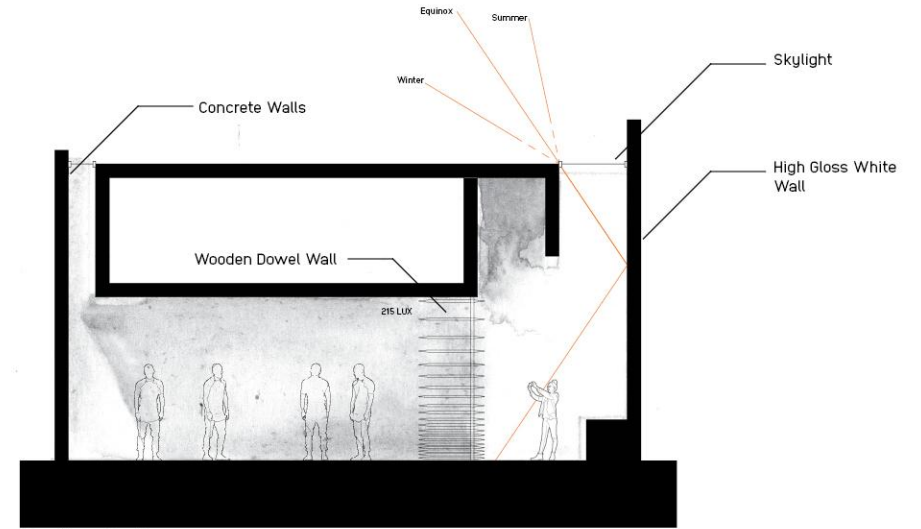


Interior Perspective



Interior Perspective

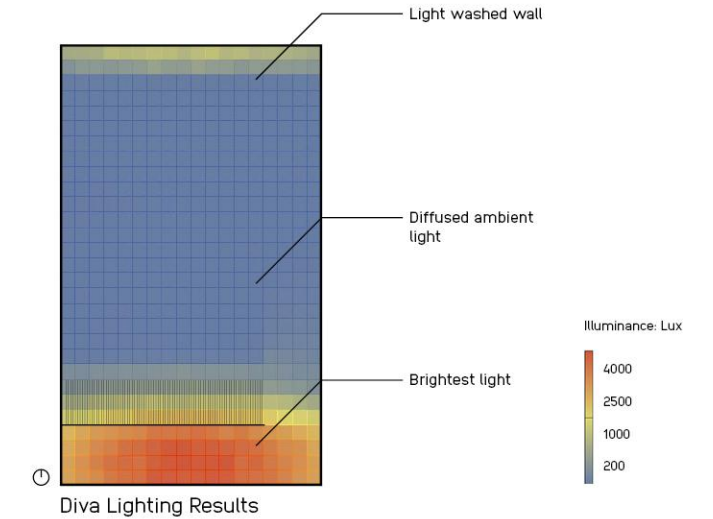
The Conservation Pavilion is a place where numerous artworks can be stored and worked on. This demands a range of lighting conditions for the appropriate piece of work. With multiple ways to diffuse light, there are many different areas in which an artwork can be worked on to showcase the best lux value for it. The multiple materials also allows for different hues whether the artwork needs a cold or warm light. This room displays the use of materials to create a wide range of lighting conditions that will show off the artwork.



Pavilion Section

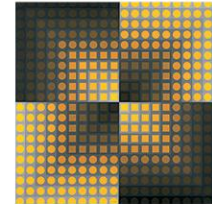


Interior Perspective





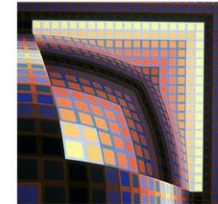
SILK SCREEN PAVILION



Toll (from the Permutations Series)
Artist: Victor Vasarely
Year: 1965
Type: Tempera on board
Dimensions: 31 1/2 x 31 1/2 inches
Country of origin: Hungary
Lux value: 9000



Composition in purple
Artist: Victor Vasarely
Year: 1965
Type: Silk Screen
Dimensions: 80 x 80 cm
Country of origin: Hungary
Lux value: 9000



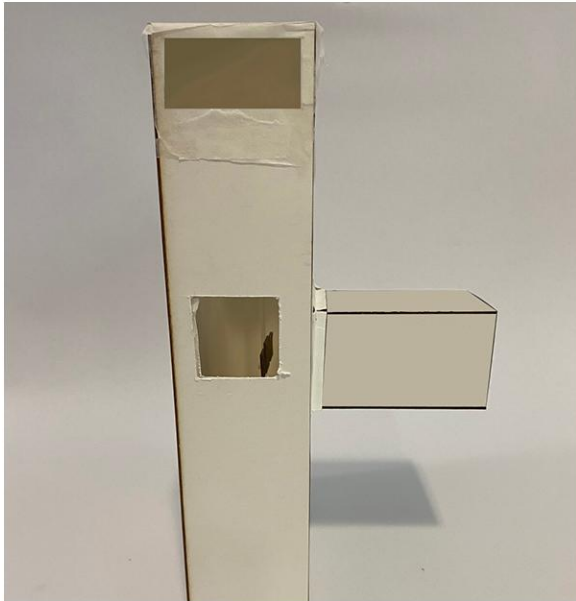
Composition no. 240/250
Artist: Victor Vasarely
Year: 1979
Type: Silk-screen
Dimensions: 99 x 99 cm
Country of origin: Hungary
Lux value: 9000

The Silk Screen Pavilion holds three paintings by Victor Vasarely that show how geometry and color can create exquisite art. These paintings require a high lux with ambient lighting. The pavilion envelope creates a vibrantly ambient lit white room that houses the colorful artwork.

ITERATION PROCESS

FIRST ITERATION

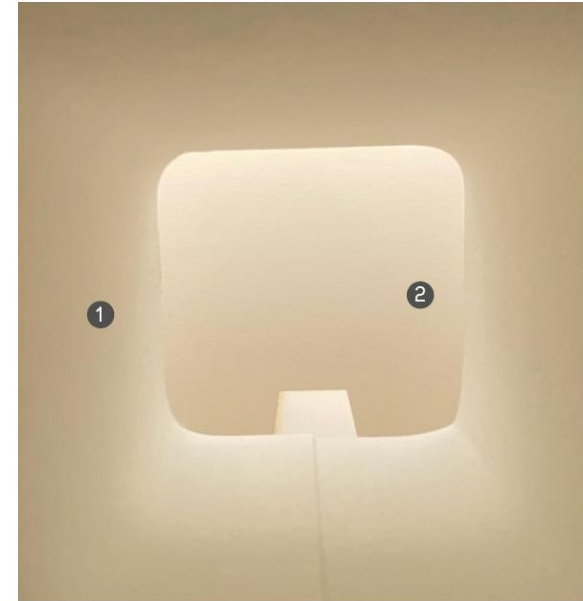
The objective of this model is to create two distinct zones, one being a dark tunnel and the other being a bright void.



Overall Model



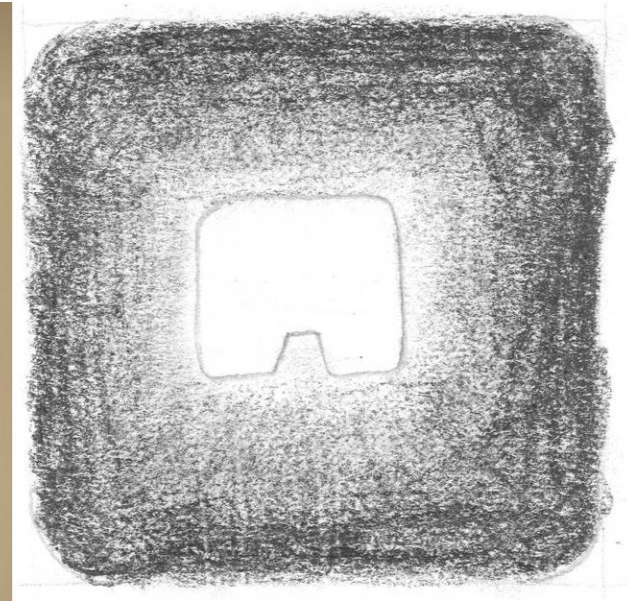
Interior Perspective



Interior Perspective Showing Corrections

① Lux values need to be more distinct. Transition needs to be more dramatic.

