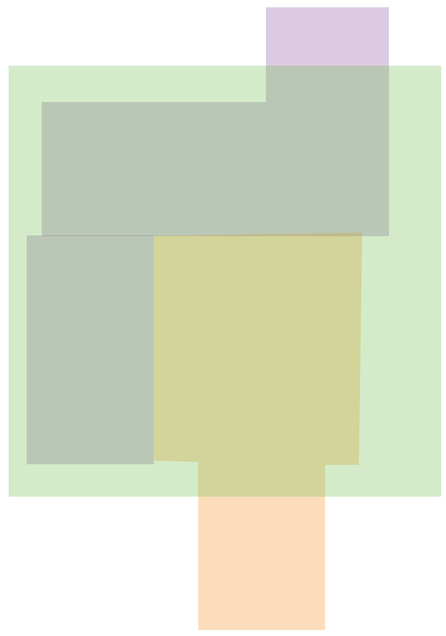
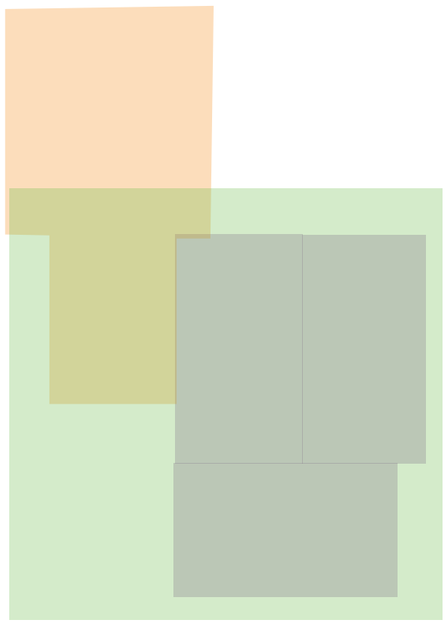
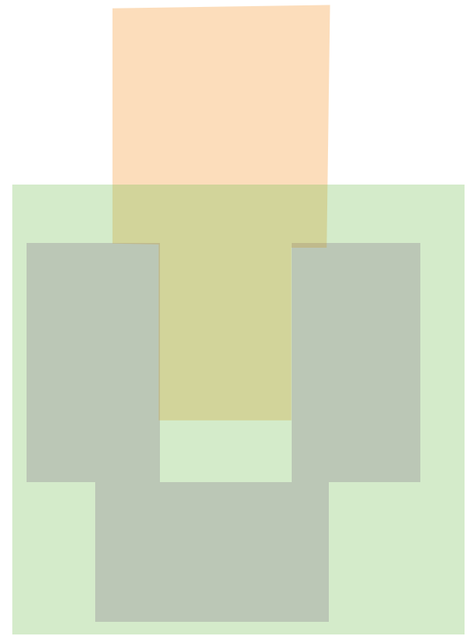
Spring 5-9-2023

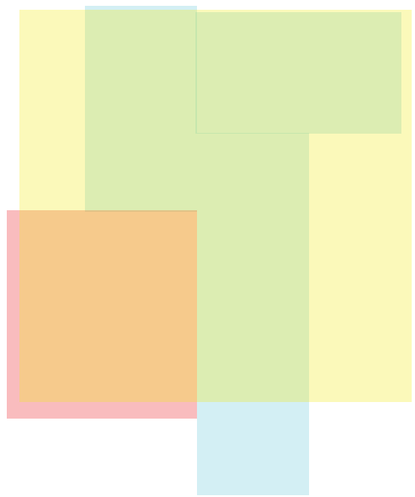
The Dwelling and The Shed: Redefining the Homestead

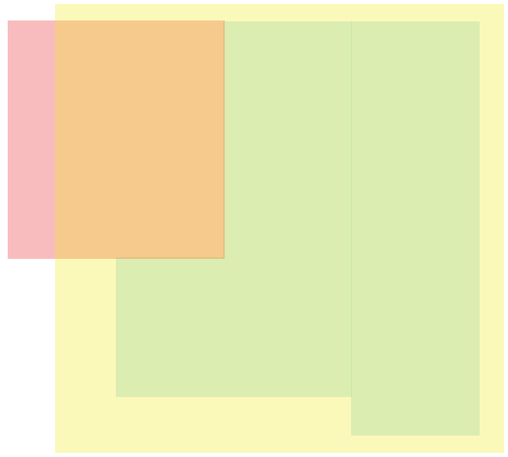
Ryan Mattox



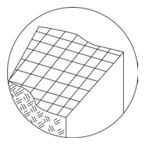


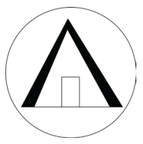






THE DWELLING AND THE SHED
REDEFINING THE HOMESTEAD





THE DWELLING AND THE SHED
REDEFINING THE HOMESTEAD

Approval of Thesis Research
Project Book is Presented to:

Trace Gainey

and to the
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College of Architecture and Construction Management

By

Ryan Mattox

In partial fulfillment of the requirements for the degree

Bachelor of Architecture

Kennesaw State University
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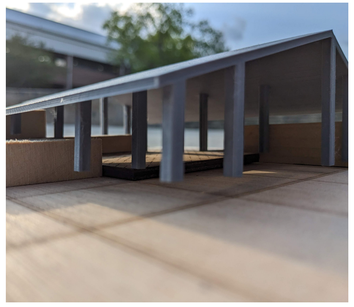
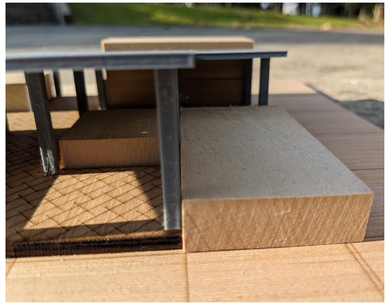
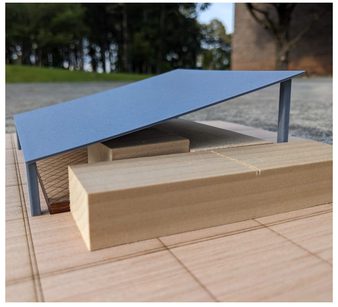
December 12, 2022







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CH. 1 DESIGN THEOREM

Theorem

Thesis Summary/Abstract

The homestead is the frontier of exploration. It is the place that shows people can take care of themselves through self-sufficient means. This place also looks at making a more sustainable population. That is partly due to the individual needing to take care of the environment around themselves so that the environment can provide for them.

My thesis project will look to create a **technological** and **sustainable** residential module that can be replicated and modified to create **community** based on *self-sufficiency* by means of *sustainability*. To achieve this goal, my thesis will look at combining the architectural elements of the homestead into a singular structure that will capitalize on both the **dwelling** element needed for people and the **shed** element or the basic protective structure. In addition, the structure will look at implementing technologies that will help provide for the individual like **aquaponics**.

The project will explore taking a suburban/rural landscape and converting it into a **rural utopia** based on the ideas of the *Garden City by Ebenezer Howard* in addition to the ideas *Frank Llyod Wright had with Broad Acre*. The result of the project is to make a **community** that combats the collectivist narrative by giving people the means to not only provide for themselves but to also create a community that can **sustain** itself, for now and for future generations.

Designs like this are not without their challenges. Many homestead designs go without a lot of elements like constant running water and as a result push people away. My thesis will look to counter these difficulties by implementing **new** and **emerging technologies** to **Redefine the Homestead** design in *correlation* with the ideas of a **rural utopia** to make them more palpable to a *mainstream audience*.

Thesis Statement

Thesis Narrative

In today's world, where urbanization is rapidly taking over, the importance of preserving our rural landscape has become more crucial than ever. As an aspiring architect, I am deeply concerned about how we can design and build structures that blend seamlessly with the rural environment, preserving its unique character while also meeting the needs of modern-day living.

My thesis is an exploration of how we can combine the functional aspects of rural buildings with the aesthetic sensibilities of contemporary architecture. The focus of my research is on designing dwellings that incorporate the practicality of agricultural buildings while also incorporating modern design elements that are visually appealing and functional.

To achieve this goal, I have undertaken extensive research into the design of rural structures, examining the materials, forms, and construction techniques that have been used over the centuries. I have also analyzed contemporary architectural trends and identified the key design elements that could be integrated into rural structures without sacrificing their functionality or traditional character.

My research has led me to conclude that the key to creating a successful design is to approach rural structures from a "shed aesthetic" perspective. Shed architecture is characterized by its simplicity, functionality, and minimalism. Shed structures prioritize practicality over ornamentation, using raw materials and straightforward construction techniques that celebrate the beauty of simplicity.

Through my research, I have identified several key design principles that can be applied to create successful rural structures that embody the shed aesthetic. These principles include a focus on the efficient use of space, the use of raw and natural materials, and an emphasis on the connection between indoor and outdoor spaces.

My thesis project will apply these design principles to the creation of a rural dwelling that combines the practicality of agricultural structures with the aesthetics of contemporary architecture. By incorporating the shed aesthetic into my design, I hope to demonstrate that rural structures can be both functional and visually appealing while also preserving the unique character of the rural landscape.

Ultimately, my goal is to contribute to the ongoing dialogue around how we can preserve our rural heritage while also meeting the needs of modern living. By embracing the shed aesthetic, we can create structures that are both practical and beautiful, helping to ensure that our rural landscape remains a vital part of our cultural heritage for generations to come.

QUESTIONS:

WHAT IS DWELLING AND WHAT IS SHED?

THE DWELLING IS THE ELEMENT OF THE STRUCTURE THAT PROVIDES SHELTER FOR THE OCCUPANT. IN MANY CASES THIS WOULD BE CONSIDERED THE HOME. THE SHED IS THE STORAGE ELEMENT AND CAN BE CONSIDERED ALL OTHER TYPES BUILDINGS NEEDED ON A HOMESTEAD.

