

A DEEP BREATH OF ART

A DEEP BREATH OF ART

Sara Alkhatib

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Master of Architecture in Architecture

Susan Piedmont-Palladino Paul Emmons Jodi La Coe

> May 22nd, 2020 Alexandria, Virginia

© Copyright by Sara Alkhatib

Disclaimer: Page intentionally left blank

Keywords: Architecture, Art, Artist Retreat, Arboretum, Nature

Disclaimer: Page intentionally left blank

A DEEP BREATH OF ART

Sara Alkhatib

ABSTRACT

In a busy city like Washington D.C., where people tend to work for long hours, and remain in constant fight with deadlines as they try to complete their daily tasks, such lifestyle can be very exhausting. Artists are no exception to that. A preoccupied lifestyle can keep them distant from their inner creativity and would make them lose their inspiration for art. What they really need is to take a step away from this fast society and find a place that offers them the space, time and environment to recharge and reconnect with their art.

This thesis explores the role of architecture in creating moving artistic experiences that ignite the artists' inner creativity and feeds their imagination. By using design concepts that encourage their interaction with their surroundings, we can raise their curiosity to explore and observe to help them unleash their creativity. Because ,we, humans are mostly influenced by the spaces we inhabit and spend most of our time in.

A proposed artist retreat in the U.S. National Arboretum, creates an architecture that enhances the way artists experience art through the use of proportions, forms, materials, light and shadow. The project consists mainly of two parts, the first part is a place that respects the artists' need for solitude, to be able to self-reflect on their inner self and art. The second part is a place for the artist community, where they socialize and exchange their knowledge and experiences. Moreover, the buildings design aims to breaks the barrier between the inside and outside worlds to help create an intimate experience between the artists and nature. On the other side, there is the relationship between the buildings and the site, where the buildings design, materials and construction respects the landscape of the site and are adaptive to the beauty of the site's seasonal changes. This is how my thesis will explore art through the lens of architecture and give these artists a deep breath of art.

Disclaimer: Page intentionally left blank

A DEEP BREATH OF ART

Sara Alkhatib

GENERAL AUDIENCE ABSTRACT

In a busy city like Washington DC, where people tend to work for long hours, fight deadlines and try to complete their daily task, such a lifestyle can be very exhausting. Artists are no exception of that, as such lifestyle can keep them distant from their inner creativity and lose their inspiration for art. What they really need is to take a step away from this fast society and find a place that offers them the space, time and atmosphere to recharge and reconnect with their art.

This thesis explores the role of architecture in creating moving artistic experiences that ignite the artists' inner creativity and feed their imagination. By using design concepts which encourage their interaction with their surroundings, raises their curiosity to explore, observe and unleash their creativity. Because we humans are mostly influenced by the spaces we inhabit and spend most of our time in.

My thesis will be an artist retreat at the US National Arboretum, a place for these artists to practice their art in a natural environment, in places that either encourage them to socialize with the artist community or in single cabins in the forest, that isolate them into their own world. The buildings will act as thresholds that bring the outdoor natural views, sunlight and wildlife to the indoor living spaces to embrace the performance of these artists and let them experience art through the lens of architecture. The buildings also have their own language of how they represent and respect the nature of the site. This is how my thesis will give these artists a deep breath of art.



This thesis is dedicated to my **Husband** for his endless love, support & encouragement that made this dream possible. To my **Father**, who has always inspired me in this life, for pushing me a little harder to challenge myself and dream bigger. To my **Mother**, for always keeping me in her prayers and for her kind and loving heart that enriched my soul.

Susan Piedmont-Palladino, Paul Emmons & Jodi La Coe: My incredible committee members, I deeply appreciate your valuable feedback and guidance throughout this entire year. You gave me the passion and inspiration I needed to fall in love with Architecture. Only with your support and encouragement I have gone this far. It was an absolute pleasure working with you!

Family and Friends: Thank you for overwhelming me with your love, enthusiasm and support for this thesis. You have all been a big part of this journey and I am grateful to have you in my life.

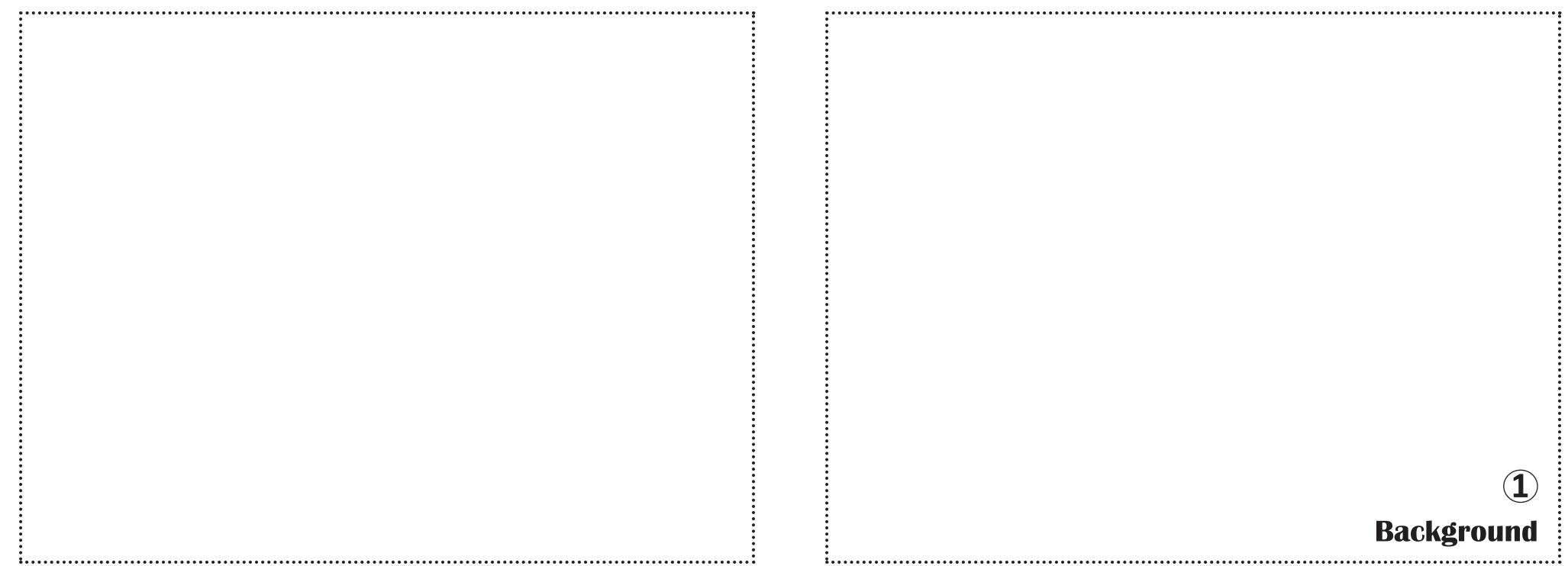
ACKNOWLEDGMENTS

X

BACKGROUND	2	PART I. MAIN BUILDINGS	4
Questions	4	Main Buildings Site Plan	4
Introduction	6	Massing	4.
Art, Architecture and Nature	7	Plans	4
	•	Elevations	5
SITE ANALYSIS	10	Sections	5.
Site Criteria	11	Materiality	5
Arboretum History	13	PART II. CABINS+BOARDWALK	6
Site Selection	15	Cabins Site Plan	6
Site Sections	19	Massing	6
Site Topography	23	Plans	6
Site Photography	25	Elevations	6
Site Experience	29	Sections	7
·	•	A Day in a Life Series	7
DESIGN CONSIDERATIONS+PROGRAMMING	32	PERSPECTIVES	7
Design Concepts	33	Exteriors	7
Programming	37	Interiors	8
	•	ENDNOTES	1
THE ARTIST RETREAT	40	IMAGE CREDITS	1
Artist Retreat Site Plan	41	BIBLIOGRAPHY	1

TABLE OF CONTENTS

XII



ΧI\/



- How can Architecture **create** physically & psychologically beneficial experiences that ignite artists' inner creativity and feed their imagination?
- How can we design spaces that encourage artists' interactions with their surroundings, motivate them and raise their curiosity to explore?
- How can artists **experience** their art through the lens of Architecture?