② Tunnel's material needs to absorb while room needs brighter ambient light



Iteration Sketch

Tunnel is painted black and will be a dark wood

SECOND ITERATION

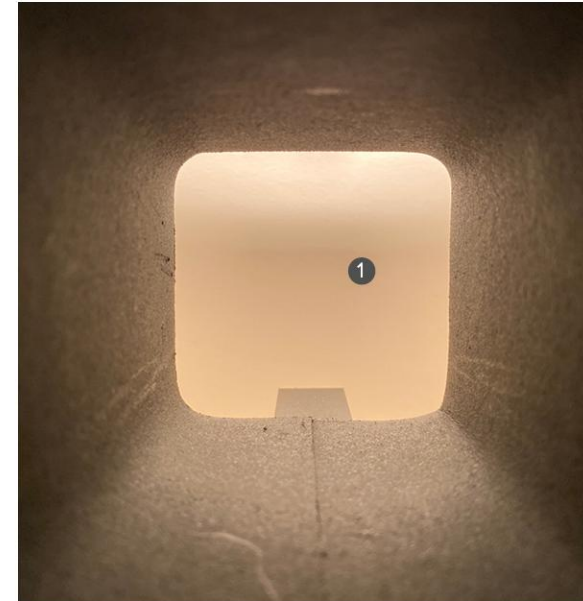
Change the material of the tunnel helps create 2 distinct zones, but the contrast is not enough



Overall Model

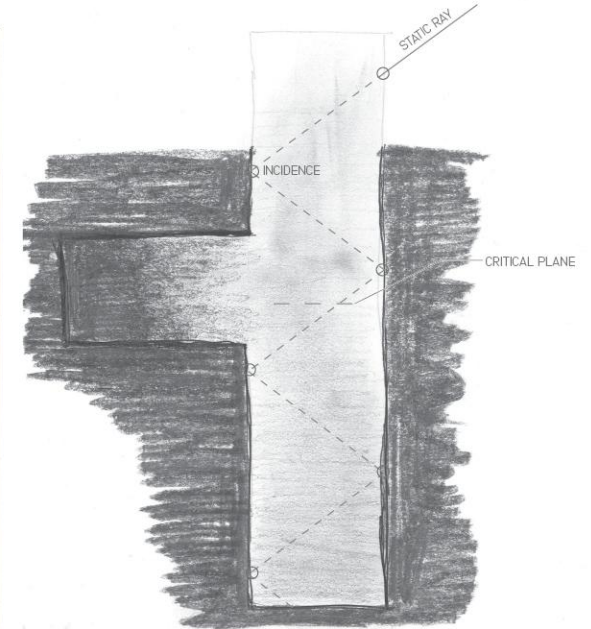


Interior Perspective



Interior Perspective Showing Corrections

- 1 Room walls are still distinct even when they are curved. Light is not ambient enough



Iteration Sketch

Translucent material will be applied to diffuse light

THIRD ITERATION

In this iteration, I discovered that now I need to put in the actual paintings to show the lighting values.



Overall Model

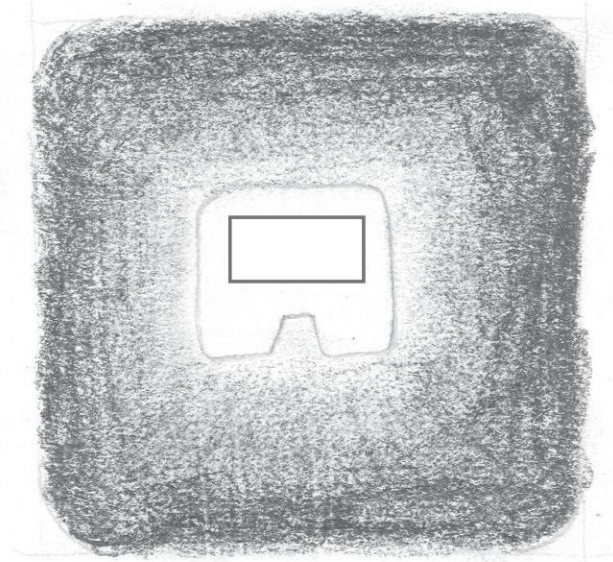


Interior Perspective



Interior Perspective Showing Corrections

- 1 Lux Values and transitions are achieved but no paintings to determine if the values are correct

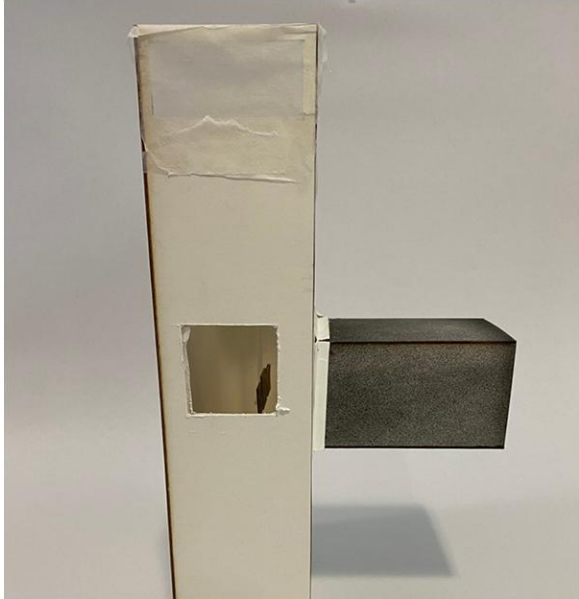


Iteration Sketch

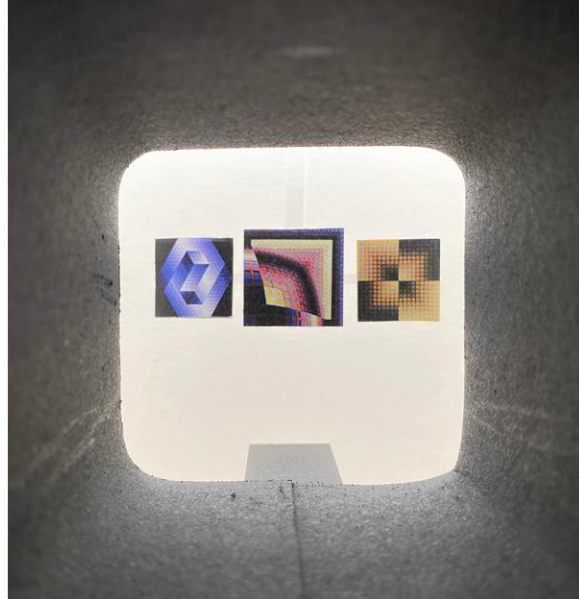
Paintings will be added to show true light values

FOURTH ITERATION

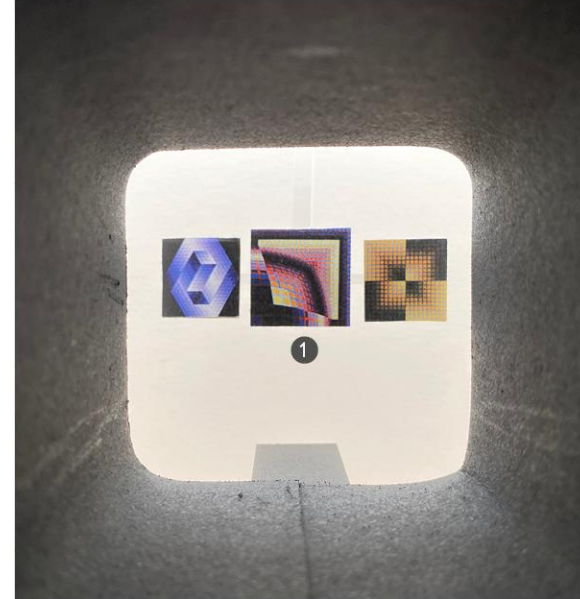
The room has the correct lighting conditions but the paintings are too big.