WHAT DOES ONE NEED TO BE SELF-SUFFICIENT?

THE MAIN THINGS NEEDED TO BE SELF SUFFICIENT ARE ONE'S OWN SHELTER, A WAY TO PROVIDE FOOD AND WATER FOR ONES SELF.

WHAT IS THE REASON FOR COMBINING STRUCTURES?

ONE REASON FOR COMBINING MULTIPLE STRUCTURES IS TO REDUCE THE AMOUNT OF LAND NEEDED FOR A HOMESTEAD. ANOTHER REASON WOULD BE TO EXPLORE INTEGRATING SYSTEMS WITHIN THE ARCHITECTURE SO THAT WE BEGIN CREATING ARCHITECTURE THAT PROVIDES FOR AN INDIVIDUAL.

WHY IS BEING SELF-SUFFICIENT BETTER FOR THE ENVIRONMENT?

THE SELF-SUFFICIENT INDIVIDUAL BETTERS THE ENVIRONMENT BY ENSURING THAT HE IS REDUCING USAGE ON THE ENVIRONMENT AS MUCH AS POSSIBLE AND NOT RELYING AS LITTLE AS POSSIBLE ON COMPANIES THAT PRODUCE MOST OF THE POLLUTION IN THE WORLD.

WHAT MATERIALS WILL ALLOW FOR SELF-SUFFICIENT/GREEN DESIGN?

MATERIALS USED IN SELF-SUFFICIENT AND GREEN DESIGN WILL VARY DEPENDING ON THE ENVIRONMENT ONE INHABITS. HOWEVER, BY USING THE EARTHSHIP AS A MODEL OF DESIGN, THE EARTH ITSELF BECOMES THE VESSEL FOR DESIGN AND OBJECTS LIKE TIRES ARE REUSED TO REINFORCE THE STRUCTURE, ELIMINATING WASTE.

Proposition Essay

The two major books that I read was Escape the City by Travis J. I. Corcoran. I read both Volume one and volume two. Both books talked about what was needed when it comes to homesteading. The book covered land, buildings, animals, plants, farm equipment, and survival methods. The two books allowed me to understand what was needed to start homesteading. Based off of these books I hypothesis that a lot of the elements needed for homesteading can be combined to reduce land usage and consolidate everything within less building mass. I also hypothesis that a lot of the elements can be implemented within the architecture to create an architecture that provides for the individual. This combination would look at promoting a self-sufficient life style.

The intersection between sheds and dwellings has the potential to create more sustainable, self-sufficient, and harmonious living spaces. Shed roof design principles, inspired by the Dog Trough style of architecture prevalent in early American homesteads, can provide a protective barrier for architectural space and support self-sufficient activities. The integration of aquaponic systems within self-sufficient dwellings can support sustainable food production and water conservation. Practical insights into the design and construction of self-sufficient dwellings can be found in Travis Corcoran's "Escape the City: A How-To Homesteading Guide," while Leo Marx's "The Machine in the Garden" provides historical and cultural perspectives on the relationship between technology and nature that can inform contemporary design. By exploring the intersection between sheds and dwellings in contemporary architecture, we can create more sustainable, self-sufficient, and harmonious living spaces that support community building, environmental conservation, and personal autonomy. As such, the design and construction of self-sufficient dwellings that integrate sheds and aquaponic systems can serve as a model for sustainable living in the 21st century.

FIGURE 1 - *Escape The City* book V1

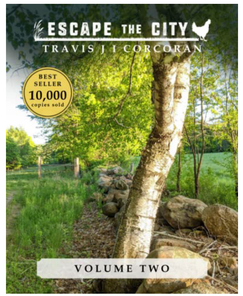


FIGURE 2 - *Escape The City* book V2

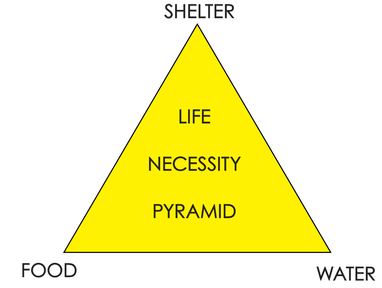


FIGURE 3 - *Nessesity Triangle*

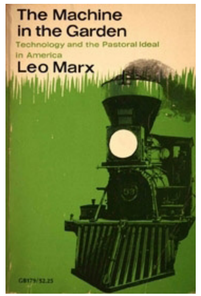


FIGURE 4 - THE MACHINE IN THE GARDEN BOOK

Methodology

This thesis uses a combination of literature review and case studies to explore the potential for sheds to enhance sustainable living through efficient and functional design. Case studies will include examples of shed structures in various contexts, including residential and community settings. The analysis will focus on the design principles and strategies used to achieve a harmonious and sustainable relationship between the shed and the dwelling, as well as the benefits and challenges associated with these approaches. The Dog Trough style of architecture will serve as a precedent for shed roof design principles that provide a protective barrier for architectural space and support self-sufficient activities.

Aquaponics integration and natural light will be explored as supplementary aspects of shed design. The incorporation of aquaponics systems can provide a means of sustainable food production, while natural light can enhance the functionality and aesthetic appeal of the shed as a workspace or living space. These elements will be examined in relation to their ability to enhance the intersection between the shed and the dwelling.

Goals

1. To explore the use of shed architecture in contemporary design and its potential for sustainability and functionality.
2. To investigate the history and evolution of shed architecture, and how it has been used in different cultural contexts.
3. To analyze various design principles and techniques related to shed architecture, such as grid structures, roof types, and spatial organization.
4. To experiment with different materials, construction methods, and environmental strategies to enhance the performance and aesthetics of shed architecture.
5. To apply the insights and findings from shed architecture to the design of a specific project or site, such as a residential or commercial building, a community space, or a public infrastructure.
6. To contribute to the discourse on sustainable design, resilient communities, and adaptive reuse through the lens of shed architecture.
7. To develop a set of guidelines, recommendations, or best practices for architects, builders, and policymakers who want to incorporate shed architecture into their projects or policies.

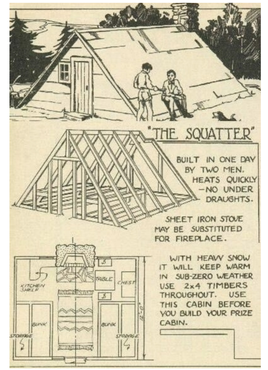


FIGURE 5 - Temporary A-frame Structure

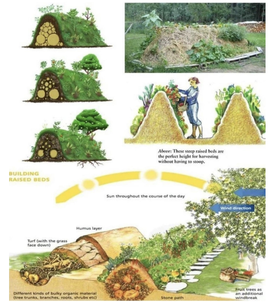


FIGURE 6 - Farming to base project around

FIGURE 7 - Project Idea

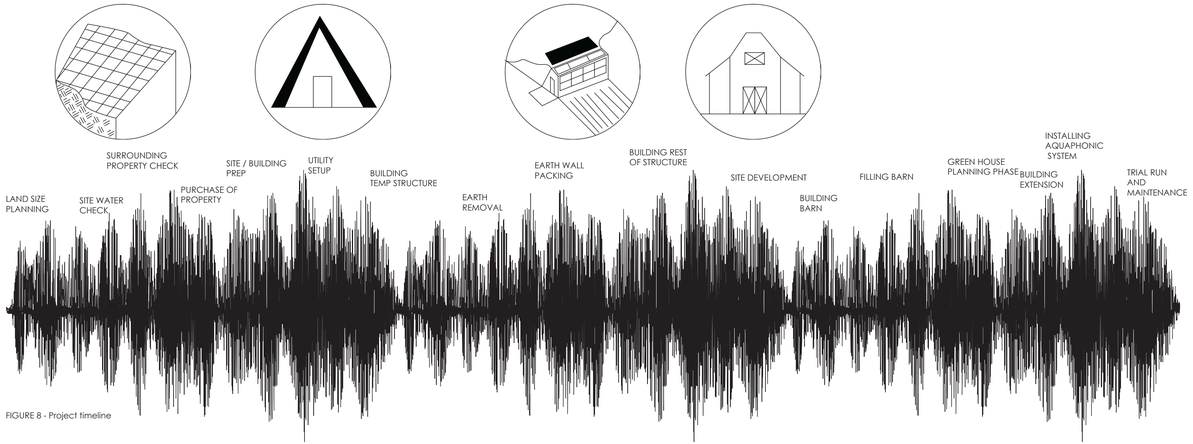


FIGURE 8 - Project timeline

The timeline of events provides a detailed plan of the steps needed to complete the construction of a self-sufficient dwelling. The first steps involve land size planning, checking site water availability, and surveying the surrounding property before the purchase of the property can be made. The analysis on the Sawmill project highlights the importance of a well-planned grid system, which can be applied to the site and building prep phase. The utility setup phase can be informed by the studies on sustainable energy sources and systems that maximize energy efficiency.

The use of a temporary structure during the earth removal and wall packing phases, as suggested by the study on Michael Reynolds' School of Design, can provide a practical and cost-effective solution. The building phase can be informed by the analysis of different roof types and the advantages of disconnecting the roof from the building for a shed aesthetic and function. The site development phase can be informed by the study on permaculture and the use of natural and sustainable landscaping techniques. The building of the barn and the filling of the barn can be informed by the study on the advantages of using different roof types for storage.

The planning phase for the greenhouse and the building of the extension can be informed by the study on greenhouse design and the use of sustainable materials. The installation of the aquaponic system can be informed by the study on sustainable food production systems. Finally, the trial run and maintenance phase can be informed by the study on the importance of continuous monitoring and adaptation to ensure optimal performance and sustainability. Overall, the timeline of events provides a practical and informed plan for the construction of a self-sufficient dwelling.