QUESTIONS



INTRODUCTION

As humans, we are mostly consciously and unconsciously influenced by the spaces we inhabit, as they affect the way we feel, think, behave and perform. From that, we start thinking of the relationship between the human behavior and architecture, which is where Neuroarchitecture comes to prove the interplay between Neuroscience, Human Psychology and Architecture. This field studies Neuroscience to understand the impact of architectural design on the human perceptions and uses that to create places that are physically beneficial for us. Thomas Albright, a professor of Psychology and Neuroscience at University of California, says: "our buildings provide physical solutions to problems dictated by human biology, we also expect them to satisfy our psychological needs. We expect them to inspire and excite us, to promote mental states that lead us to discover, understand and create, to heal and find our way, to summon the better angels of our nature."

Many studies show that we spend 90% of our times indoors and that approximately 70% of that time is spent at our homes, where the other 20% is spent indoors in other social gathering spaces. Leaving a small percentage of that time spent outdoors.³ This raises two different ideas, the first is to enhance the quality of the indoor spaces to make them psychologically beneficial and the second is to start encouraging people to go outdoors and explore more natural environments.

As this thesis proposes an artist retreat that accommodates artists, it will investigate the immense influence of architectural design in promoting their creativity and triggering their curiosity to explore and imagine, by utilizing design concepts that play with materiality, forms, light, shadow, colors, thresholds and proportions.

This series of drawings illustrate the four main elements that this thesis will be shedding light on. It is an attempt to understand each element on its own and then its relationship with the other, to see how they can all intertwine to create a successful project. These elements are:

- The Artist:

This retreat will accommodate artists from a variety of art disciplines, such as painting, drawing, printmaking, modern sculptures and graphic art. The main purpose of this place is to serve as a facility that provides artists with the appropriate atmosphere that will help them in strengthening their relationship with art. It should also help them better understand their needs, and discover what inspires and motivates them to practice their art with passion.

- The Community:

By creating a community for artists, where they can share their experience, art and perspective, we encourage social interaction between them so they can get the best out of this experience. An artist community provides artists with a platform, where they can exchange their ideas, knowledge, and skills, and the tools to translate those into creative artistic products.

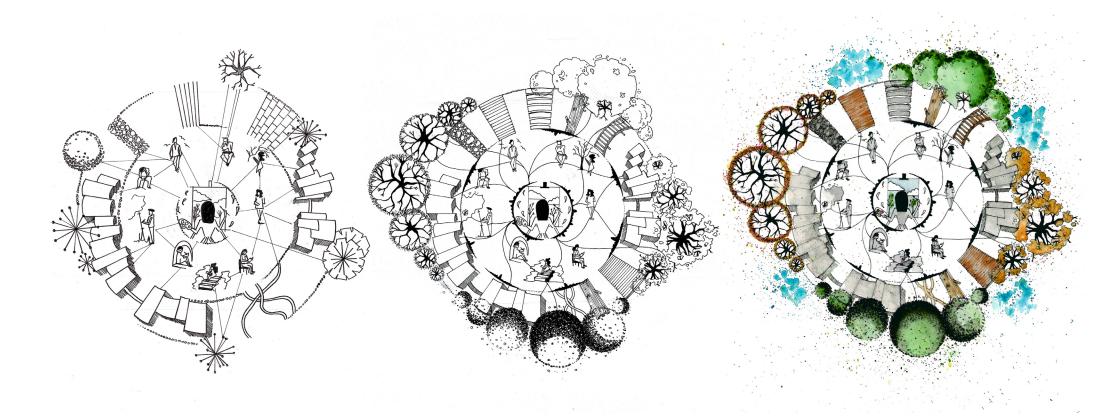
- The Architecture

By providing artists with the opportunity to explore architectural designs and concepts that are physically surrounding them, whether in pathways, buildings, entrances, or social spaces, we aim to trigger artists' positive emotions and feelings, which I believe are conductive to creativity.

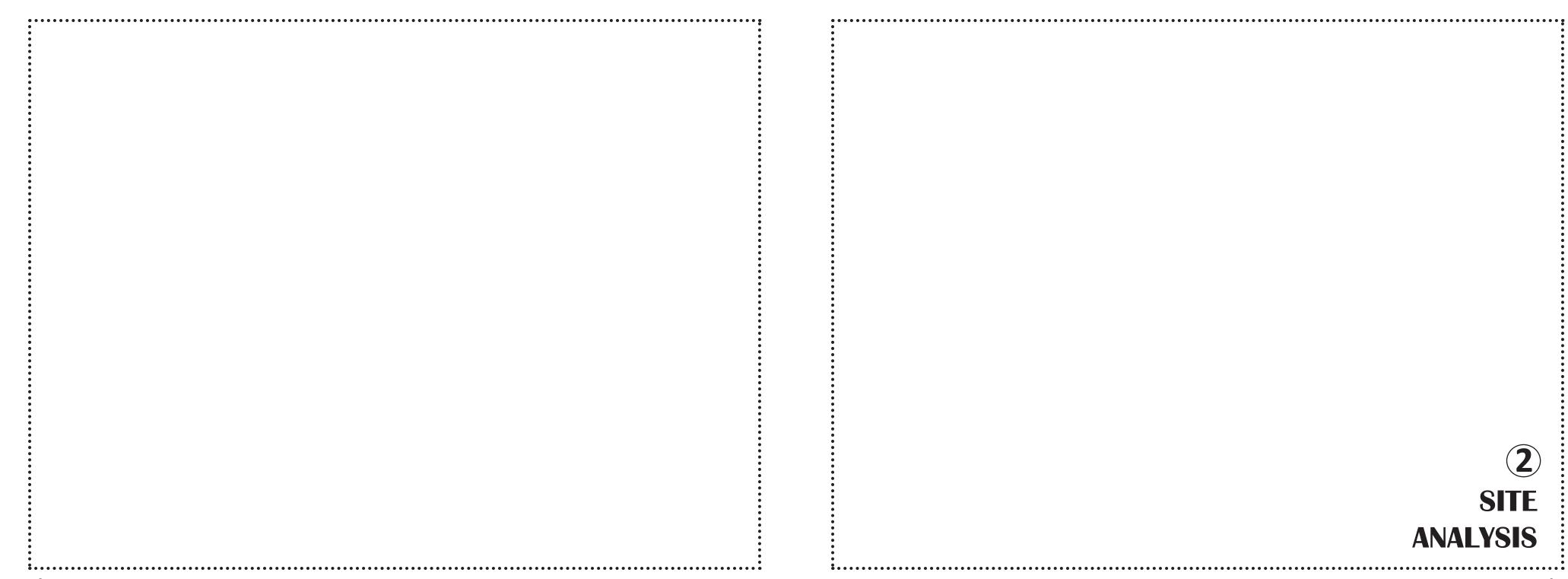
-The Nature

The element of nature is the core of this project. It is important to study, discover and decide what type of natural environment this project needs, including the nature of the site itself and what panorama the surrounding landscape will provide. By incorporating nature in the architectural design we aim to use its positive impact on artists' behaviors.

ART, ARCHITECTURE & NATURE



- The Artist
- The Community
- The Architecture
- The Nature



SITE ANALYSIS In the process of searching for a suitable site, I had set some criteria that I wanted to explore in my search.