Overall Model

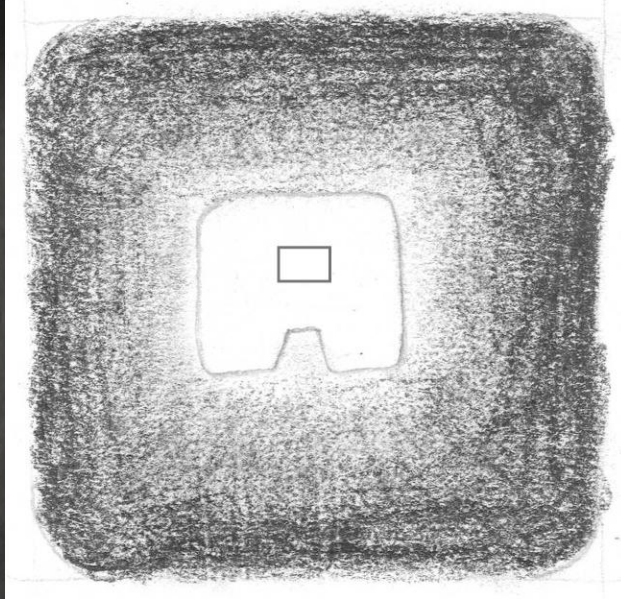


Interior Perspective



Interior Perspective Showing Corrections

1 Paintings take up majority of the space.



Iteration Sketch

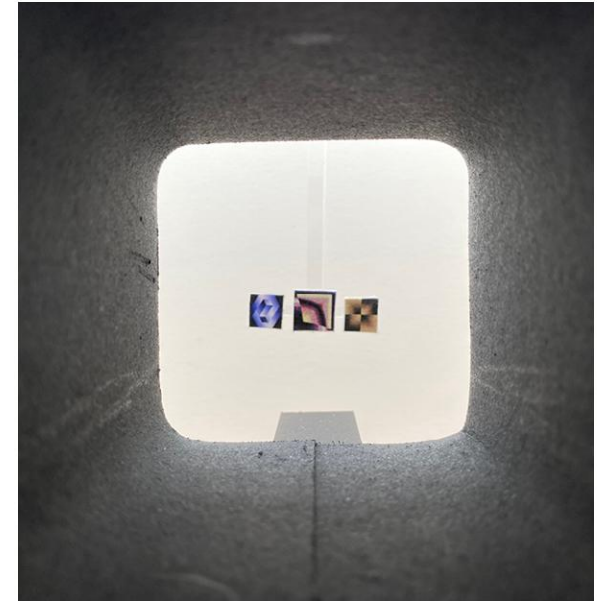
Room will be scaled by 2

FINAL ITERATION

With the top of the main enclosure being a light diffusing translucent glass, it allows for the ambient light to fall into the space and appear trapped in a void. The hallway leading to this space is a dark wood that allows for this part of the enclosure to absorb light and make the transition between the spaces magnificent.