FIGURE 9 - TOWER OF BABEL IMAGE

Within the beginning of time we have seen the failure of cities. Within the bible we see that the people had one language and united together after the flood and build a city temple to show their greatness and build above the land so God couldn't flood them again. God tells them to disperse to fill the earth. Man does not and God divides the languages so that the tower can not be finish. God does this because man was trying to be like God rather than doing what he says and dispersing among the land and taking care of it.

FIGURE 10 - CLOSER LOOK AT TOWER OF BABEL

Further ideas of this go to the ruler of this time. Jewish historians, like Josephus, write about the tyrant Nimrod. His actions lead to a centralization of power to himself and Then began to propose taxation to fund the tower of Babel. This taxation came to mach the tithe given to God at the time. From the beginning of their inception **Cities are a false god** imposed to take from the people to fund the tyrannical.

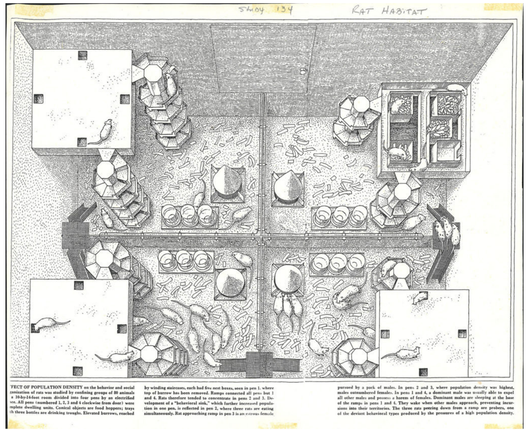


FIGURE 11 - CAGE LAYOUT IMAGE

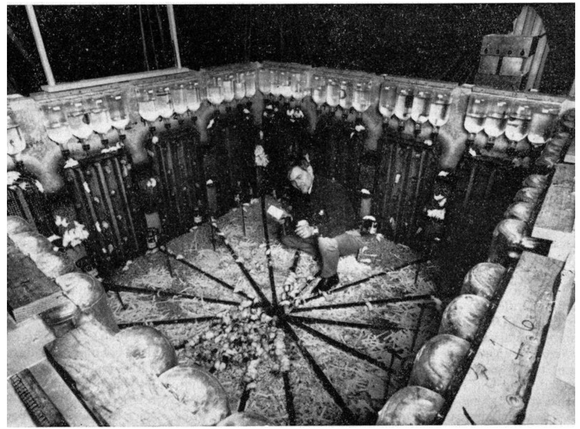
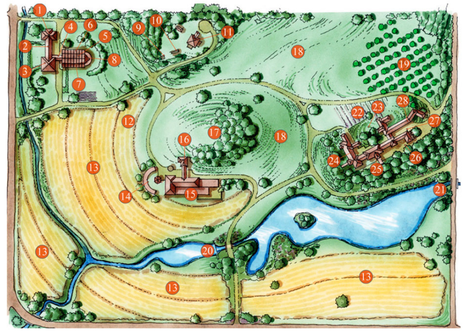


FIGURE 12 - RAT UTOPIA PHOTO

When looking at simulations of cities like The Rat Utopia we see where how cities can destroy themselves when they reach a maximum density. The experiment was a study conducted in the 1960s to see how rats behaved when they were crowded together with limited space. Initially, the rats were happy and reproduced, but as the population grew and hit a maximum capacity for the cage, they began to act strangely, such as violent and cannibalistic tendencies formed. The experiment showed how social density can affect animals and has been used to understand problems in human societies.

Precedence Analysis

BROAD ACRE BY FRANK L WRIGHT



Taliesin

1. Hillside
2. Staff dining
3. Kitchen / living
4. Bridge
5. Bridge
6. Drafting room
7. Staff quarters
8. "Tea" circle
9. Staff residences
10. "Romeo & Juliet"
11. Tan-Y-Deri
12. Vegetable gardens
13. Cultivated fields
14. Machinery shed
15. 'Midway' farm
16. Staff residence
17. Midway hill
18. Pasture
19. Orchard
20. Upper dam
21. Lower dam
22. Vineyard
23. Hill garden
24. Main residence
25. Studio
26. Lower Court
27. Upper Court
28. Staff residences

FIGURE 13 - Broad Acre layout

Land Uses

1. County seat
2. Airport
3. Stables and track
4. Sports fields
5. Baseball field
6. Athletic clubs
7. Lake and stream
8. Small farms
9. Custom residential
10. Interior parks
11. Music garden
12. Physical culture
13. Market center
14. Roadside inn
15. Employee residential
16. Industry and dwellings
17. Commercial
18. Service businesses
19. Main parkway
20. Industry
21. Vineyards and orchards
22. Live/work
23. Residential
24. Schools
25. Wpship center
26. Guest houses
27. Research center
28. Arboretum
29. Zoo
30. Aquarium
31. County fair
32. Hotel
33. Country fair
34. Sanitarium
35. Industrial units
36. Medical clinics
37. Apartments
38. Dairy
39. Elementary school
40. Taliesin equivalent
41. Design center
42. Cinema
43. Forest cabins
44. Reservoir
45. Automobile objective
46. Garages and stores
47. Gas stations
48. Educational center

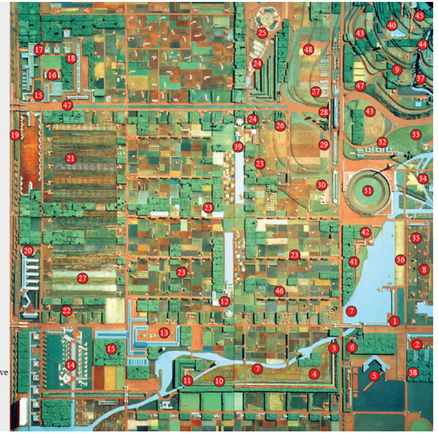


FIGURE 14 - Broad Acre Plan

Frank L Wright's Broad Acre plan serves as an ideal model for designing a community of homesteads. The plan involves maximizing the usage of a rural landscape through the design of low-density, self-sufficient homesteads. The homesteads would be designed to specialize in different homesteading practices such as agriculture, livestock farming, and renewable energy production. These homesteads would operate under a system of anarcho-capitalism, where individuals would trade their specialized homesteading products or services for something of value.

Wright's design breaks down the environment and returns the cityscape from one of compact nature to one of more rural spacing. This design approach allows for the use of a large amount of space while maintaining a sense of community. The individual homesteads would be designed in a way that maximizes their functionality and self-sufficiency while also being aesthetically pleasing. The design emphasizes the importance of integrating agriculture, renewable energy, and waste management into each homestead, creating a sustainable and self-sufficient community.

Overall, Frank L Wright's Broad Acre plan serves as an inspiration for designing a community of self-sufficient homesteads that operate under anarcho-capitalism. The design focuses on maximizing the usage of a rural landscape, creating a sense of community, and emphasizing the importance of sustainability and self-sufficiency. By specializing in different homesteading practices, individuals can trade their products and services for something of value, creating a self-sufficient and sustainable community.

Broad Acre

Constraints	The ideas of Broad Acre are more in line with the ideas for my thesis. The issue that will come into play is the fact that is only theoretical and has not been proven through actual construction.
Potentials	Broad Acre is a great example for my thesis not only does it look at a more suburban community it look to make the most of the environment given the what is put within it to allow both the people and the nature to be comfortable.
Priorities	Study the ideas within this project and take away the main ideas that make it appealing to people and apply that to Earthship architecture.
Opportunities	Broad acre shows of the multiple uses for land and how to adapt that to a rural environment.

FIGURE 15 - Table 1

GARDEN CITY BY EBENESER HOWARD

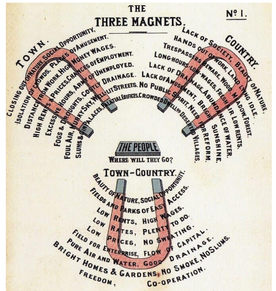


FIGURE 16 - Garden City concepts

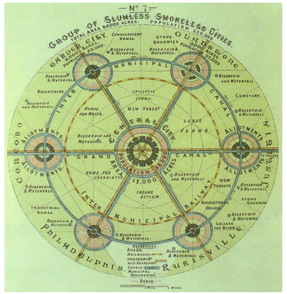


FIGURE 17- Garden City Overall Plan

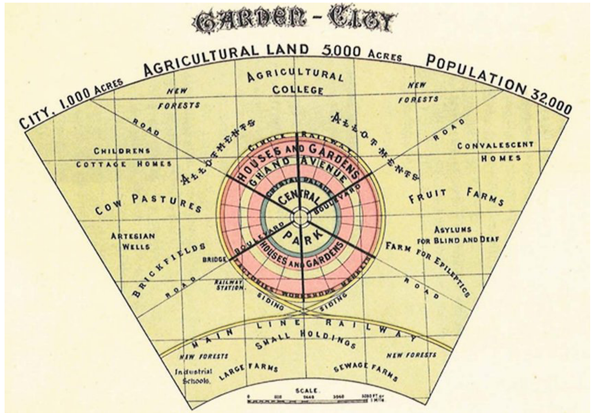


FIGURE 18 - Garden City Unit Plan

The Garden City by Ebenezer Howard offers an alternative to the traditional urban environment, one that allows for a more harmonious relationship between people and nature. In Howard's vision, smaller communities are separated by gardens and green spaces, offering privacy and a connection to the natural world. This design is particularly relevant to my thesis, as it provides a blueprint for how multiple homesteading communities could come together to form smaller clusters within the larger Garden City.