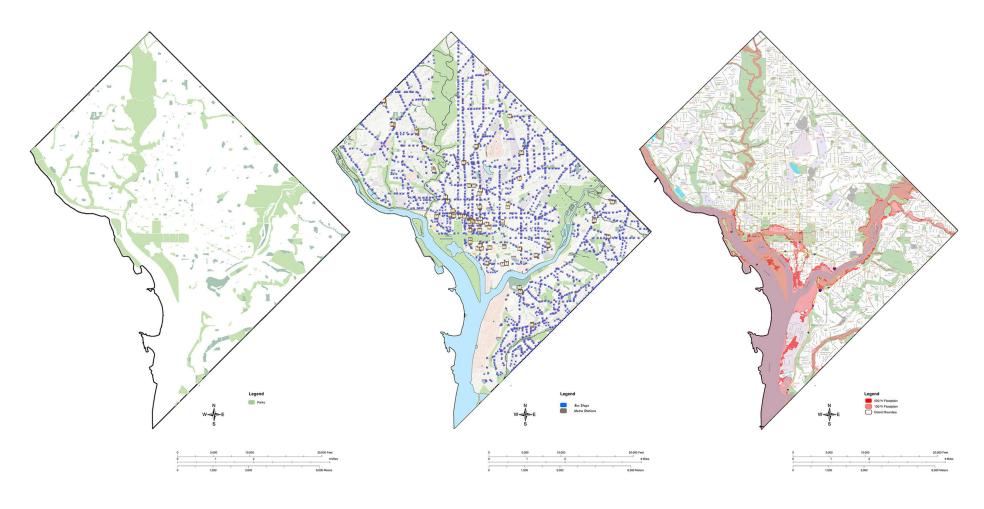
The first one was the location of the site. Since this artist retreat is meant to be for artists who live in the Washington Metropolitan Area, I wanted a site that was away from the busy city but also easily accessible, so I started looking at locations on the edges of the city.

My second and third criteria, were finding a site with a suitable natural environment that provides greenery and water features, to bring the artists back to nature.

My fourth criterion, was finding a site that can be easily accessible with public transportation, so I looked at metro-stations and bus stops.

My last criterion was looking at the site topography and how the flood plain will impact the area in the coming 100 years.



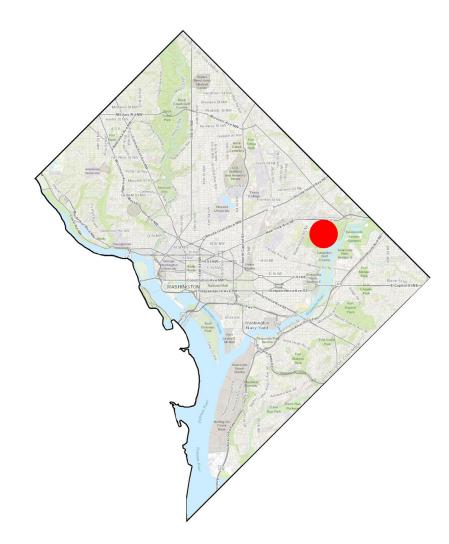


SITE CRITERIA

The site I chose for my thesis, is the United States National Arboretum, which is a 446 acres land that was established by an act of Congress in 1927.⁴ The site is a living museum that is home for thousands of stunning plants, flower and tree collections all displayed in gardens, exhibits and research areas open to the public, where they all work on enhancing the ecological, economic and visual value of ornamental and landscape plants.⁵

The site is located on 3501 New York Avenue in North-East Washington, DC. It has two entrances, one on New York Avenue and the second on R Street. As for site accessibility, you can easily get there by car, but if you were to use public transportation, you can exit at the Stadium Armory station then take bus to Bladensburg Road.

ARBORETUM HISTORY



United States National Arboretum

If we look at this map, you can see the topography of the site, which presents attractive landscape throughout the site. Looking at the various features the site offers, we have:

Location: The site is on the Northeast edge of the city, which means it's away from the busy city and in a more natural environment.

Accessibility: As mentioned before, the site has two main entrances and from there you can easily access the Arboretum either by car, bike, scooter or on foot. There are roads spread through the site with parking spots in each area.

Greenery: The site is rich with trees, plants, flower collections displayed through exhibits, gardens and research areas. It also has many woodlands.

Water Features: The site has several water features, such as Hickey Run, which runs through the site coming from the Potomac River.

Once the location for the site was selected, the next step was narrowing down the area of the site within the geographical area of the United States National Arboretum. To be able to do that, setting more specific features for the site was needed, which included the followings:

- -The site should be away from the public reach, in a more private area.
- -The site is preferred to offer several natural views, panoramic landscape and water features.
- -It is also preferred to be close to the other main buildings in the Arboretum and not far from the two entrances. As, It should be easily accessible.

SITE SELECTION

ARBORETUM SITE MAP

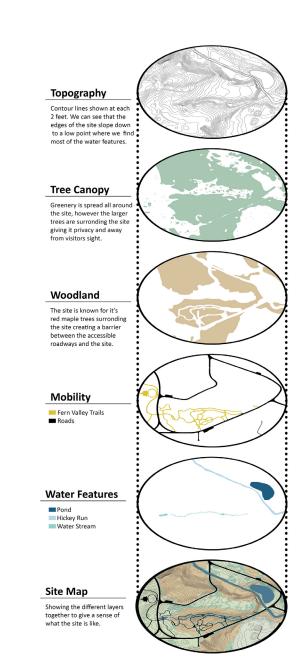
After looking at different areas within the site, I narrowed it down to Lilac Hill, which seemed to be the most suitable area for the project. There, the trees are spread around the site, creating a barrier between the site from the inside and the outside , providing the privacy the project needs.

Secondly, the site offers interesting topography as in the middle area it is a flat ground that slopes down on the edges, overlooking Spring Beech Pond and Hickey Run from the east, Fern Valley Trail from the south, US Capitol Columns from the west and a forest from the North.

Finally, the site has roads surrounding it and three parking spots. The identified area for the project is not easily reachable by the public as it has one trail that takes you up to the hill from the east.

SITE SELECTION

THE SELECTED SITE



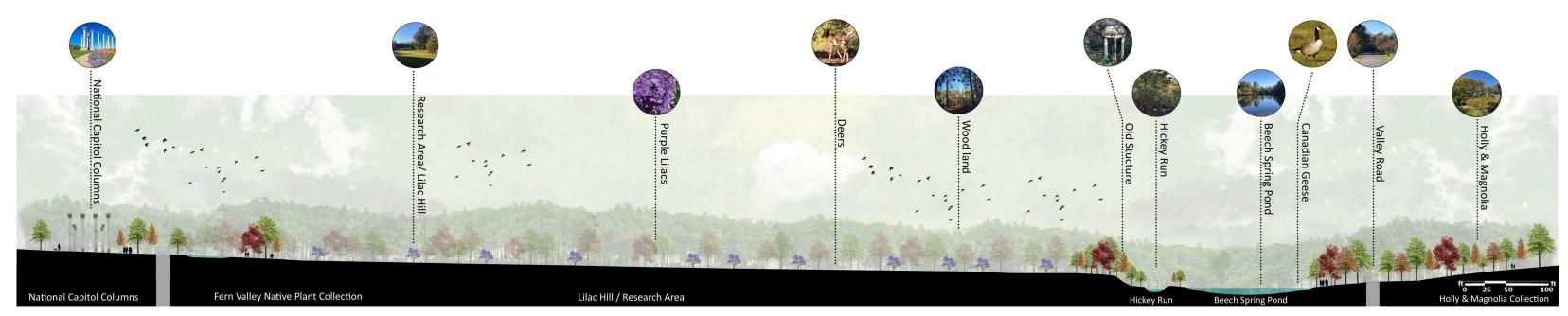




Diving deeper into site investigation, this section, shows a clearer look of the site topography, water features, natural views, wildlife, plants and trees.

SITE SECTIONS

SECTION LOOKING NORTH-WEST

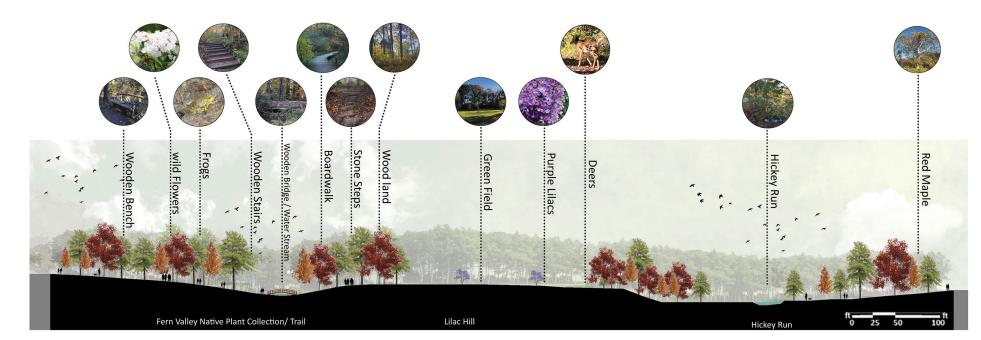




This Section cuts through Lilac Hill and Fern Valley Trail, showing the flat topography of the hill and the sloping areas on its edges.