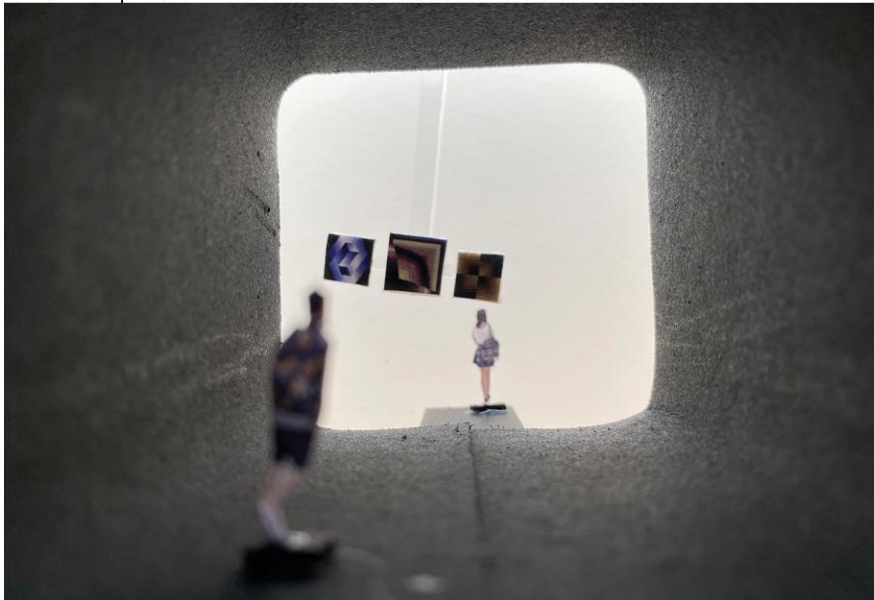
Overall Model



Interior Perspective

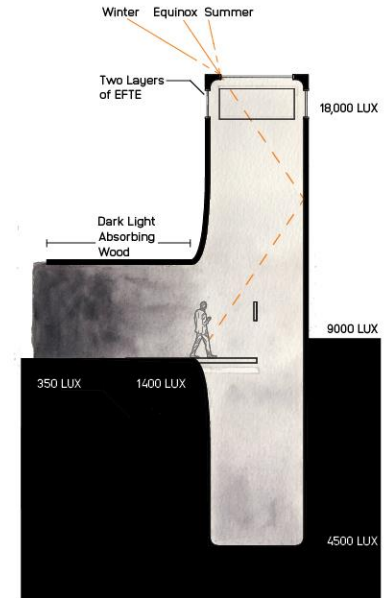


Interior Perspective

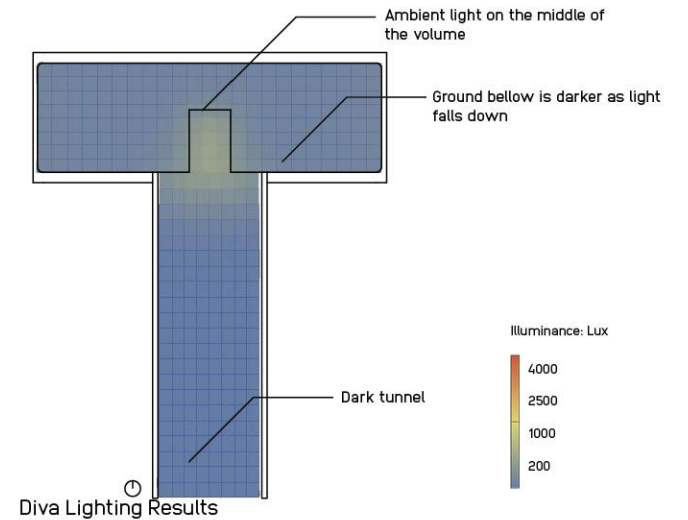


Interior Perspective

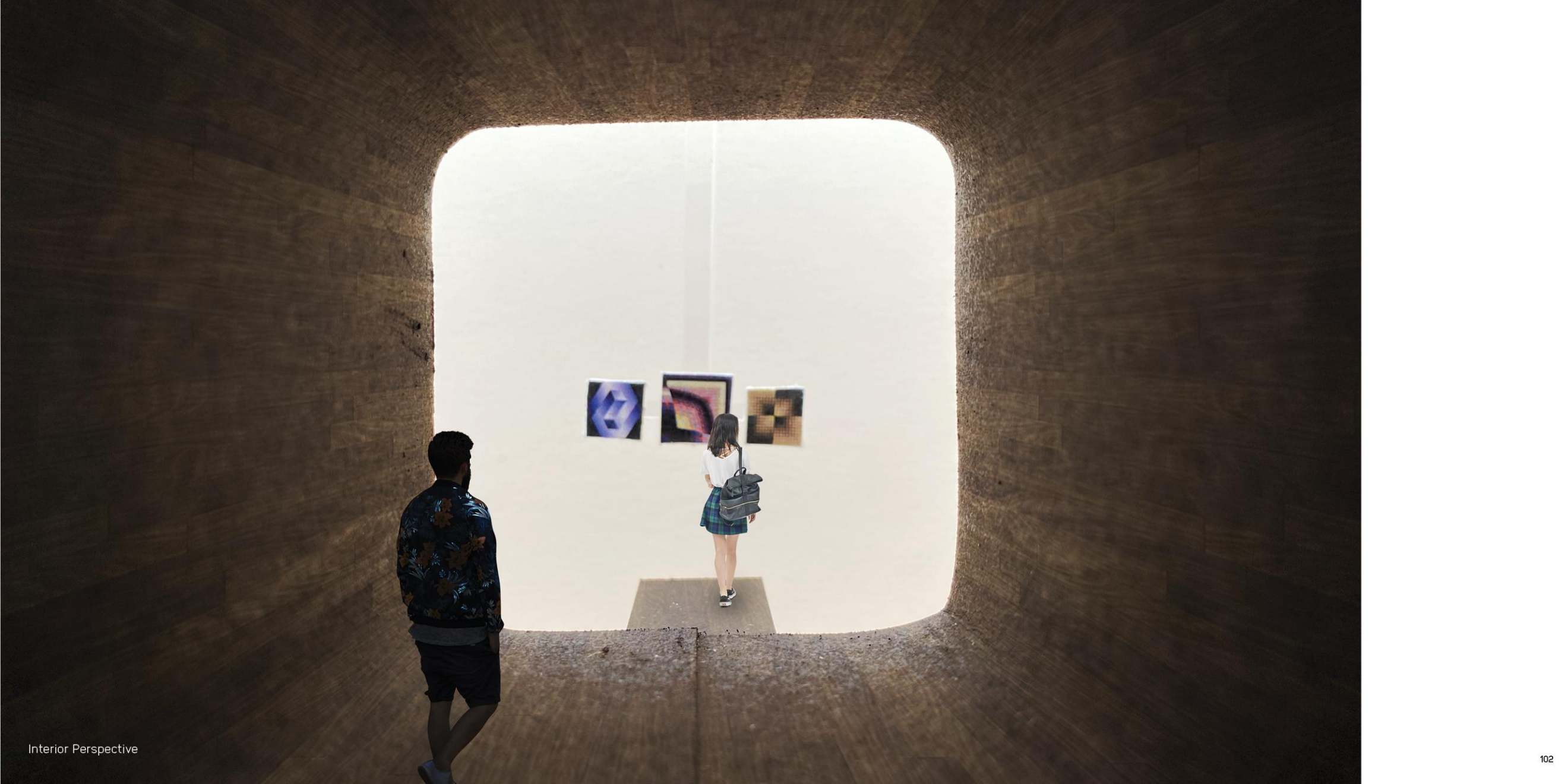
The Silk Screen Pavilion holds three geometric abstract art that demands a high lux value. To enter the space to get to the room, you have to walk through a small dark hallway. What appears before you is three paintings suspended with wires, and is behind a backdrop of a white wall. When you go to the ledge where the artwork is, you enter a ambient lit void where you cant tell where the walls stop and meet another. This is achieved through curving all of the walls where the shadows remain a constant. The dream like space in contrast to the sharp colors of the paintings creates a contrast that highlights both aspects of the room and artworks. This room shows the duality of two different materials and lighting conditions, but how they can work together to enhance the art.



Pavilion Section



Diva Lighting Results



DARK OIL PAVILION



Study after Velázquez's Portrait of Pope Innocent X
Artist: Francis Bacon
Year: 1953
Medium: Oil on canvas
Dimensions: 153cm x 119cm
Lux value: 900



Crowning with Thorns
Artist: Valentin de Boulogne
Date: 1627-28
Medium: Oil on canvas
Dimensions: 132 x 96.3 cm
Lux value: 900



The Death of Socrates
Artist: Jacques-Louis David
Year: 1787
Medium: Oil on canvas
Dimensions: 51.0 in x 77.2 in
Lux value: 900

The Dark Oil Pavilion holds three paintings that show great contrast between the light and dark. These paintings require ambient lighting, therefore this pavilion lets the ambient light fall down onto the paintings while leaving the center of the room dark.

ITERATION PROCESS

FIRST ITERATION

In this pavilion, I am using concrete embedded with glass, and allowing the ceiling to be open on the perimeter to allow light inside.



Overall Model

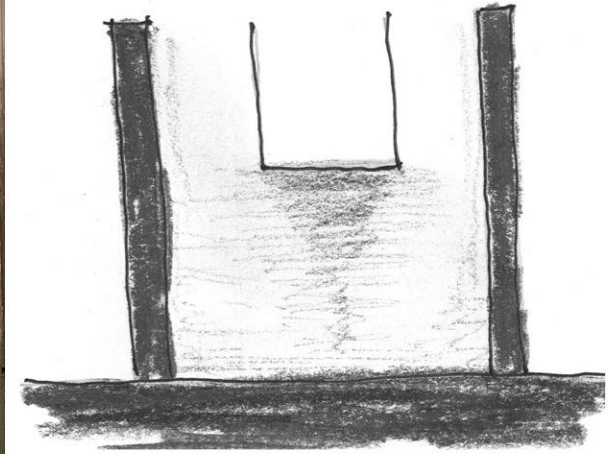


Interior Perspective



Interior Perspective Showing Corrections

- 1 Space is too dark, and needs more ambient light



Iteration Sketch

Space needs more light inside.
Create larger ceiling

SECOND ITERATION

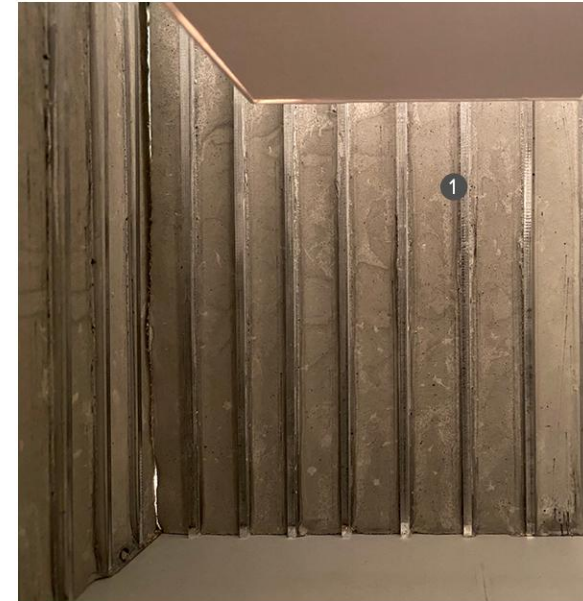
By changing the depth of the ceiling and the opening size, it changes the lighting values of the room.



Overall Model

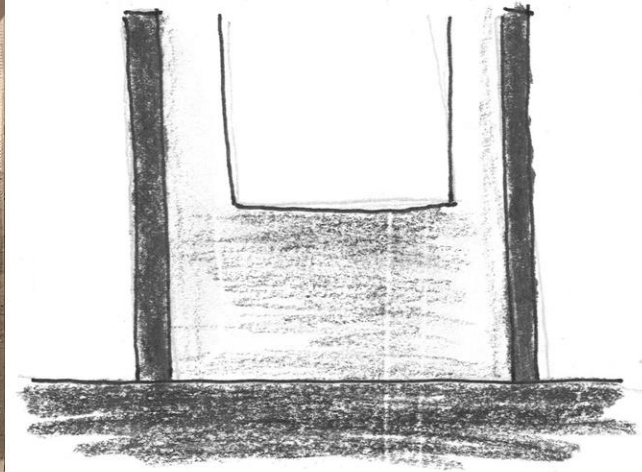


Interior Perspective



Interior Perspective Showing Corrections

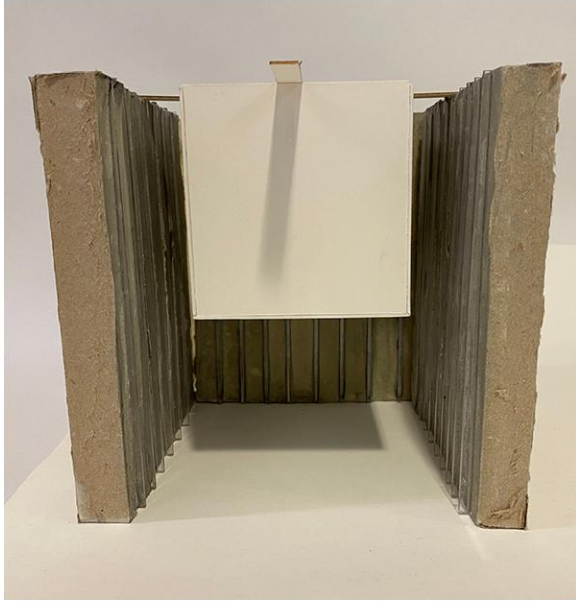
- 1 Ceiling and wall opening to large. Does not create a dynamic shift in light