The Garden City's emphasis on green spaces and the connection between people and nature is a valuable lesson for my thesis. By emphasizing sustainable living and reducing the carbon footprint of urban areas, this approach can promote a healthier and more harmonious way of life for urbanites. The design's small communities, connected by shared green spaces, would allow for a sense of community and connectedness while preserving privacy and autonomy.

In sum, Garden City's focus on nature, community, and sustainable living provides a powerful alternative to traditional urban design. By drawing on this vision, my thesis can offer a model for how multiple homesteading communities can come together to form a larger, more harmonious urban environment.

The Garden City utopia

Constraints	The Garden City utopia is a great philosophy to follow for my thesis as it will provide a temple for multiple green communities to be connected and create a larger city scape design if I so choose to fallow that.
Potentials	The green focus of this Urban Utopia will allow for nature to take a front and center spot in the design of my project.
Priorities	Study the philosophy of the smaller units of the garden city to understand how one would be built.
Opportunities	The modular nature of the design will allow for replication on a grander scale in addition to opening up more connections.

FIGURE 19 - Table 2

SCHOOL OF DESIGN BY MICHAEL REYNOLDS

FIGURE 20 - School of Design Picture

FIGURE 21 - School of Design Picture

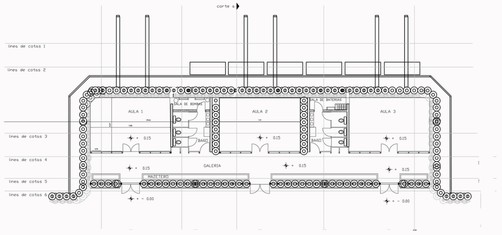


FIGURE 22 - School of Design Plan

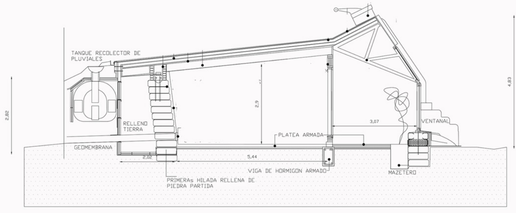


FIGURE 23 - School of Design Section

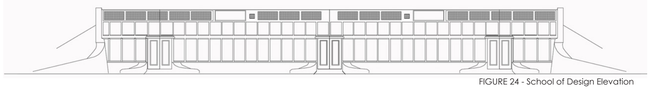


FIGURE 24 - School of Design Elevation

The School of Design by Michael Reynolds is a remarkable example of sustainable Earthship design. This design showcases the highest degree of sustainability by utilizing everyday materials such as tires to create multi-use spaces. This approach is perfect for guiding the creation of the design intended in this thesis. The plans and sections of the school demonstrate the incorporation of passive elements and other systems that allow the building to function autonomously.

One interesting aspect of the School of Design is its potential conversion into a greenhouse. By utilizing earthship design principles and the use of everyday materials, this school can inspire a new way of creating greenhouses that are self-sufficient and sustainable. The school's design systems can be adapted to incorporate solar gain, rainwater harvesting, and natural ventilation, all of which are crucial elements in greenhouse design.

Overall, the School of Design serves as a successful example of how sustainable design can be achieved using everyday materials and earthship design principles. The school's plans and sections demonstrate a clear understanding of incorporating passive elements and other systems that allow the building to function independently. By utilizing these principles, the design can be adapted to create a sustainable and self-sufficient greenhouse, showcasing the potential of earthship design in a different context.

School of Design by Michael Reynolds

Constraints	The School of Design looks at an Earthship and how to design one in the most sustainable ways that are currently available.
Potentials	The green element of Earthships will allow for spaces to introduce new technologies to make my design palatable to sustainability experts and the common man.
Priorities	Study the building style and construction design for implementation within design.
Opportunities	The modular nature of the design will allow for replication on a grander scale in addition to opening up more connections.

FIGURE 25 - Table 3

CH. 2 DESIGN ANALYSIS

Historical Shed Exploration

The historical shed drawings, such as the Plate XX drawing and the accompanying diagram with yellow, green, and blue sections, break out space into circulation, storage, and work areas. This organization of space reflects the functional nature of sheds, which were typically used for utilitarian purposes like storage and work. The use of a grid and careful arrangement of spaces also suggest an emphasis on efficiency and functionality. The Sawmill House, which also utilizes a grid and careful arrangement of spaces, draws inspiration from this historical precedent. By examining these historical shed drawings, designers can gain valuable insights into the organization and arrangement of space that can inform the design of more efficient and functional self-sufficient dwellings that integrate shed structures and aquaponic systems.

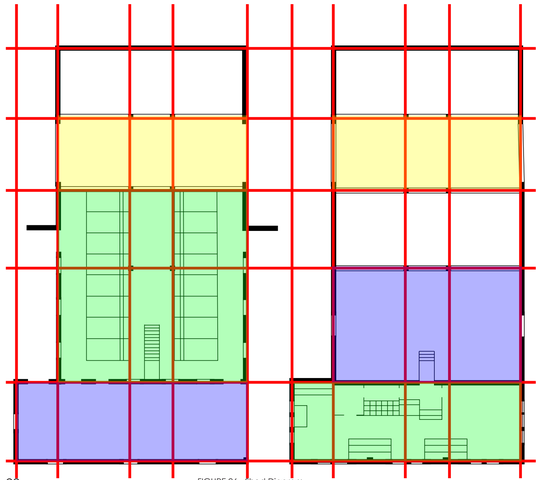


FIGURE 26 - Shed Diagram

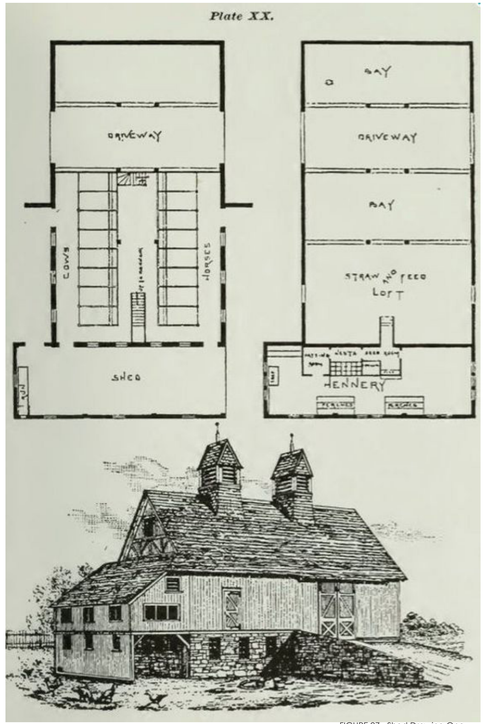


FIGURE 27 - Shed Drawing One

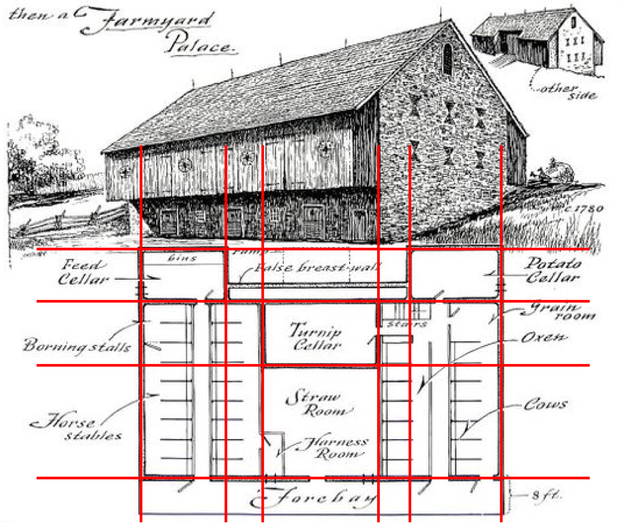


FIGURE 28 - Shed Drawing Two

The image "Then a Farmyard Palace" depicts a large farm building with a clearly defined box shape in the floor plan. The grid of the building is visible and suggests a careful and organized arrangement of space. This attention to organization and function reflects the utilitarian nature of the building, which likely served a variety of purposes related to agriculture and animal husbandry. It can be seen as a valuable historical precedent for the design of self-sufficient dwellings that integrate shed structures and aquaponic systems. This image, along with the previous analysis of historical shed drawings and the Sawmill house, reinforces the importance of careful space organization and the use of a grid in the design of functional and efficient self-sufficient dwellings. By studying these historical precedents, designers can gain insights into the arrangement and interaction of spaces that can inform the design of contemporary self-sufficient dwellings.