SITE SECTIONS

SECTION LOOKING WEST





SITE TOPOGRAPHY

PHYSICAL MODEL

Contour lines are shown at every two feet

23







Looking down hill to the pond

Lilac Hill- Looking south

Lilac Hill- Looking west







The Forest

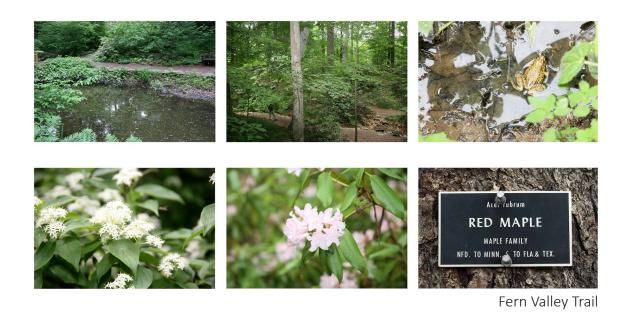
Fern Valley

The site's tree cover

These photographs capture the beauty of the site, showing how colorful the scenery can be and how that could be incorporated in the design.

SITE PHOTOGRAPHY

THE SELECTED SITE





Lilac Hill







Spring Beech Pond

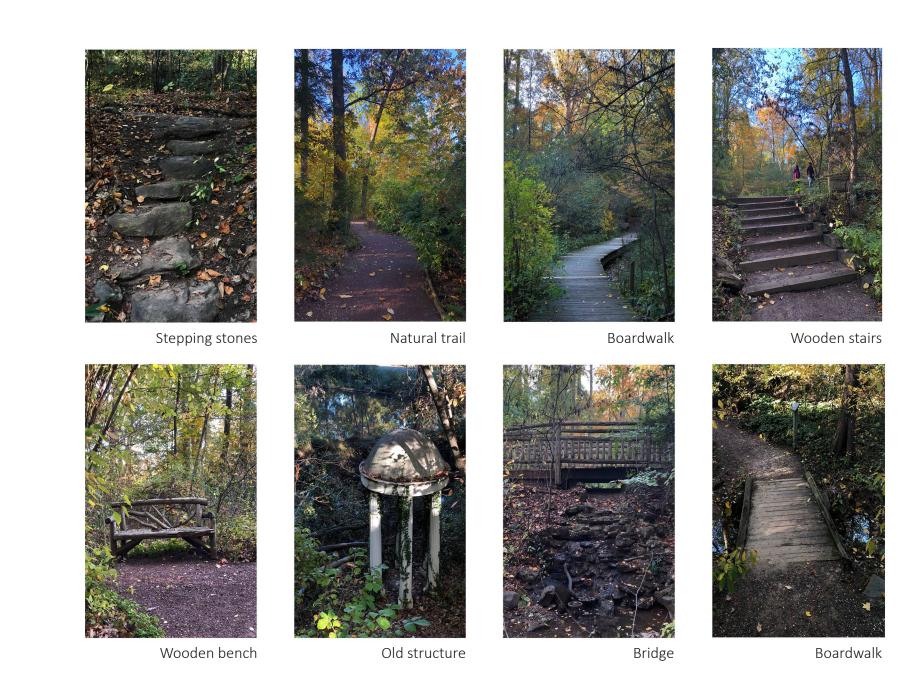
These photographs show the surrounding areas of the site, to get a better sense of it's natural environment.

SITE PHOTOGRAPHY

THE SITE'S SURROUNDING AREAS

Through exploring the site, one can see boardwalks, natural trails, pathways, stone steps, wooden stairs, wooden benches, bridges and old structures, spread around the area. All of these are features that are important to analyze and understand, so that the same language can be integrated in the design for its major role in increasing artists' curiosity to explore.

SITE EXPERIENCE





After thoroughly analyzing the site, I started reflecting on the design concepts that I want to integrate in my design. These concepts focus on providing artists with the architectural spaces they need. Adding to that, the site investigation, I reached four main design concepts that I will focus on in my design process.

Firstly, Framing Views, by exploring openings and how they can frame the outdoor natural environment to bring it to the indoor spaces to add more life to them and be a source of inspiration to the artists, just like framing an artwork.

Secondly, A Play of Light and Shadow, by visualizing how light enters the building, where it will act as a canvas for light and shadow to be casted on.

Thirdly, Contrast; the contrast between interior and exterior materials, public and private spaces, light and shadow, wide and narrow, solid and open and the contrast between the building and the site.

Finally, Thresholds, by emphasizing on the transition between one space and another and the different experiences they offer.

DESIGN CONCEPTS



FRAMING VIEWS



A PLAY OF LIGHT & SHADOW



CONTRAST



THRESHOLDS

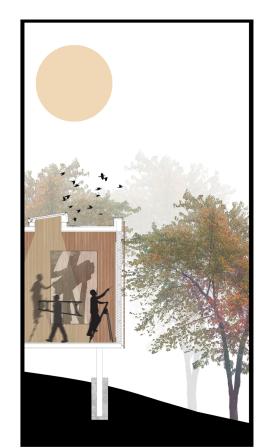
This early series explores how a day in a life of an artist could look like, to better understand how their cabins will be designed. Moreover, the series offers different design schemes that respond to their activities through the different times of the day.

DESIGN CONCEPTS

A DAY IN A LIFE SERIES









The project's programs will be divided into: private spaces, which are the Cabins, the artist community social spaces, which are the Residency, and the public spaces that are open to all visitors, which are the Art Gallery, Fern Valley Trail and Sculpture Garden.

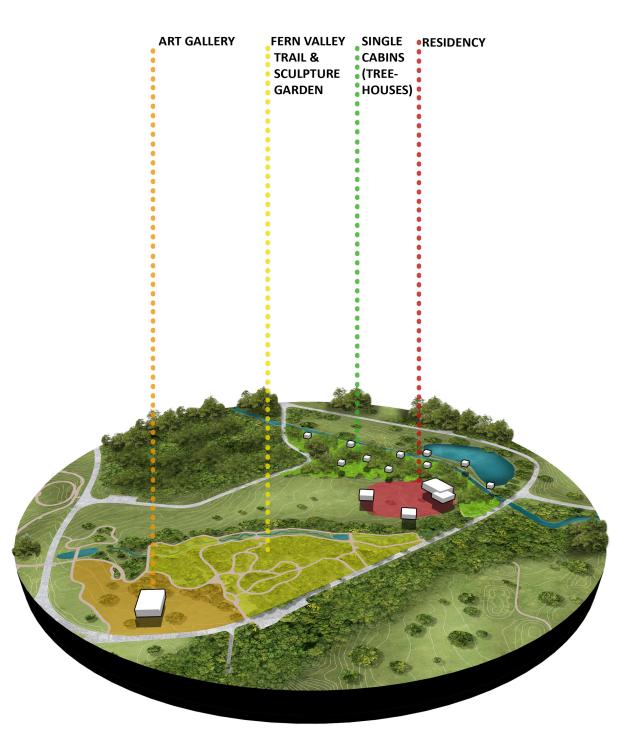
The two more private areas, which are only for the artist community, will be placed in the areas that are away from public reach and are not easily visible or accessible to the public. Meanwhile, the Gallery and the Sculpture Garden will be placed in an open area next to Fern Valley Trail, which will be open to all visitors.