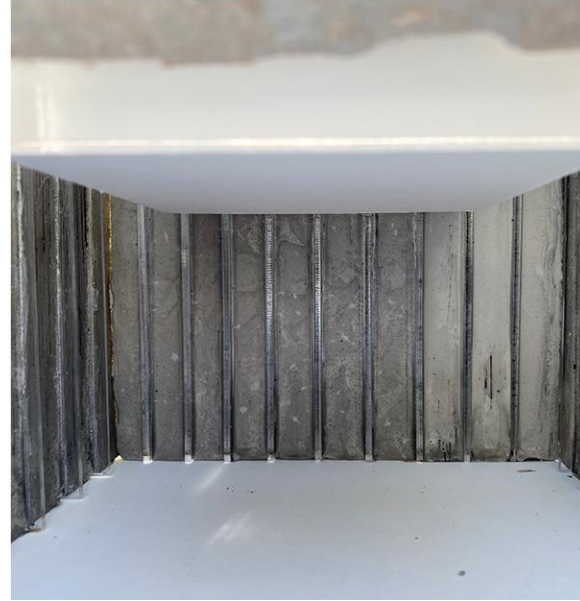
Iteration Sketch
Create deeper and wider ceiling

THIRD ITERATION

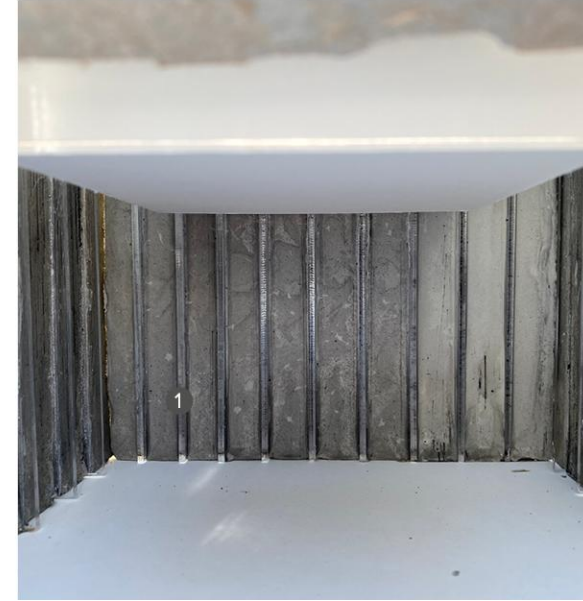
By making the depth of the ceiling even greater, it allows for a dynamic change in lighting and allows the space to feel compressed in the center.



Overall Model

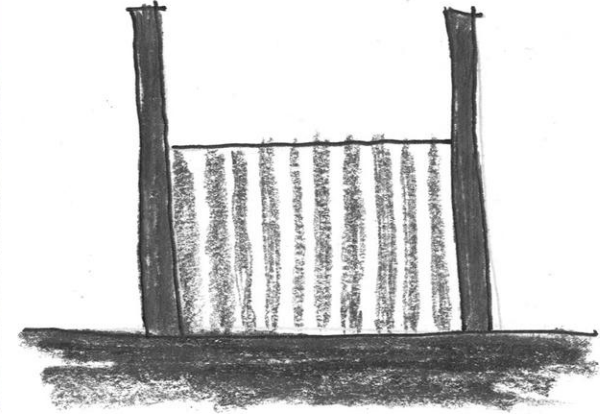


Interior Perspective



Interior Perspective Showing Corrections

- 1 Can the plexi glass transfer more light



Iteration Sketch
Enhance plexi glass wall by cutting out ambient light

FOURTH ITERATION

By closing of the ceiling it allows for light to enter through the glass but the space is to dark.



Overall Model



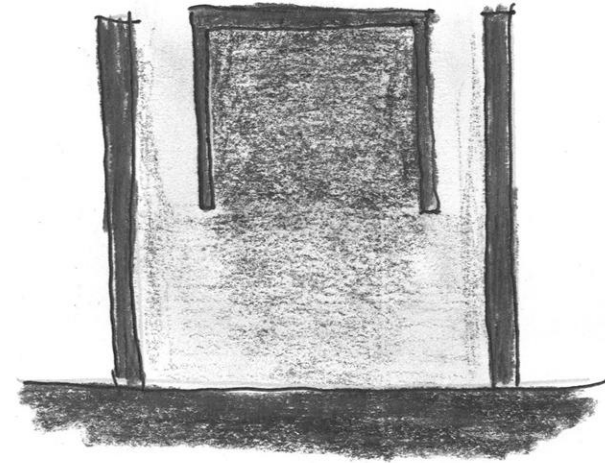
Interior Perspective



Interior Perspective Showing Corrections

1 Although plexi glass is illuminating, the space is to dark for artwork

Revert back to old design and add artwork to test the lux of the space



Iteration Sketch

Revert back to previous design, but make ceiling a dark void

FIFTH ITERATION

Hollowing out the box and painting the inside black creates this dark void up above while the perimeter allows light to cascade down to the paintings.



Overall Model



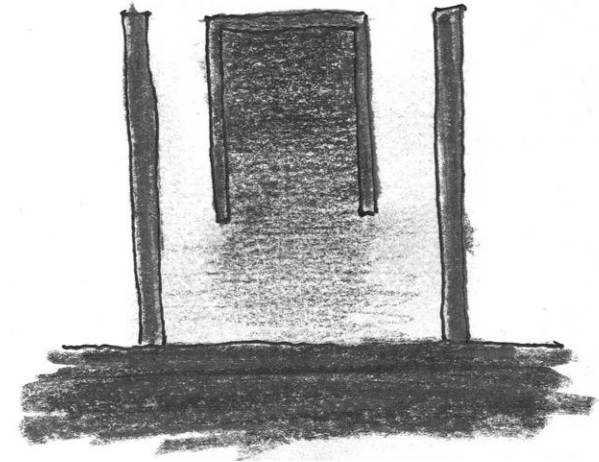
Interior Perspective



Interior Perspective Showing Corrections

1 Walls are not bright enough

2 Middle space needs to be darker to allow for dramatic shift in light quality



Iteration Sketch

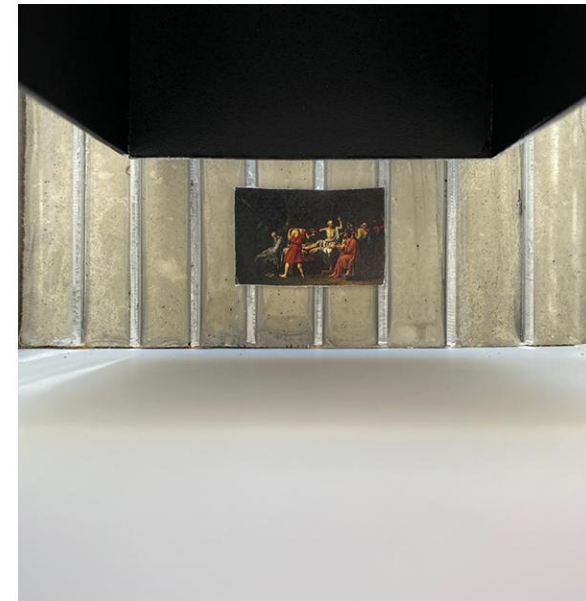
Add more space to bring in more light

FINAL ITERATION

The concrete and glass enclosure creates a light washed wall that is not to overexposed. The height of the enclosure lets light diffuse as it bounces down the walls to the artwork. The dark void above creates contrast with the space and the artworks on the outer edge.