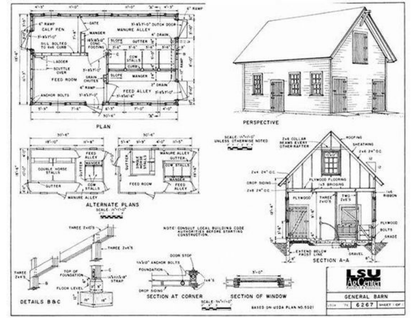


FIGURE 30 - More Historical Plans

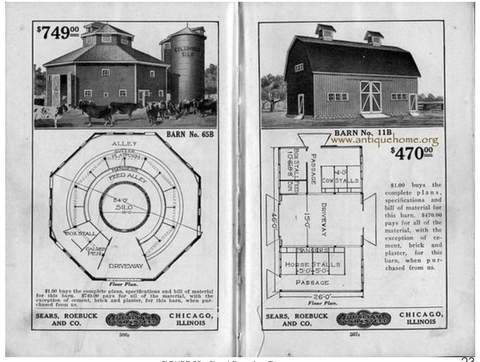


FIGURE 29 - Shed Drawing Three

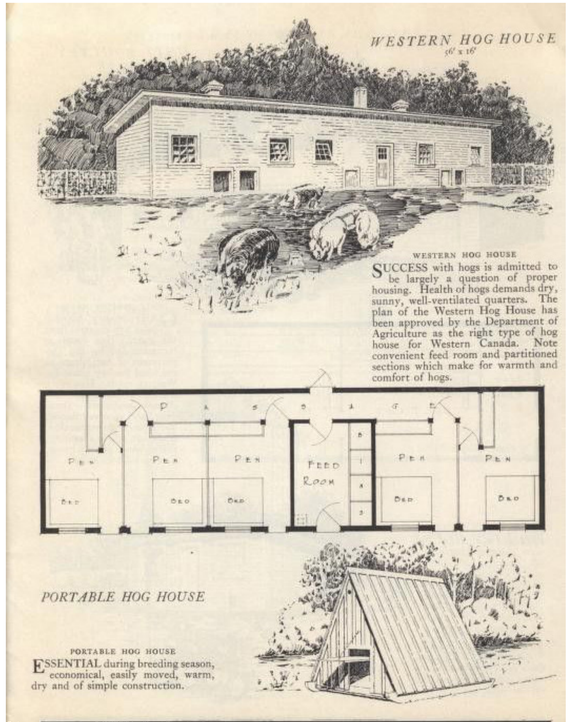


FIGURE 31 - Shed Drawing Four

The Western Hog House provides an interesting precedent to analyze the breakdown of space and proportionality. The grid of the space is well-defined, with a clear proportional allocation of space for different functions. The layout is optimized for the primary users of the space, the pigs, with efficient circulation paths and ample space for feeding and resting. This analysis can inform the design of the coop in the final project, ensuring that the space is optimized for the needs of the animals while also being functional and efficient for the user. Additionally, the Western Hog House provides an interesting perspective on the relationship between storage and dwelling, which is relevant to the thesis's exploration of the shed and its potential for housing and self-sufficiency.

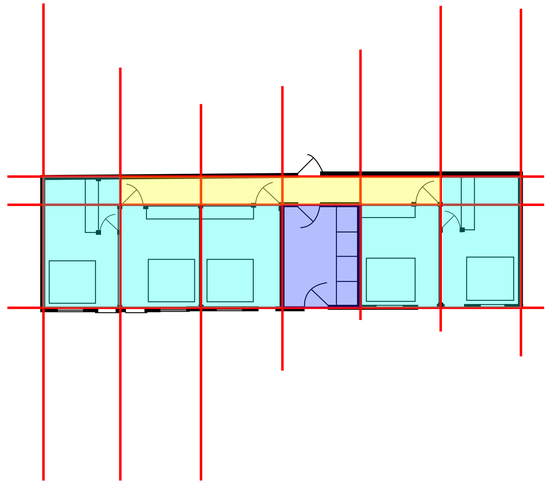


FIGURE 32 - Shed Drawing 4 Diagram

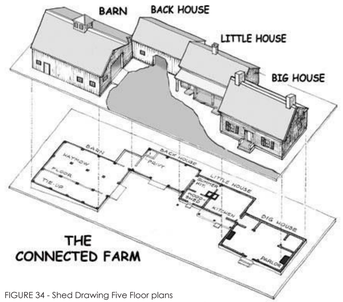


FIGURE 34 - Shed Drawing Five Floor plans

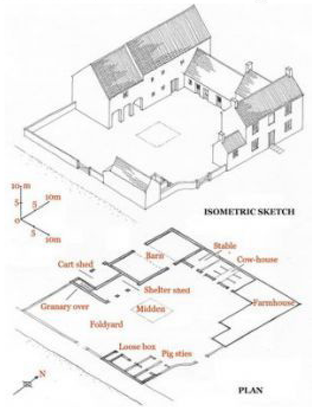


FIGURE 33 - Shed Drawing Six Floor plans

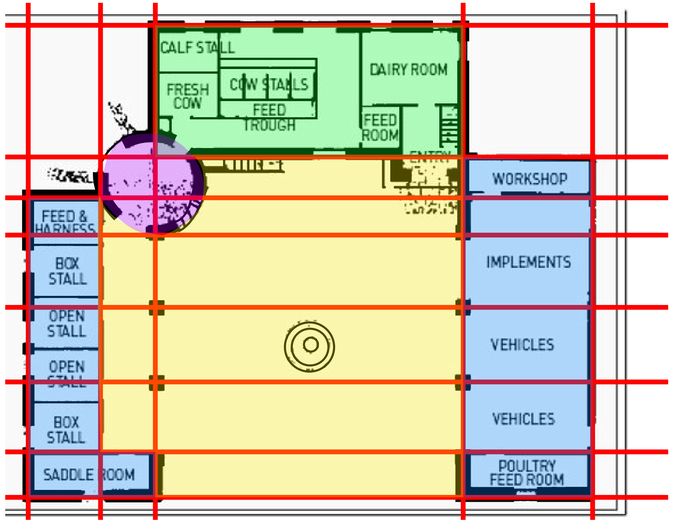


FIGURE 35 - Shed Drawing Four

The analysis of the historical barn structure reveals a clear focus on optimizing the use of space for storage and work, with a smaller focus on creating a courtyard area. This provides valuable insights into the efficient use of space, and how different areas can be used for specific functions. However, when looking at the layout of buildings with a courtyard focus, it becomes clear that the courtyard is an important aspect of the design. While both approaches have their merits, it is evident that the dog trough style, with its emphasis on integrating sheds and aquaponic systems, will lead to a more efficient and sustainable design. By combining these elements, the design can create a cohesive system that maximizes the use of space, while also promoting sustainable living practices.

For this analysis, I looked at a more common shed drawing and focused on the grid structure. The spacing follows an a,b,b,b,a pattern one way and an a,a,b,a,b pattern the other way. This grid structure ensures efficient use of space and optimal flow through the shed. While the use of the shed is not explicitly stated in the drawing, the grid and spacing provide insights into how the shed can be best utilized. The grid analysis of this shed drawing adds to the overall understanding of how to create functional and efficient sheds. By understanding the optimal grid and spacing patterns for sheds, designers can create more effective designs that meet the needs of users.

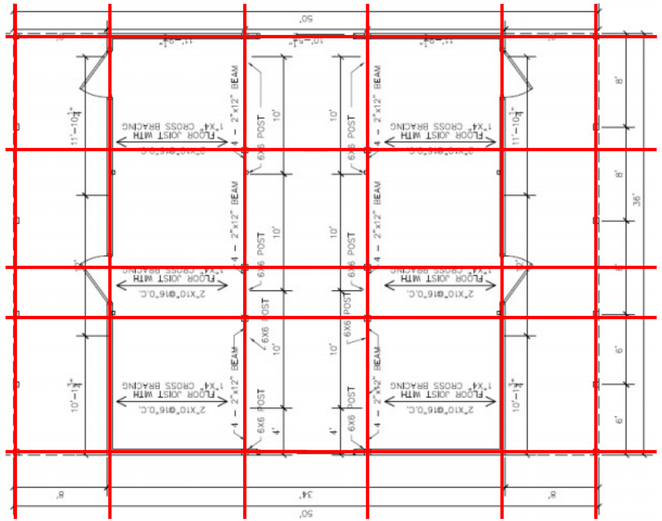


FIGURE 36 - Shed Drawing Five

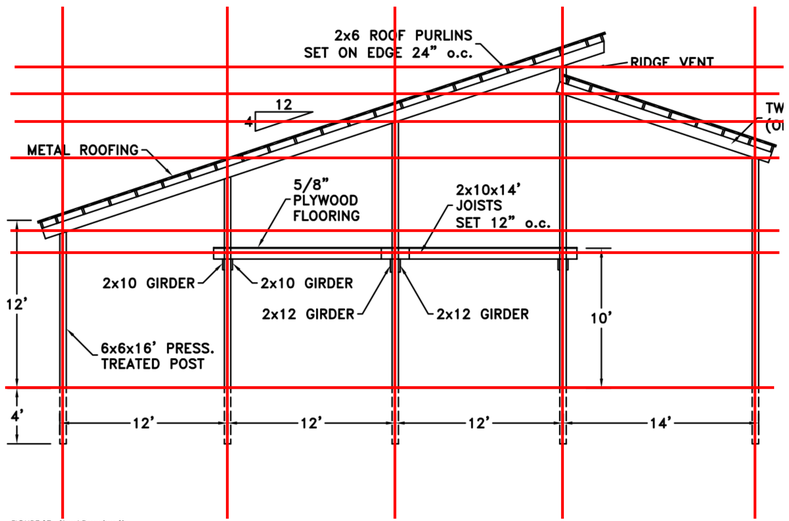


FIGURE 37 - Shed Drawing Six

Based on the analysis of the grid of the previous drawing, a specific section was explored to examine where the columns touch the roof. This analysis provides important insights into how the structure of the shed or pole barn can be optimized to ensure stability and structural integrity. By examining the specific details of the shed, such as the slope of the roof and the placement of columns, the design of the shed or pole barn can be improved to better suit the needs of the users. This analysis also highlights the importance of understanding the specific requirements and needs of the users, as well as the importance of optimizing the structure for maximum efficiency and functionality. Overall, this analysis contributes to the larger narrative of the thesis, which emphasizes the importance of designing spaces that are both functional and aesthetically pleasing, while also being optimized for the specific needs of the users.

Metal Structure Exploration

In the study of the two images, the focus is on how the shape and structure of the roof elements impact the overall design of the structure. The drawing of the structure in Image 2 shows how the columns, floor grid, and roof grid work together to create a cohesive design. The blue columns serve as the structural support for the entire structure while the red floor grid serves as the foundation for the structure. The green roof grid, on the other hand, follows the curve created by the structural elements, resulting in a dynamic and visually appealing roof design.