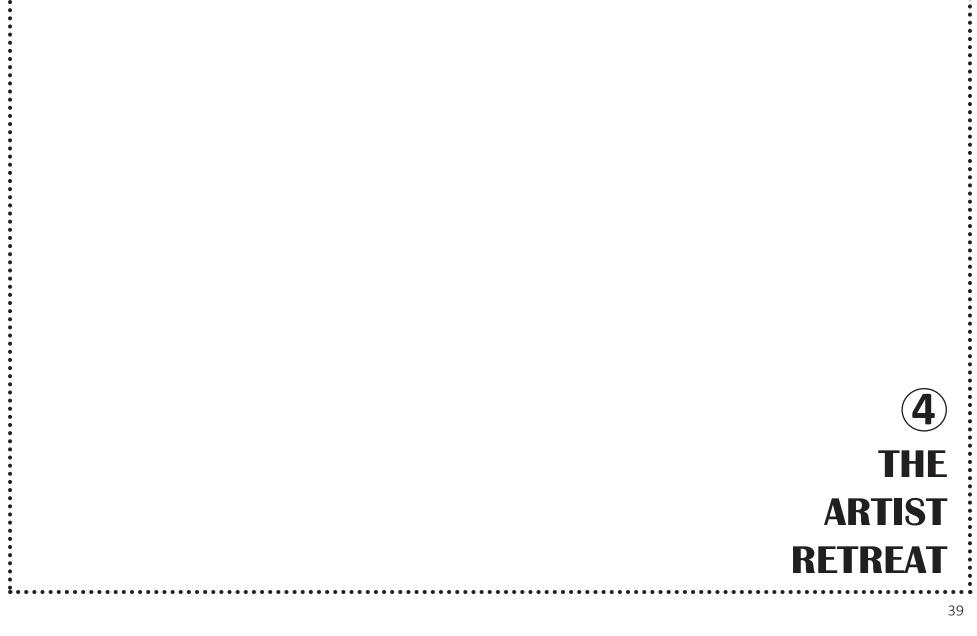
To demonstrate the programs in more details, the Residency will include the artist community social spaces, including a shared house, art studios, library, gallery space, central community area and green roofs.

The Cabins will be single tree houses inside the woodland, providing artists with a space where they can work in solitude, rest and sleep.

As for the Art Gallery and Sculpture Garden, these will be part of the Arboretum's public facilities, where artists will be able to exhibit their artwork to the public.

PROGRAMMING







Zooming in more on the Artist Retreat, we can see on the map where the main buildings are placed on the site and how the boardwalk and cabins are attached to them. Furthermore, the map shows the views, which the site overlooks and how you can reach the site from Lilac Hill Boardwalk on the lower street, shown in the map.

ARTIST RETREAT SITE PLAN

THE ARTIST RETREAT PART I THE MAIN BUILDINGS

•



The first part of the project is the main buildings, that are designated for the artist community and their daily activities. The map shows the building's top view and their orientations, which allow them to get 360 views of the site.

MAIN BUILDINGS SITE PLAN

These diagrams show what the building's massing was based on:

Program: The ground level includes the house, gallery/ event space and a shared art studio. Meanwhile, the underground level includes the library, computer lab, lounge/seating area, storage and mechanical room. Additionally, the first level includes two art studios for painting, drawing and printmaking.

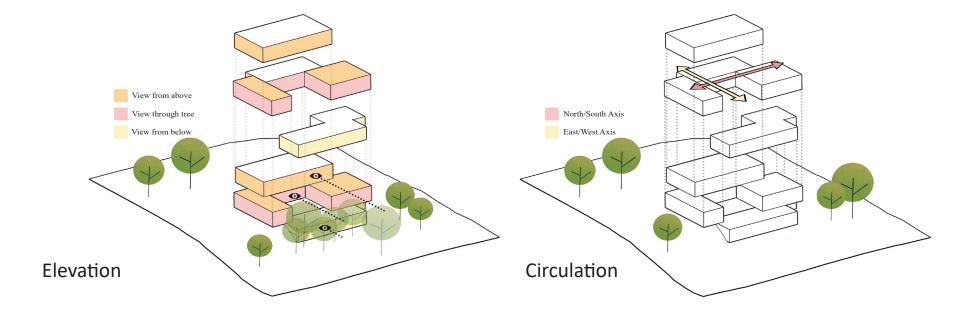
Orientation: Taking the advantage of the panoramic views the site offers, the buildings are placed and oriented in a way where each can provide a different pictorial representation.

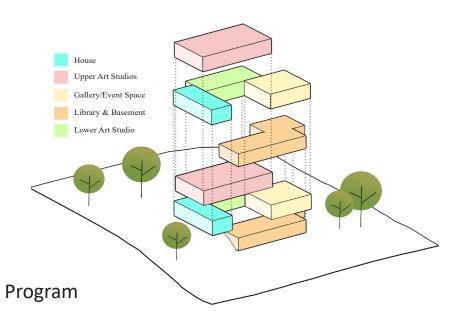
Elevation: Since the site has changing topography, each mass is sitting on the site differently, the ground level, the underground level and the upper first level. Additionally, it creates opportunities to experience different eye-level views which are illustrated in the diagram.

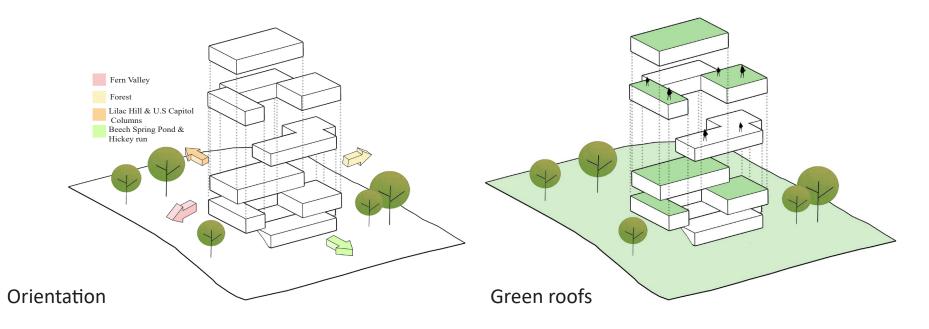
Circulation: The buildings have two different axes, the East-West axis where the main entrance is, and the North-South axis, where the boardwalk entry point is.

Green roofs: They are used to enhance the sustainability of the buildings and integrate nature in the design.

MASSING







The underground level serves as the quiet area where the artists rest, read and meditate. It includes a library with a Lounge/seating area, sketching area and a computer lab. These functions are open to a large curtain wall that opens up to the outdoor natural environment. On the other side of this floor, there is a storage area, mechanical room, laundry room and restrooms. This level is accessed either by stairs or by the elevator that takes you up to the upper levels.

(1) Library & lounge



The ground level shows how the three buildings open up to the central community space. The main entrance acts as a threshold between the open green area of Lilac Hill and the private enclosed area for the artists residency. There is also a narrow and long entrance that leads artists into the shaded forest along the boardwalk.

Moving on to the buildings, the first one on the right is the house, that has a living room, a dining area and a kitchen along with the other services. The building on the left is the gallery/event space which has a flexible program and could be used to exhibit the artists' work or to host their events and presentations.

The third building is where the larger art studio is, which is mostly for larger artworks -sculptures- and it is equipped with all the services it needs. The building also has the one elevator that moves you through the three different levels.