Overall Model



Interior Perspective

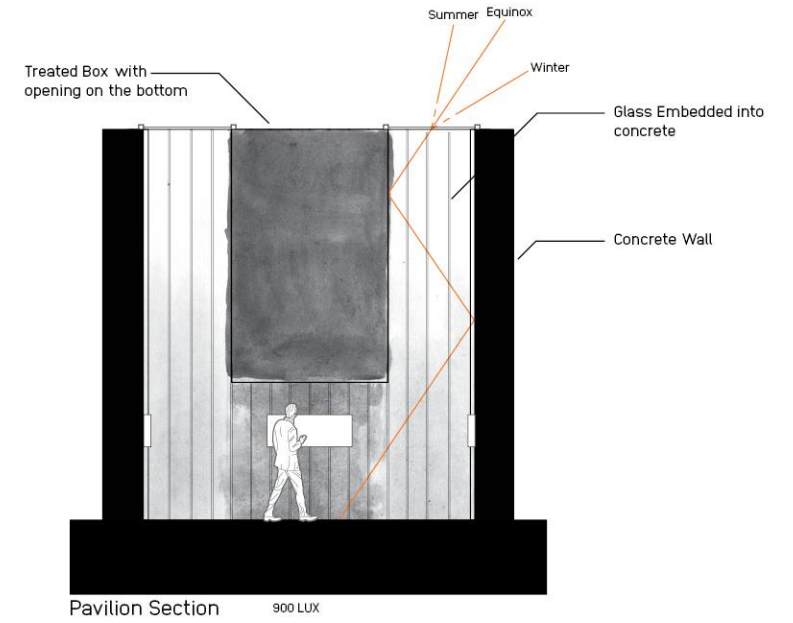


Interior Perspective

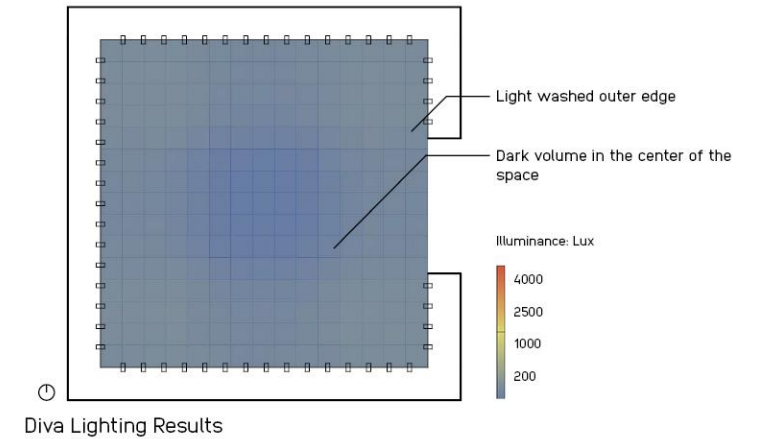
The Dark Oil Pavilion holds three paintings that show a dynamic range of light and dark values. These paintings main focus is the lighting achieved in the work, therefore the room that houses these shows a shift in the light and dark values. With the concrete and glass walls, they let light bounce down the perimeter and shine down on the paintings. The middle of the room houses a black box that is open for the viewer to look up and see the black void that appears in the room. In this room the contrast between the light and dark areas compliments the dynamic artwork.



Interior Perspective



Pavilion Section 900 LUX



Diva Lighting Results



LIGHT OIL PAVILION



The Son of Man
Artist: René Magritte
Year: 1964
Medium: Oil on canvas
Dimensions: 116 cm x 89 cm
Lux value: 2500



Rooms by the Sea
Artist: Edward Hopper
Year: 1951
Medium: Oil on canvas
Dimensions: 2' 5" x 3' 4"
Lux value: 2500



Nighthawks
Artist: Edward Hopper
Date: 1942
Medium: Oil on canvas
Dimensions: 84.1 x 152.4 cm
Lux value: 2500

The Light Oil Pavilion holds three famous paintings from the 40's, 50's, and 60's. These paintings show a great amount of detail and color and require ambient lighting. The pavilion creates an ambient lit room with a spotlight of light cascading the paintings.

ITERATION PROCESS

FIRST ITERATION

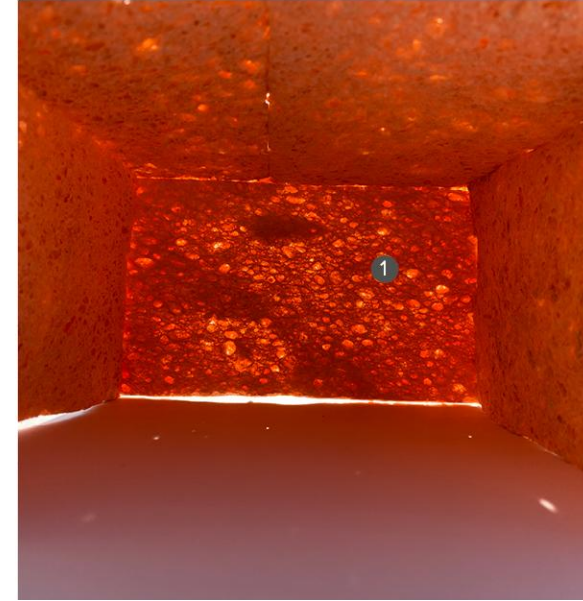
In this pavilion, I am testing the use of sponges and how they can be semi-transparent and allow light inside.



Overall Model

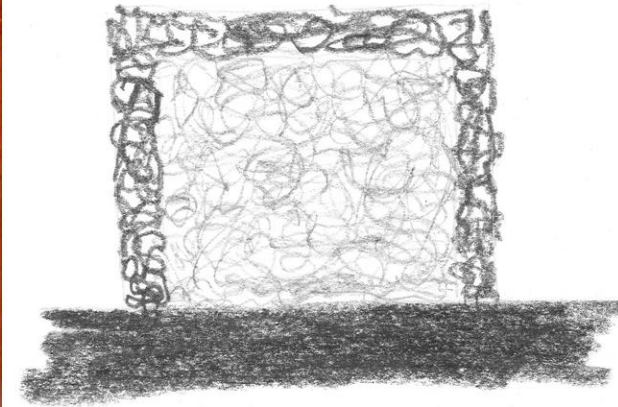


Interior Perspective



Interior Perspective Showing Corrections

- 1 Material does not allow much ambient light

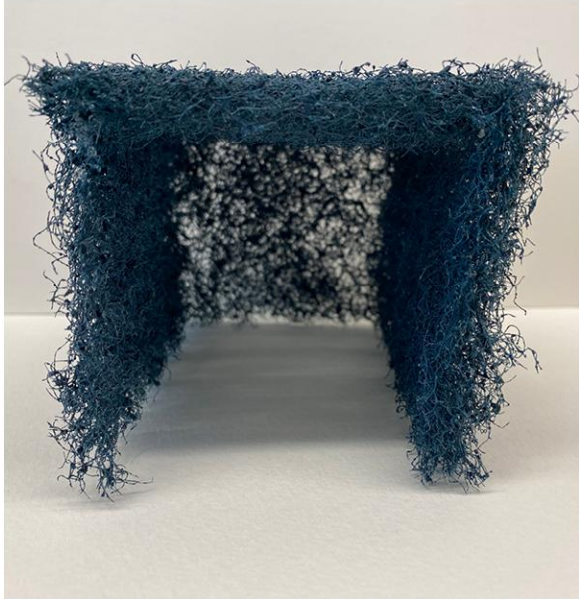


Iteration Sketch

Change material for a more transparent one

SECOND ITERATION

By using a scrub, it allows for more light to enter the space.