This analysis is important to the overall thesis as it emphasizes the importance of considering the design and structure of the roof elements in creating a functional and visually appealing structure. By studying the grid and shape of the roof, designers can optimize the use of space and create a design that is both functional and aesthetically pleasing. Moreover, this analysis builds on the previous exploration of the grid and spacial layout of historic structures, highlighting the importance of understanding the grid and structure in creating a successful design.

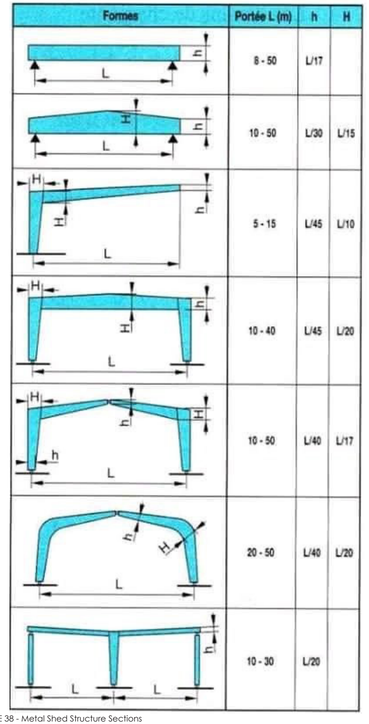


FIGURE 38 - Metal Shed Structure Sections

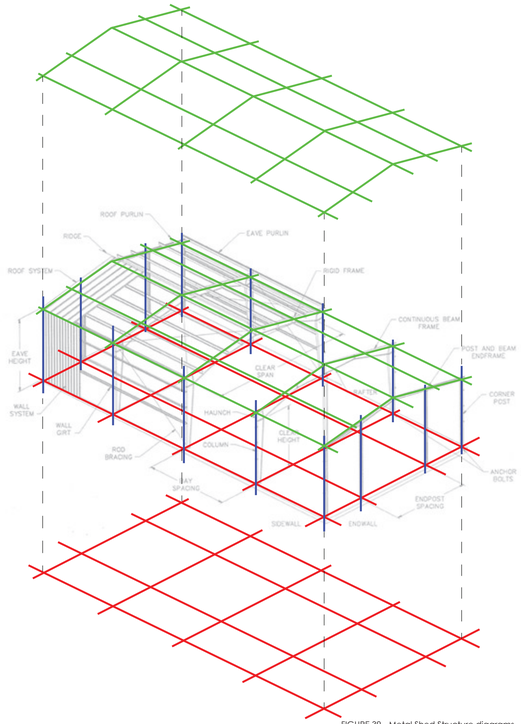


FIGURE 39 - Metal Shed Structure diagrams

Roof study

The analysis of different roof types is crucial to understand the pros and cons of each type to make an informed decision on which type of roof to use in a design. The VIN diagram shows three circles, each representing a different advantage of roof types. One circle represents roofs that are better for storage, another represents more architectural roofs, and the third circle represents architectural roofs with extra features.

While each type of roof has its advantages, it is important to consider the overall aesthetic and function of the design. In the case of the proposed design, the goal is to combine shed roof structures to protect the dwelling elements. By disconnecting the roof from the building, the design can capitalize on the shed's aesthetic and function.

In conclusion, while each type of roof has its advantages, it is important to consider the overall design and function when making a decision. In the case of this design, the decision to disconnect the roof from the building will allow for the full potential of the shed's aesthetic and function to be utilized.

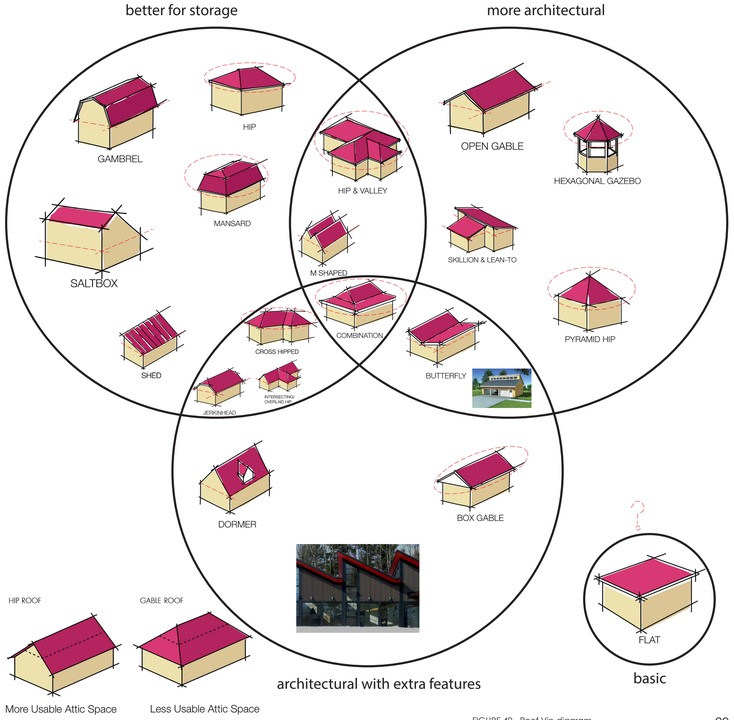


FIGURE 40 - Roof Vin-diagram

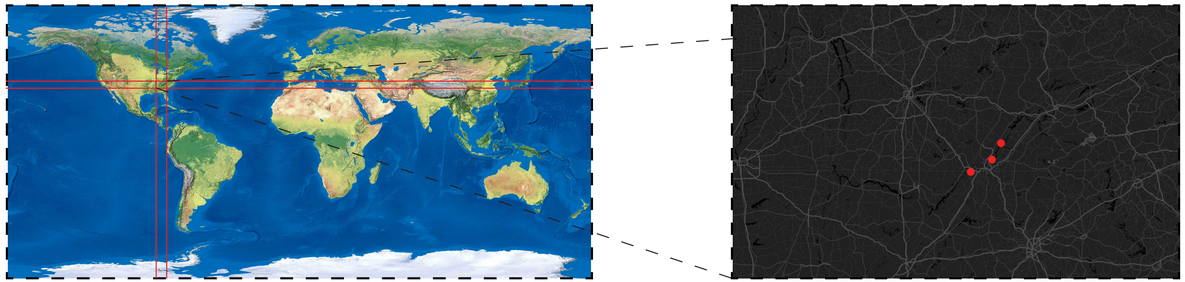


FIGURE 41 - diagram site reference

LOCATION:

7547-7501 Nelson Spur Rd, Hixson, TN 37343

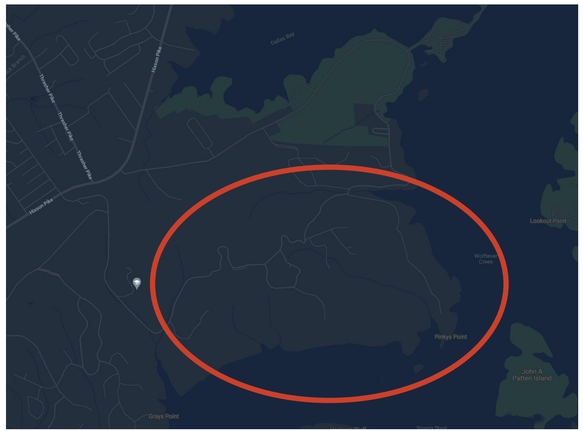


FIGURE 42 - Site One Map

Constraints	The Tennessee River is known to rise and fall depending on rainfall. Careful consideration needs to be taken. A small community is already there that would need to be converted or built around.
Potentials	While the area not built in is open and would allow for a number of buildings, the integration with an already existing community allows for more connections with others outside of the urban landscape.
Priorities	Use the lumber and other materials on site to build the structures needed. Remove as little of the environment as possible to construct design.
Opportunities	Location near the river allows for a water access set up. A pre-existing community will allow for more engagement from the existing community.

FIGURE 43 - Table 4

LOCATION:
6 Georgia 1, Chickamauga, GA 30707

FIGURE 44 - Site Two Map

Constraints	The Tennessee River is known to rise and fall depending on rainfall. Careful consideration needs to be taken.
Potentials	Open environment allows for maximum change without disrupting what is already there.
Priorities	Use the lumber and other materials on site to build the structures needed. Remove as little of the environment as possible to construct design.
Opportunities	Location near the river allows for a water access set up. Increased remoteness from the city center allows for a more spread out community like Broad Acre.