- (2) Living area
- (3) Kitchen & Dinning
- (4) Services
- (5) Gallery/Event space
- (6) Art studio
- (7) Storage area
- (8) Boardwalk
- 9 Outdoor social space

PLANS GROUND FLOOR

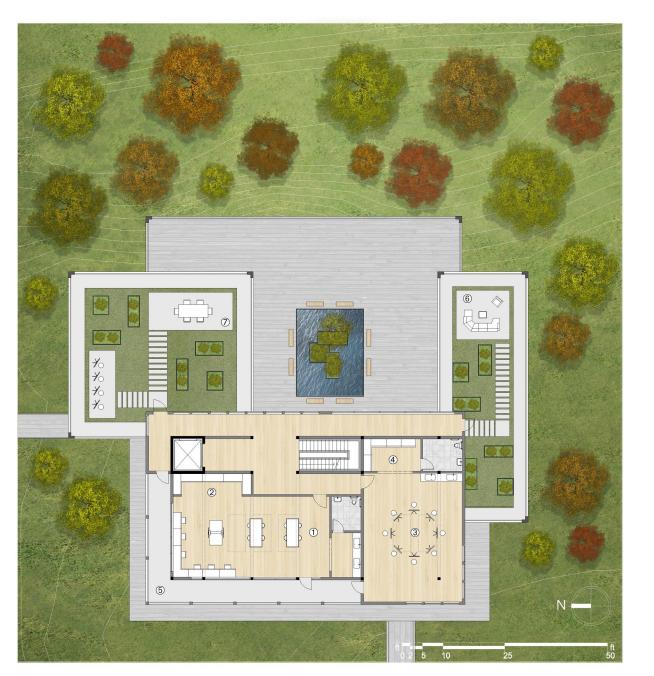


(2) Computer lab (3) Sketching area (4) Mechanical room (5) Storage Area (6) Laundry room (7) Restrooms



PLANS

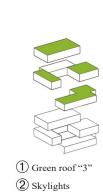
The first floor plan shows the two upper art studios that are for painting and printmaking, they are both open to a terrace with a view of the green open space on the west. Furthermore, the buildings on the right and left have green roofs with seating/resting areas and platforms where artists can practice their art.



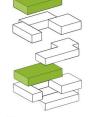
This roof plan shows the top green roof, along with the skylights that open to the sunlight coming from the north side.

PLANS

TOP FLOOR







- 1 Mixed art studio
- (2) Storage area
- 3 Painting studio
- (4) Storage area (5) Terrace
- 6 Green roof "1"
- 7 Green roof "2"

PLANS

FIRST FLOOR

One of the main design concepts in this project was contrast, in this East elevation you can clearly see how the buildings give a richer appearance to the building itself and the nature around it. The exterior design of the facades is clean and simple, using large curtain walls and a horizontal thin opening to play with how each opening frames an outside view. Furthermore, each building has clear edges that define each mass.



The West elevation shows the main wide entrance that opens up to the artist community's central space with a nice view looking through the trees.



ELEVATIONSWEST ELEVATION

ELEVATIONS

EAST ELEVATION

The North elevation shows the changing topography of the site along with its water features.



ELEVATIONSSOUTH ELEVATION



ELEVATIONS

NORTH ELEVATION

This section cuts through the three levels, showing the buildings sitting on concrete slabs where retaining walls are used to support the underground level. Furthermore, it shows the views you get on each floor.



This section cuts through the art studios, showing the height of their ceilings. It also shows the north facing skylights that allow sunlight to enter the art studios.

SECTIONS
NORTH/SOUTH SECTION



SECTIONS

EAST/WEST SECTION



SECTIONS

SITE SECTION LOOKING WEST

Facade Focus: Shou Sugi Ban

A centuries-old Japanese technique as explained by architect Terunobu Fujimori.

to produce the proper

degree of char—the boards

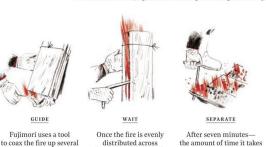
are separated.

The main material for my exterior facades was Charred Cedar Wood, which is made by a technique called "Shou Sugi Ban", an old traditional Japanese way of charring wood siding. It is done by charring the wood, cooling it with water, brushing it and then adding to it an oil finish. 6 Choosing this material was based on the following reasons:

- It is a sustainable durable material that is resistant to fire, rot, insects and water.
- It has a unique texture and appearance.
- -It blends in with the natural materials of the site.

The material used for the interiors is bright plywood, that gives a clean and bright environment to the indoor spaces, which works well with the artists' messy world of art. This gives the artists a chance to add their own colors to the indoor spaces. Whereas for the interior flooring, bamboo flooring is used, which is a durable and sustainable material.

MATERIALITY



the length of the boards

it is simply a matter of waiting.

boards that have been

tied together;

this ensures an even

charring of the wood.



The primitive and painstak-

have been put out, the

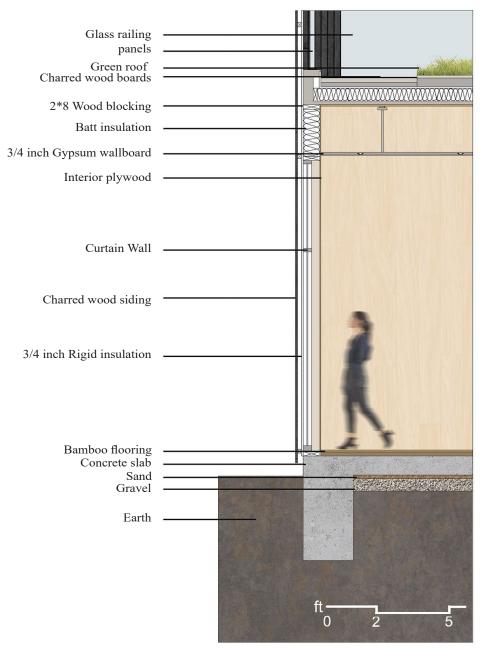
boards continue to crackle

ing process is said to protect wood against rain, rot, and insects for 80 years. It also gives the exteriors a reptilian texture that's as striking as it is practical.

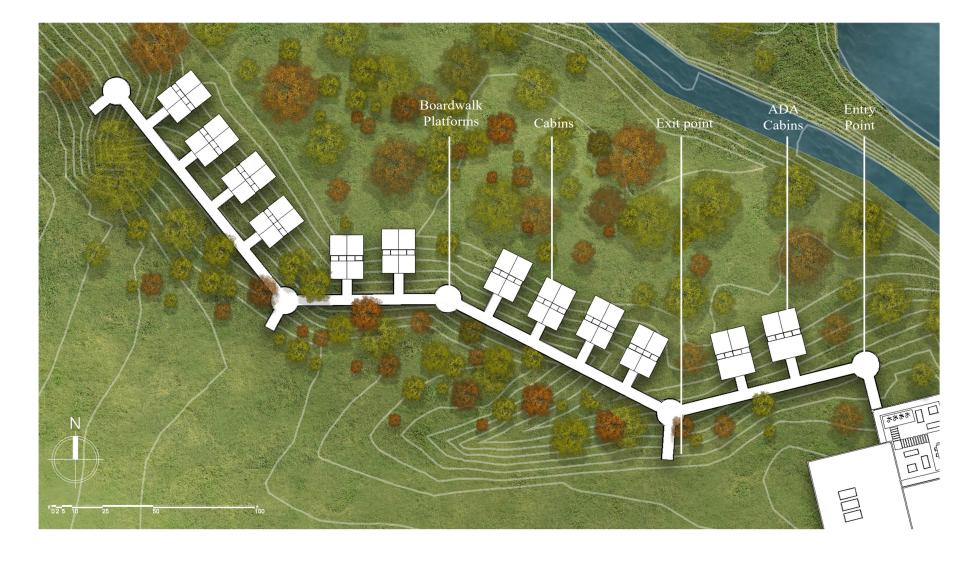
Shou Sugi Ban



MATERIALITY WALL SECTION



THE ARTIST RETREAT PART II CABINS+BOARDWALK



The boardwalk is placed on the edges of Lilac Hill, following the contour lines of the site. All the cabins attached to the boardwalk get a view of the depth of the forest. The first Cabins on the right are ADA cabins, which are slightly larger cabins that follow the ADA standards. The boardwalk is easily accessible from the main buildings, as it is elevated from the ground level so that it doesn't cause harm to the trees surrounding it. Adding to that, there are three exit points that stretch like arms from the forest to reach the ground level.