Overall Model

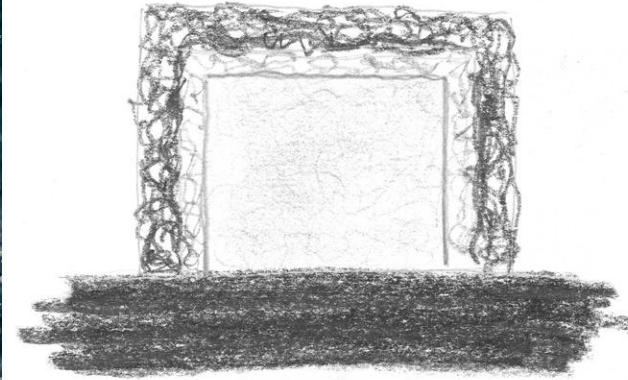


Interior Perspective



Interior Perspective Showing Corrections

- 1 Material is too distracting and light is not ambient enough

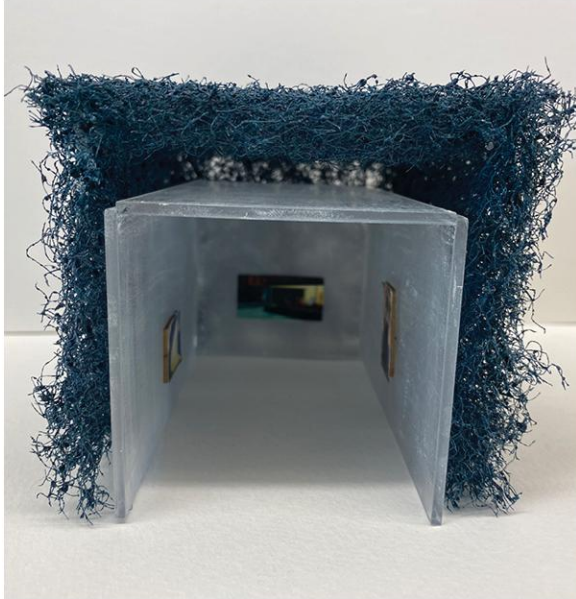


Iteration Sketch

Add a light diffusing surface after the main material

THIRD ITERATION

Adding a translucent glass allows for the harsh shadows to become diffused



Overall Model

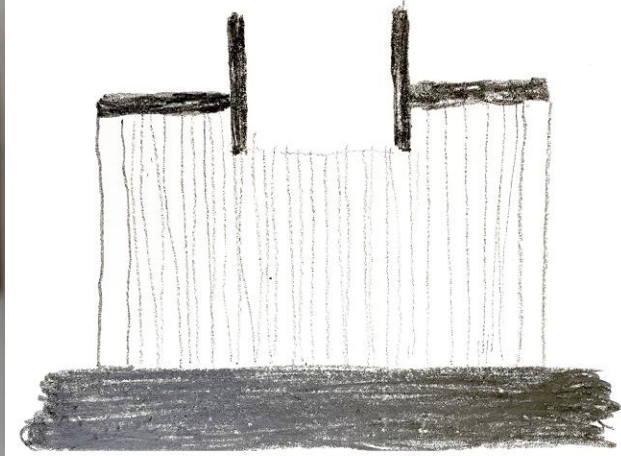


Interior Perspective



Interior Perspective Showing Corrections

1 Not enough ambient light to show paintings

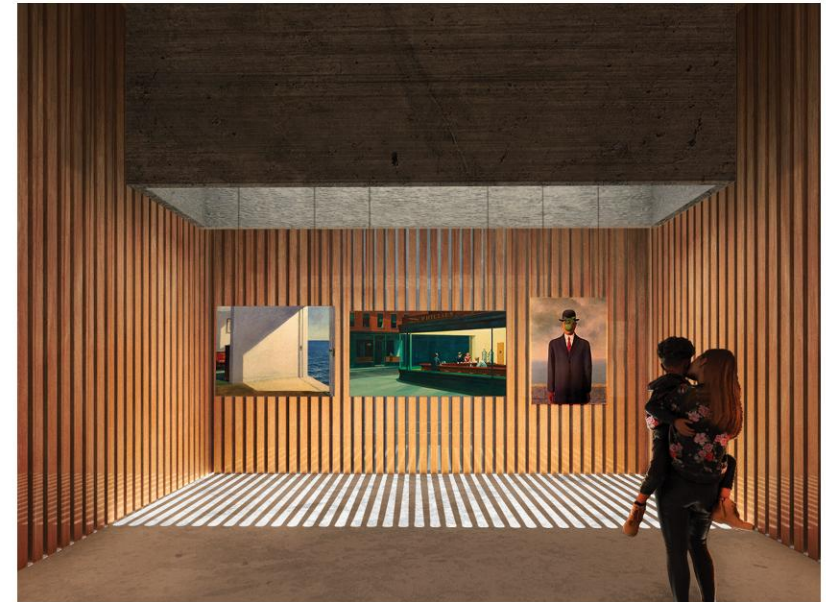


Iteration Sketch

Change light filter material and add illuminating spotlight

FINAL ITERATION

By changing the material being used to diffuse the light, it brings more controlled ambient light. The concrete spotlight brings a focus of light onto the artwork



Interior Perspective

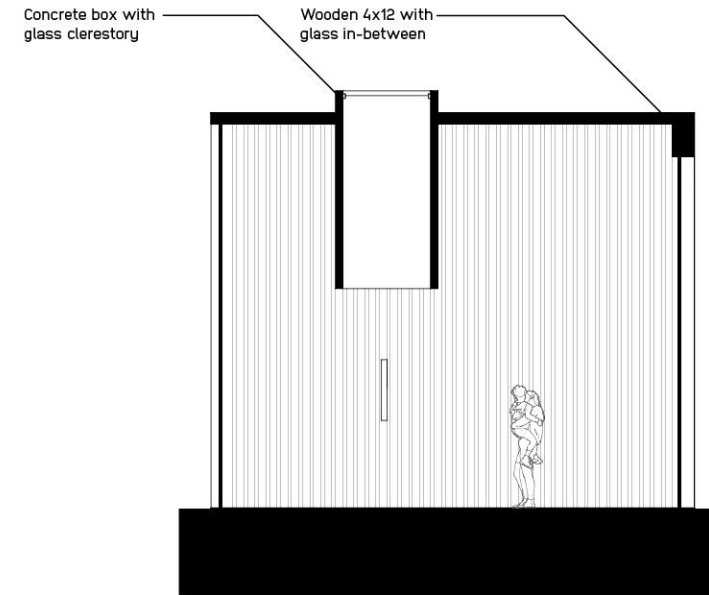


Interior Perspective

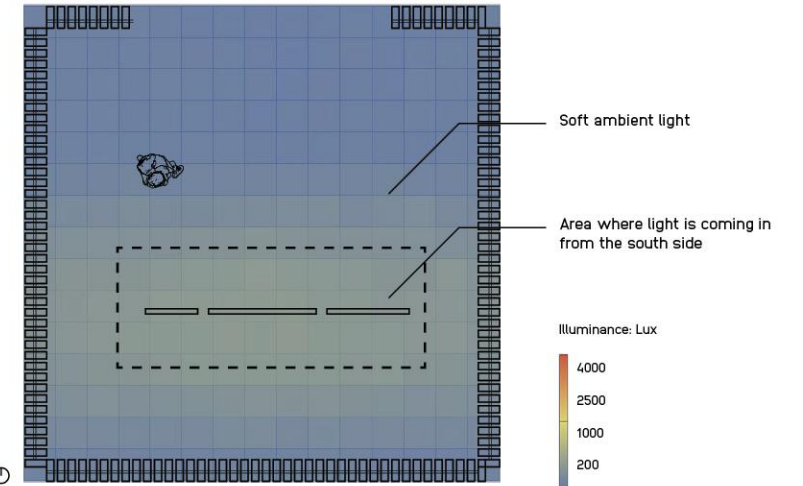
The Light Oil Pavilion holds three artworks that show a great range of color and atmosphere. This room creates a warm ambient lit atmosphere with a spotlight on the work. The spotlight is concrete to help neutralize the warmth of the room for the paintings. This room displays the use of materials to create an overall ambient light, and also focusing on how the ambient light colors work together to create the desired lighting conditions.



Interior Perspective



Pavilion Section

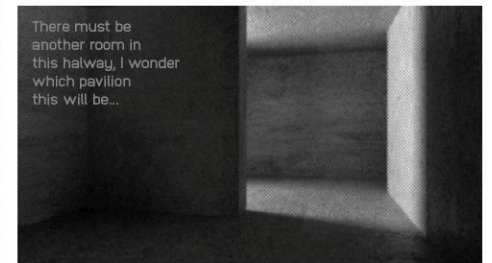
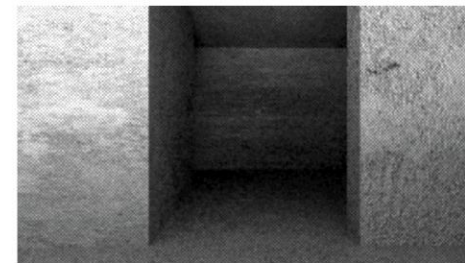
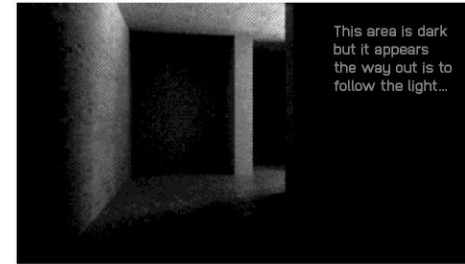
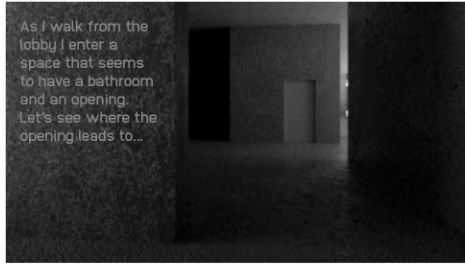