FIGURE 45 - Table 5

Final Site

Location: 35.277797, -85.106850
11697-11401 Armstrong Rd,
Soddy- Daisy, TN 37379

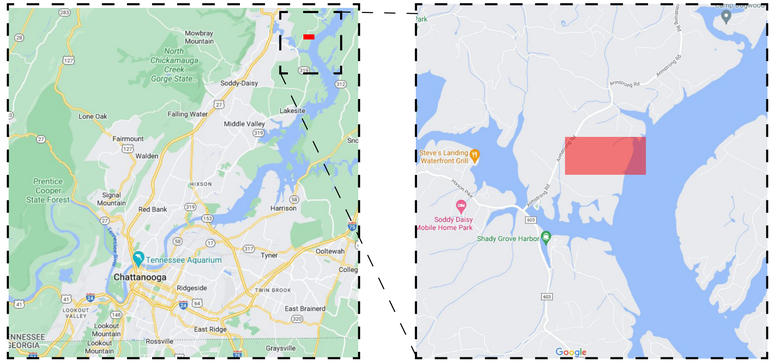


FIGURE 46 - Final Site

CH. 3 DESIGN PROCESS

Site Analysis

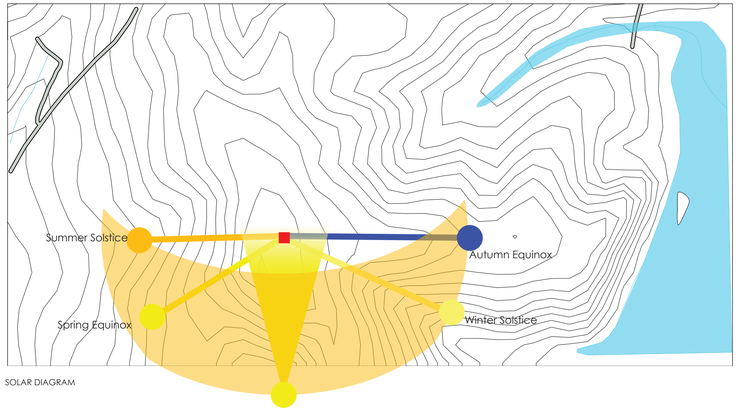


FIGURE 47 - Sun Path Diagram

A solar study can be a crucial component of the design process for self-sufficient dwellings. Shed roof design principles can provide a protective barrier for architectural space and support self-sufficient activities. The integration of aquaponics systems within self-sufficient dwellings can support sustainable food production and water conservation. A solar study can help determine the optimal location and orientation for the dwelling and its components to maximize solar gain and energy efficiency. This includes analyzing the sun's path throughout the day and the year to determine where to place windows, skylights, and solar panels, as well as how to design shading devices to reduce heat gain during the summer months. By carefully considering solar gain and energy efficiency in the design process, self-sufficient dwellings can reduce their reliance on external energy sources, thereby increasing their autonomy and sustainability. Furthermore, integrating solar energy systems can further reduce the carbon footprint of the dwelling, supporting environmentally conscious living. A solar study can provide valuable information to inform the design of self-sufficient dwellings, supporting the creation of more sustainable, self-sufficient, and harmonious living spaces.

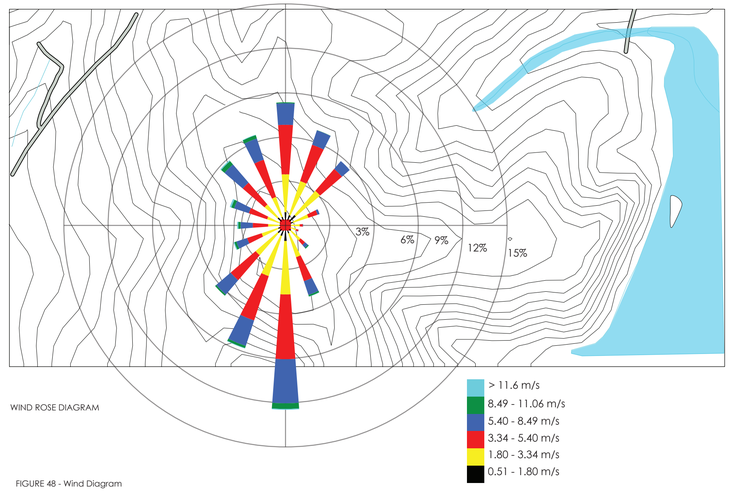


FIGURE 48 - Wind Diagram

In addition to solar gain, a wind study can be a crucial aspect of designing self-sufficient dwellings. Shed roof design principles can create a protective barrier that also works to channel and direct wind flow. This can be particularly useful when designing passive ventilation systems or to create outdoor spaces that are protected from strong winds. A wind study can help identify the optimal orientation and placement of the dwelling and its components to take advantage of natural wind patterns, allowing for increased natural ventilation and improved indoor air quality. By utilizing natural ventilation, self-sufficient dwellings can reduce their reliance on mechanical HVAC systems, thereby decreasing energy consumption and costs. A wind study can provide valuable information to inform the design of self-sufficient dwellings, supporting the creation of more sustainable, self-sufficient, and harmonious living spaces.

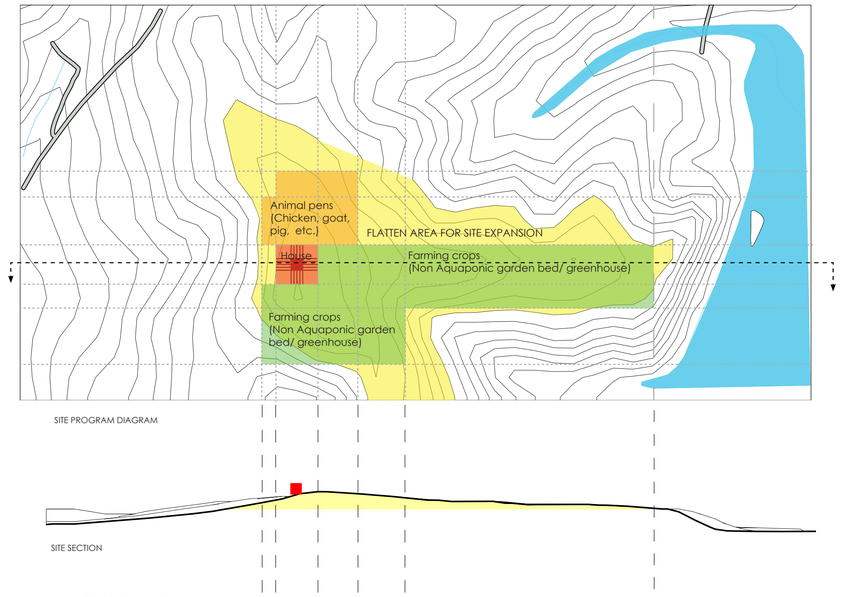


FIGURE 49 - Layout Diagram

Space breakdown chart

- Building Spaces -

House: Living Space
Workshop: Working/ Farming space
- SPACES PART OF DAILY USE
- CARING FOR FAMILY
- DAILY LIFE OUTSIDE OF WORK

Bunkhouse or Cottage: Guest Space
1. SPACES FOR VISITING FAMILY
2. RENTAL TINY HOMES TO GENERATE INCOME ON BIG ENOUGH SITE.

Barn: Food / Animal Storage
Coop: Birdhouse
Run-in Shed: Outside shelter [Open Space]
- SPACES FOR LIVING AND SURVIVAL
- AREA SET ASIDE FOR ANIMAL CARE
- FOOD GENERATION
- STORAGE

Sugar Shack: Hobby/Kitchen help Space
Garden Shed: Green house / Biltmore Garden room
- SPACES PART OF DAILY USE
- GARDEN SPACE FOR GROWING FOOD

Tractor Shed: Enclosed Carport
Firewood Shed: Storage
- SPACES FOR STORING GOODS
- EQUIPMENT
- SUPPLIES

Wooden Frame Building: Sturdy Living Space
- SPACES FOR LIVING PERMANENTLY
1. WOOD
2. SIPs

Fabric Building: Temp, Structure(s)
- SPACES FOR STARTING
- RV
- TENT
- A-FRAME BUILDING (BOARD 1)

Cargo Containers: ??? Storage ???

Smokehouse: Cooking Space [focused on fireplace]
- SPACES FOR LIVING / DAILY USE
- COOKING
- FOOD

FIGURE 50 - Program Though

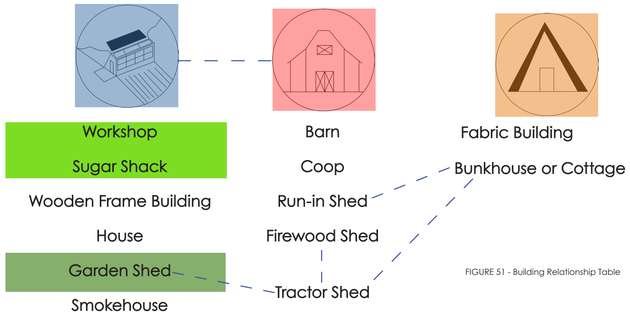
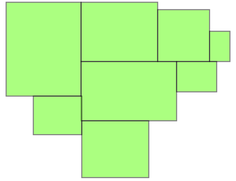
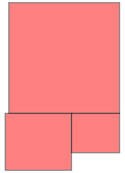


FIGURE 51 - Building Relationship Table

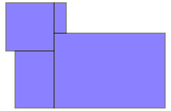
Program and Spatial Exploration



Living space



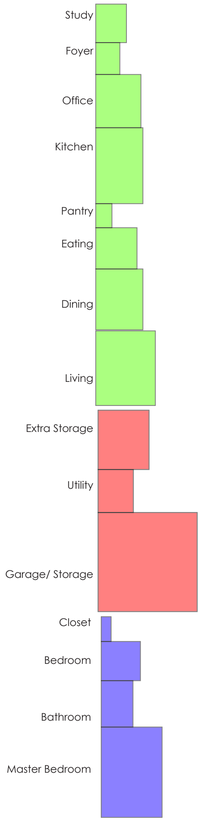
Storage space

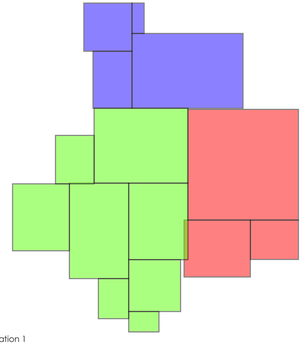


Private space

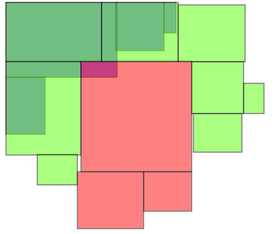
Analyzing standard housing living space can provide valuable insights into the design of self-sufficient dwellings that integrate shed structures and aquaponic systems. By examining the limitations and shortcomings of conventional housing and breaking down the average square footage for room sizes into different types of space, designers can identify opportunities for innovation and improvement. The arrangement and orientation of spaces, as well as the interaction of spaces on top of each other, can be manipulated to maximize energy efficiency and sustainability (page 30). Shed structures, for example, can provide a more efficient and sustainable means of regulating indoor temperatures and improving indoor air quality, while aquaponic systems offer a means of producing fresh food on-site. By analyzing and playing with different arrangements of standard housing living space, designers can identify areas for improvement and innovation, informing the design of more sustainable, self-sufficient, and harmonious living spaces that better align with the principles of the thesis.