CABINS SITE PLAN

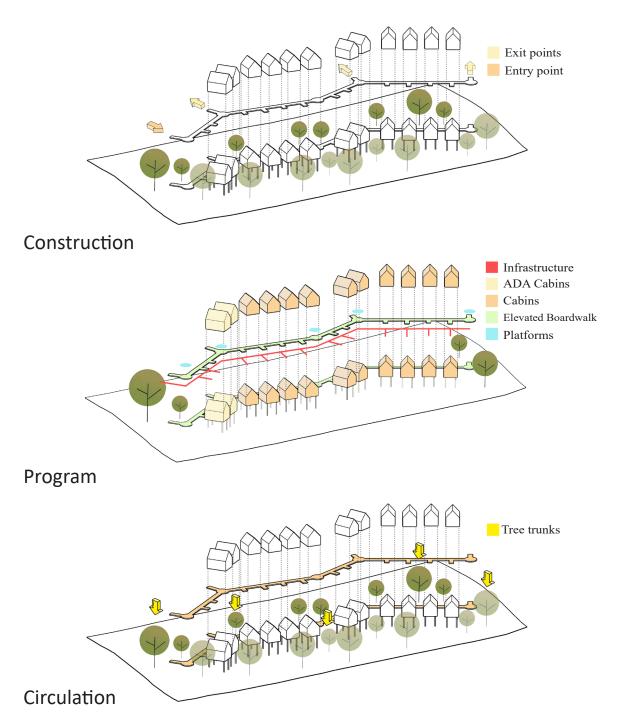
The challenge here was that the boardwalk will be constructed in a woodland with large trees, so to protect these trees as much as possible, the tree trunks of larger trees were located so that the boardwalk is constructed away from them.

Each intersection of the pathways creates a node, which will serve as a platform to gaze through the woodland. As the platform will be provided with seats.

As for the infrastructure, to avoid digging into the ground and hurting the trees, all the infrastructure runs beneath the boardwalk, from the main buildings to the cabins.

As for accessibility, the entry point starts from the main buildings and along the path there will be three other exit points that reach ground level.

MASSING



The cabin plan divides the cabin into three areas, the first is where all the services are; the small kitchen and the bathroom, the second is the working/sleeping area, that includes a working desk, reading zone, artist easel and a Murphy bed. The third area, is the terrace that opens up to the outside .There is also an upper loft that can be reached by a ladder.

PLANS TYPICAL CABIN PLAN



(1) Terrace

② Sleeping area

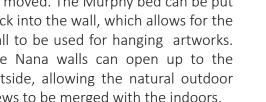
③ Bathroom

Reading area

⑤ Kitchen

Boardwalk

This plan shows how flexible the cabin layout is, where the furniture can easily be moved. The Murphy bed can be put back into the wall, which allows for the wall to be used for hanging artworks. The Nana walls can open up to the outside, allowing the natural outdoor views to be merged with the indoors.







- 1 Terrace
- ② Sleeping area
- 3 Bathroom
- Reading area
- (5) Kitchen
- Boardwalk



65

- 1 Terrace
- ② Sleeping area
- 3 Bathroom
- ④ Reading area
- ⑤ Kitchen
- Boardwalk

PLANS ADA CABIN PLAN



The cabins design is inspired by the natural environment that surrounds them, where it is an abstraction for a tree.

ELEVATIONS

NORTH ELEVATION

ELEVATIONSSOUTH ELEVATION







ELEVATIONSWEST ELEVATION

ELEVATIONSEAST ELEVATION

This section is showing the vertical window that splits the cabin into two parts, allowing for more views to the outside and the sky above. It is placed over the sleeping area, where the artist would be sleeping and having a sky view above him/her. The section also cuts through the boardwalk showing where the infrastructure runs beneath it.



SECTIONS

NORTH/SOUTH SECTION



SECTIONS

EAST/WEST SECTION

Illustration of how the cabins' architectural design responds effectively to the physical and psychological needs of the artists, and their activities throughout the day. The series also shows how light enters the space during different times of the day.