Diva Lighting Results



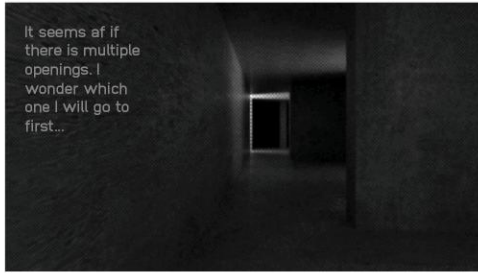
INTERMEDIARY PROGRESSION

This chapter shows the progression one might take when exploring the museum



Series One

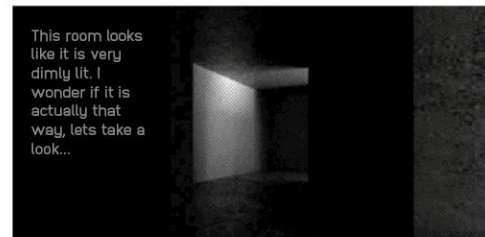
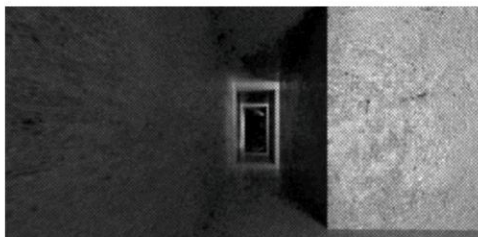
Series Two



It seems as if there is multiple openings. I wonder which one I will go to first...

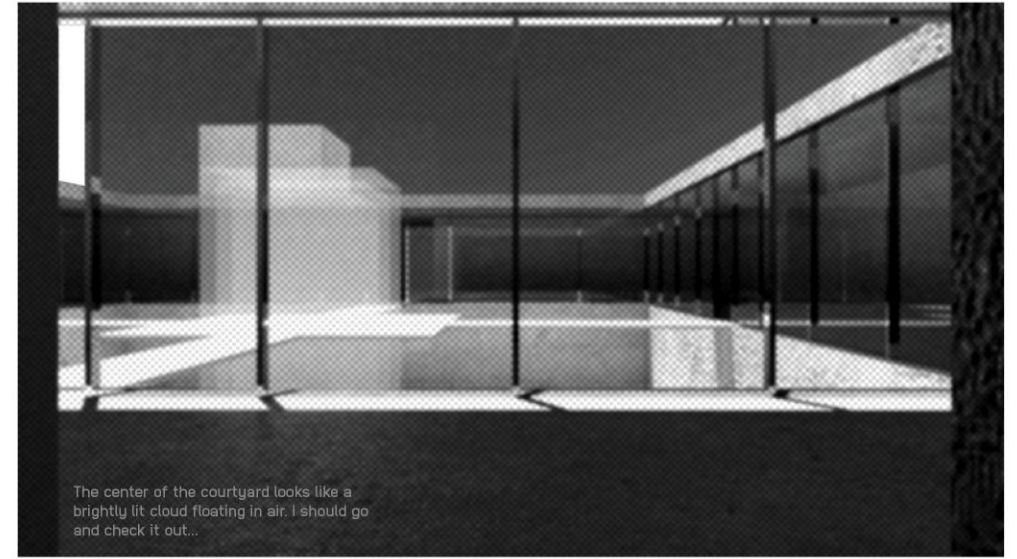


Staying in the hallway allowed my eyes to adjust to the dark lighting. It's like I'm resetting my senses after each pavilion...

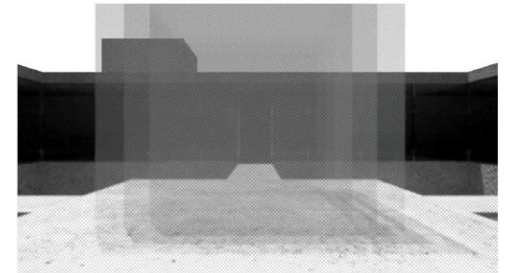
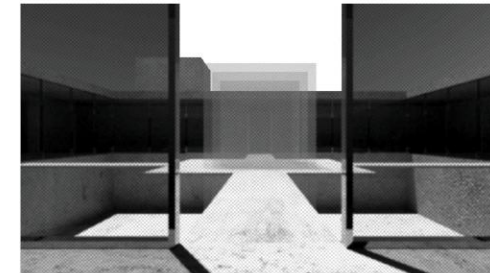


This room looks like it is very dimly lit. I wonder if it is actually that way, lets take a look...

Series Three



The center of the courtyard looks like a brightly lit cloud floating in air. I should go and check it out...



Series Four

When walking through the building, the viewer is integrated into the various light levels the museum has to offer. The staging of light and dark areas in the building helps adjust the eye to make even low levels of light be perceived as adequate. When the viewer is in the dark hallways, their eyes adjust and are able to walk around easier. Once they enter a room, their eyes adjust to the light in the pavilions. This strategy allows the building to do more with less light.

IMAGES

Marble Pavilion Paintings

pg 62 <https://twitter.com/seanvec/status/1239675492002934785/photo/1>
pg 62 https://www.pinterest.com.mx/pin/376613587589060568/?autologin=true&nic_v1=1aZ%2B9Y29AfYXKR0WQxs45p%2BW5Suo8t4jJgEiqKJZkKs%2F0KJYYJM6dz5iMpl5NGBfy6D

Conservation Pavilion Paintings

pg 76 https://www.pinterest.at/pin/540150549047921910/?nic_v1=1aYbKvdlf9NtSqEwHhNwAYorSz9u6imtaKH6df0%2FU0glmvk6ZjX3lrSFPxN9QIOBE
pg 76 <http://www.masterpsicoanalisis.com/echa-vistazo-los-textos-publicados-mas-destacados/>
pg 76 https://artchive.ru/encyclopedia/457-Zhivopis%27_i_moda_Gogen_na_spine
pg 76 <https://www.wallpaperbetter.com/id/search?q=harmensz>

Silk Screen Pavilion Paintings

pg 88 <http://www.unesco.org/artcollection/NavigationAction.do?idOeuvre=2966>
pg 88 <http://www.unesco.org/artcollection/DetailAction.do?critere=AUTEUR&index=all&idOeuvre=2962&nouvelleLangue=es>
pg 88 <http://artvalor.com/operations/victor-vasarely/>

Dark Oil Pavilion Paintings

pg 104 https://artchive.ru/news/4235~10_samykh_strashnykh_kartin_po_versii_chitatelej_Artkhiva_artyvbory_k_Khellowinu
pg 104 <https://www.metmuseum.org/art/collection/search/663663>
pg 104 <https://www.metmuseum.org/es/art/collection/search/436105>

Light Oil Pavilion Paintings

pg 122 <https://theculturetrip.com/north-america/usa/new-york/new-york-city/articles/how-new-york-shaped-artist-edward-hopper/>
pg 122 <https://wanford.com/rooms-by-the-sea-by-edward-hopper/>
pg 122 <https://www.artranked.com/topic/Ren%C3%A3%C2%A9+Magritte>

Light Sourcing and Solar Ray Tracing Images

pg 14 left image 3, pg 19 left image 3 <https://www.archdaily.com/905836/treasuring-history-photographs-of-tadao-andos-first-european-villa-restoration/5bebb0c708a5e5a58c00052b-treasuring-history-photographs-of-tadao-andos-first-european-villa-restoration-image>
pg 16 right image 3, pg 22 left image 1 <https://www.subtilitas.site/post/141268915334/gigon-guyer-kirchner-museum-davos-1992>
pg 14 right image 4, pg 20 left image 2 http://arkipelagos.blogspot.com/2013/11/blog-post_29.html
pg 18 left image 1, pg 22 left image 4 <https://ifpo.hypotheses.org/3763>
pg 18 right image 1, pg 21 left image 3 <https://afasiaarchzine.com/2014/02/so-i-3/>
pg 15 left image 4, pg 20 left image 4 <https://www.domusweb.it/it/speciali/novanta-anni/2018/domus-1978-97.html>
pg 15 left image 3, pg 20 left image 3 <https://www.archdaily.com/877432/peter-zumthors-kolumba-museum-through-the-lens-of-rasmus-hjortsho/598b7a44b2e38dac6000435-peter-zumthors-kolumba-museum-through-the-lens-of-rasmus-hjortsho-photo>
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