A DAY IN A LIFE SERIES







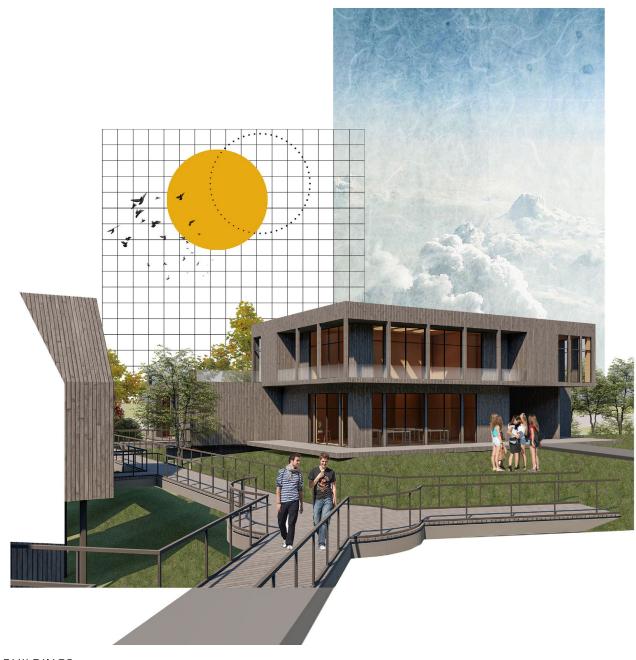




PERSPECTIVES PART I EXTERIORS



EXTERIORSVIEW LOOKING NORTH-EAST





EXTERIORS

CENTRAL COMMUNITY SPACE

EXTERIORS







EXTERIORSBOARDWALK PLATFORM



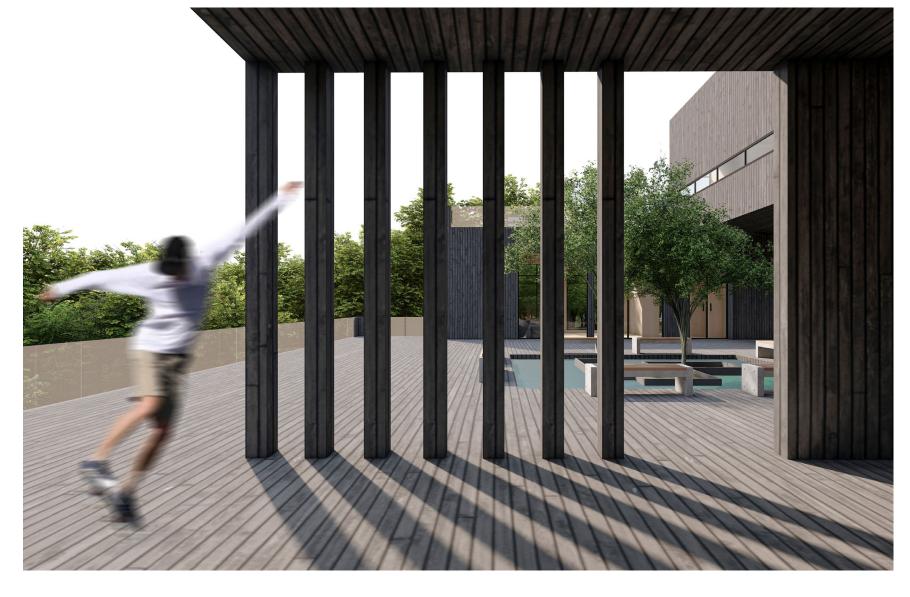


EXTERIORS

THRESHOLDS - MAIN ENTRANCE

EXTERIORSLILAC HILL BOARDWALK





EXTERIORS

A PLAY OF LIGHT AND SHADOW- VIEW FROM THE OUTDOOR CENTRAL SPACE

PERSPECTIVES PART II INTERIORS



INTERIORS
SCULPTURE ART STUDIO





INTERIORS

LIVING ROOM

INTERIORS

PAINTING ART STUDIO



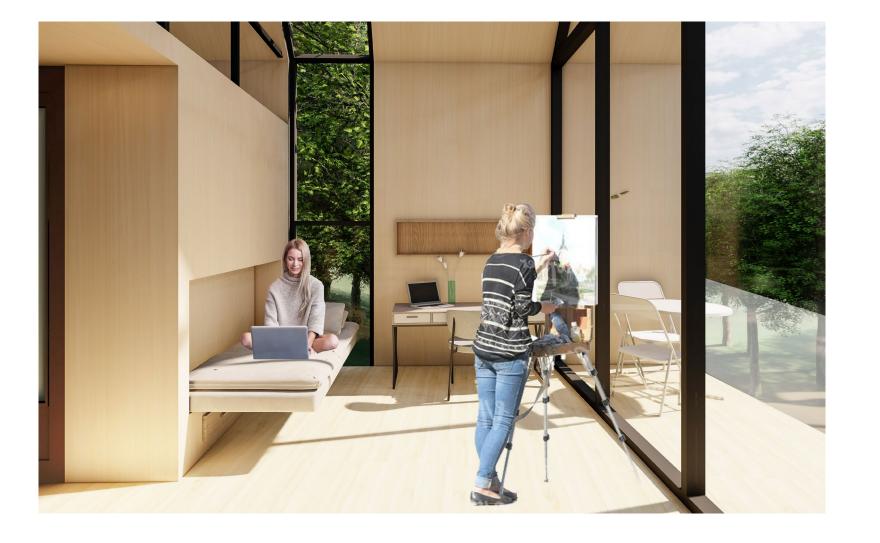


91

INTERIORS

GALLERY/EVENT SPACE



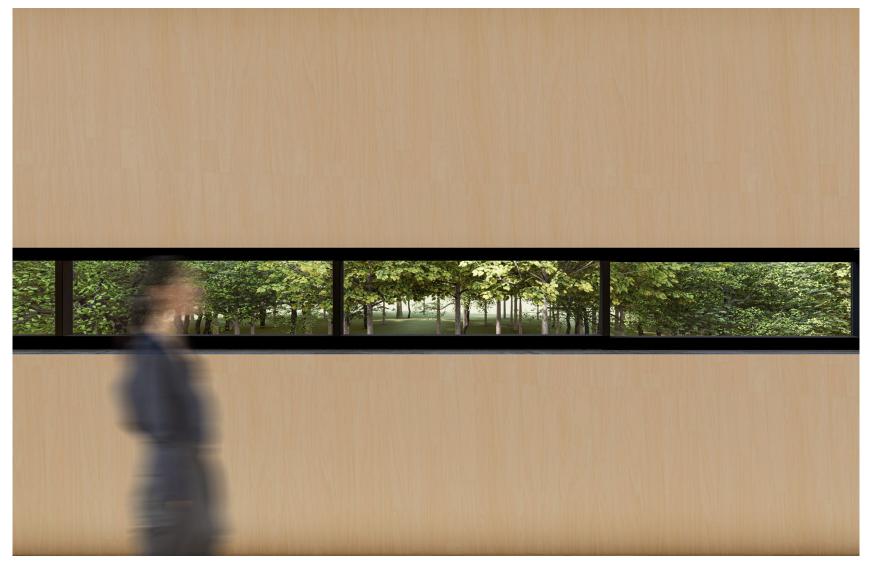


INTERIORS

CABIN INTERIOR

CABIN INTERIOR

INTERIORS





FRAMING VIEWS- HORIZONTAL WINDOWS



INTERIORS

FRAMING VIEWS- FROSTED GLASS CABIN WINDOW

"Much like a painted masterpiece, architecture is an art form that has the ability to delight, inspire, and transform."
-Steff Green



- 1. Banaei, Maryam, Javad Hatami, Abbas Yazdanfar, and Klaus Gramann. "Walking through Architectural Spaces: The Impact of Interior Forms on Human Brain Dynamics." Frontiers in Human Neuroscience 11 (2017). https://doi.org/10.3389/fnhum.2017.00477.P.1
- 2. Pallasmaa, Juhani (juhani Pallasmaa Architects). "Mind in Architecture Neuroscience, Embodiment, and the Future of Design". Mit Press Ltd, 2017. P.197
- 3. Lepper, Marion J. C. de., H. J. Scholten, and Ricard M. Stern. "The Added Value of Geographical Information Systems in Public and Environmental Health".

 Dordrecht: Kluwer Academic Publishers, 1995. P.29
- 4."Welcome to the U.S. National Arboretum." U.S. National Arboretum. Accessed May 25, 2020. https://www.usna.usda.gov/.
- 5. "Visiting the U.S. National Arboretum in Washington, DC." Washington.org, October 22, 2019. https://washington.org/visit-dc/guide-us-national-arboretum.
- 6. "Shou Sugi Ban." Shou Sugi Ban, May 19, 2020. https://shousugiban.com/.

ENDNOTES

Disclaimer: Page intentionally left blank

PAGE 5: ©Bahaa Aldahoudi

PAGE 11/12/14: Maps taken from ArcGIS.

PAGE 16: Arboretum gardens icons: U.S. National Arboretum visitor guide

PAGE 19/20: Lilac tree: ©Nick Fountain

Canadian goose: @NPS/Gordon Dietzman US Capitol Columns: @CliffPhotography

PAGE 21/22: Wild flowers/ Frog: ©CliffPhotography

PAGE 28: Fern Valley Trail: ©CliffPhotography

Lilac Hill: ©Nick Fountain

PAGE 59: Shou Sugi Ban: Peter Oumanski

Green roof planting: https://www.purple-roof.com/post/green-roof-plants-how-do-they-survive

Window metal framing: OTTOSTUMM

Glass panels railing: https://www.miracleglassllc.com/glass-metal-railings/

Charred wood: https://architextur.es/textures/charred-timber

Plywood: https://www.freepik.com/premium-photo/wood-pattern-texture-wood-

planks_4981162.htm#page=1&query=plywood&position=12

Note: All other photos are taken by the Author.

IMAGE CREDITS

"ArcGIS." Computer software, n.d.

Banaei, Maryam, Javad Hatami, Abbas Yazdanfar, and Klaus Gramann. "Walking through Architectural Spaces: The Impact of Interior Forms on Human Brain Dynamics." Frontiers in Human Neuroscience 11 (2017). https://doi.org/10.3389/fnhum.2017.00477. P.1

Elmendorf, William, Henry Gerhold, Larry Kuhns, and Retired Professor of Ornamental Horticulture Pennsylvania State University. "A Guide to Preserving Trees in Development Projects." Penn State Extension, May 30, 2020. https://extension.psu.edu/a-guide-to-preserving-trees-in-development-projects.

Fern Valley Trail: the National Arboretum. Washington, D.C.: Dept. of Agriculture, Agricultural Research Service, National Arboretum, 1977.

"Green Roofs in the District of Columbia." Green Roofs in the District of Columbia. Accessed April 22, 2020. https://doee.dc.gov/greenroofs.

Lepper, Marion J. C. de., H. J. Scholten, and Richard M. Stern. "The Added Value of Geographical Information Systems in Public and Environmental Health". Dordrecht: Kluwer Academic Publishers, 1995. P.29

"Open Data DC." opendata.dc.gov. Accessed May 25, 2020. https://opendata.dc.gov/.

Pallasmaa, Juhani (juhani Pallasmaa Architects). "Mind in Architecture - Neuroscience, Embodiment, and the Future of Design". Mit Press Ltd, 2017. P.197

Ricci, Natalie, "The Psychological Impact of Architectural Design" (2018). CMC Senior Theses. 1767. https://scholarship.claremont.edu/cmc theses/1767

"Shou Sugi Ban." Shou Sugi Ban, May 19, 2020. https://shousugiban.com/.

"U.S. National Arboretum, Map." The Library of Congress. Accessed May 26, 2020. https://www.loc.gov/resource/g3852n.ct005201/?r=-0.423%2C0.142%2C1.847%2C0.741%2C0.

"United States National Arboretum Core Framework Plan." Rep. United States National Arboretum Core Framework Plan. Reed Hilderbrand, February 1, 2018. https://www.dropbox.com/s/c4hdr62tlv7twet/180201__USNA%20Core%20Framework%20Plan.pdf?dl=0.

"Visiting the U.S. National Arboretum in Washington, DC." Washington.org, October 22, 2019. https://washington.org/visit-dc/guide-us-national-arboretum.

"Welcome to the U.S. National Arboretum." U.S. National Arboretum. Accessed May 25, 2020. https://www.usna.usda.gov/.

BIBLIOGRAPHY

BIBI IOGRAPHY

A DEEP BREATH OF ART Sara Alkhatib