FIGURE 52 - Spacal Comparison

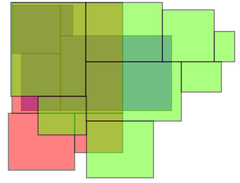




Iteration 1



Iteration 2



Iteration 3

FIGURE 53 - Spacal conection

SAWMILL BY TOM KUNDIG

The Sawmill House by Tom Kundig has a unique layout consisting of a central common space surrounded by private wings. The shed-like roof structure that covers the common area protects both common and private spaces. The grid layout and spacial elements of the building are carefully designed, creating an efficient and functional living space.

One of the most notable features of the Sawmill house is the roof, which acts as a separate entity from the building itself. This roof is designed to cover the common areas while extending outwards to partially cover some of the private spaces as well. The use of this roof adds an interesting architectural element to the house, as it creates a more expansive and open feel, while also providing ample natural light.

The grid layout of the Sawmill house is carefully thought out to create an efficient and functional living space. The central common area acts as the heart of the house, providing a communal space for all residents. The private wings surrounding the central space provide ample privacy for each resident, while still being close enough to the communal area to promote socialization. The use of a separate roof structure adds an interesting architectural element to the house and protects it while still allowing ample natural light. Overall, the Sawmill House is a well-designed and functional living space that combines architectural design with functionality.

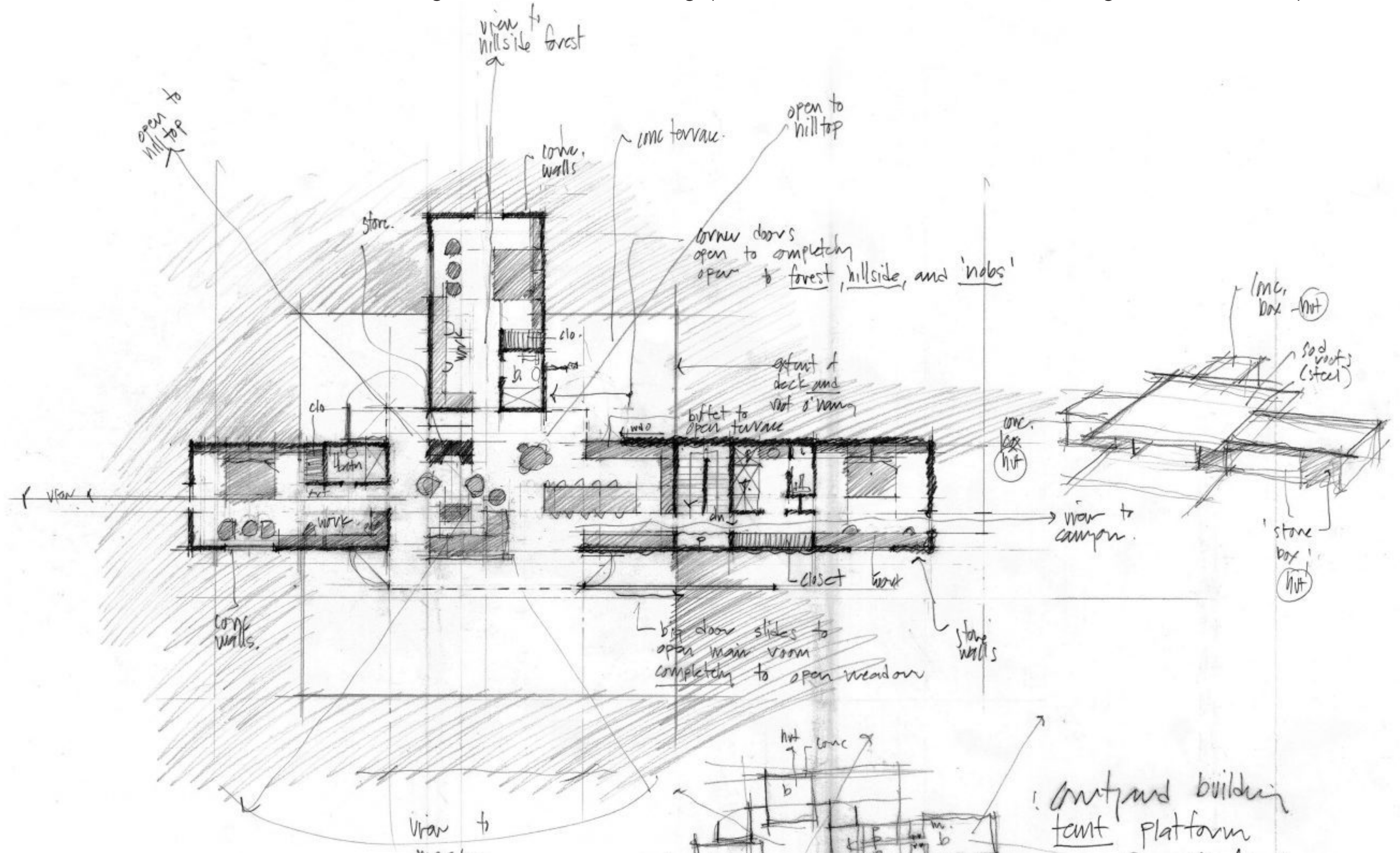


FIGURE 54 - Sawmill Plan Drawings

FIGURE 55 - Sawmill Picture

FIGURE 56 - Sawmill Picture

FIGURE 57 - Sawmill Picture

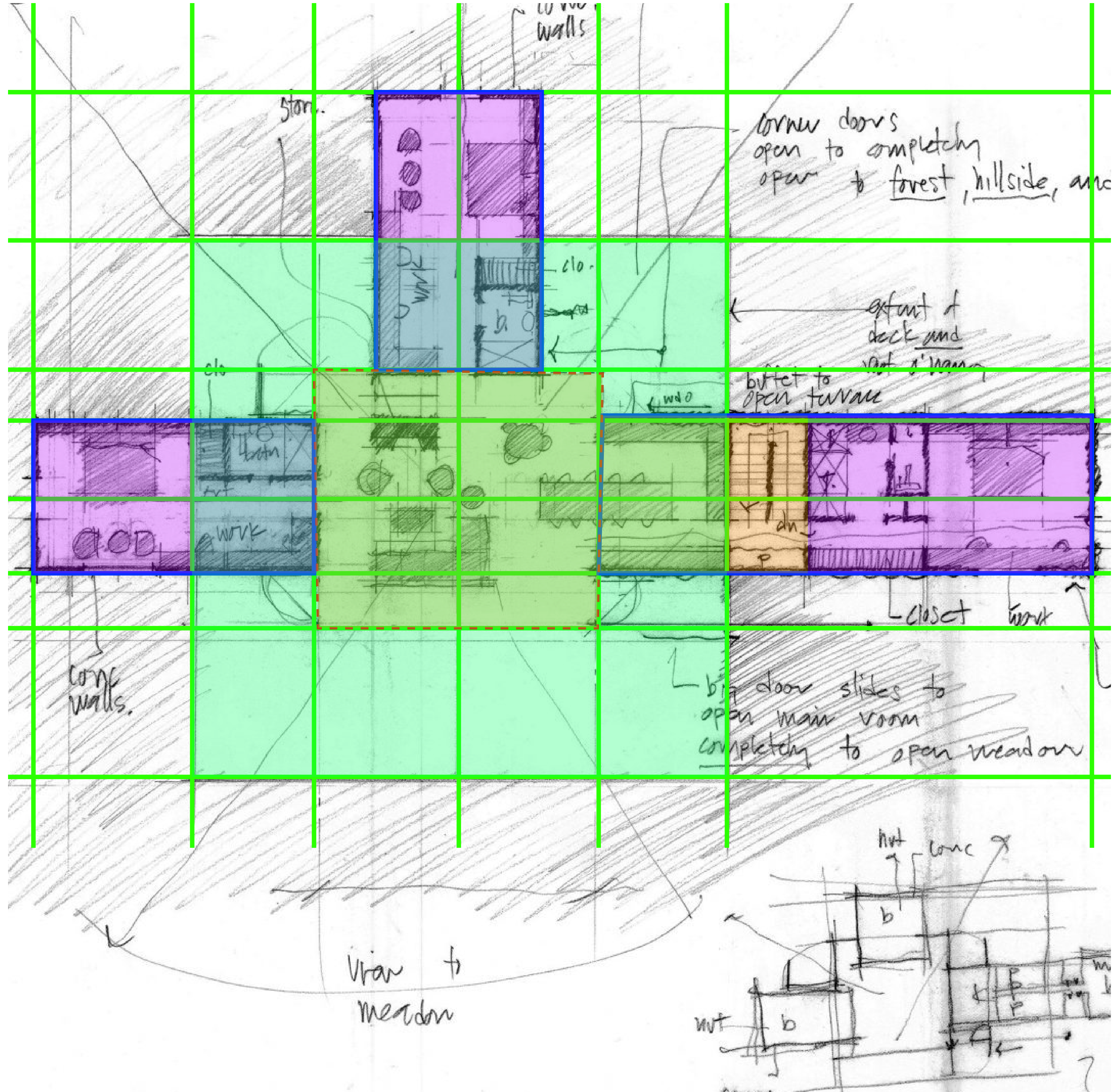


FIGURE 58 - Sawmill exploration

VOLUME STUDY BASED ON SPACE PURPOSE

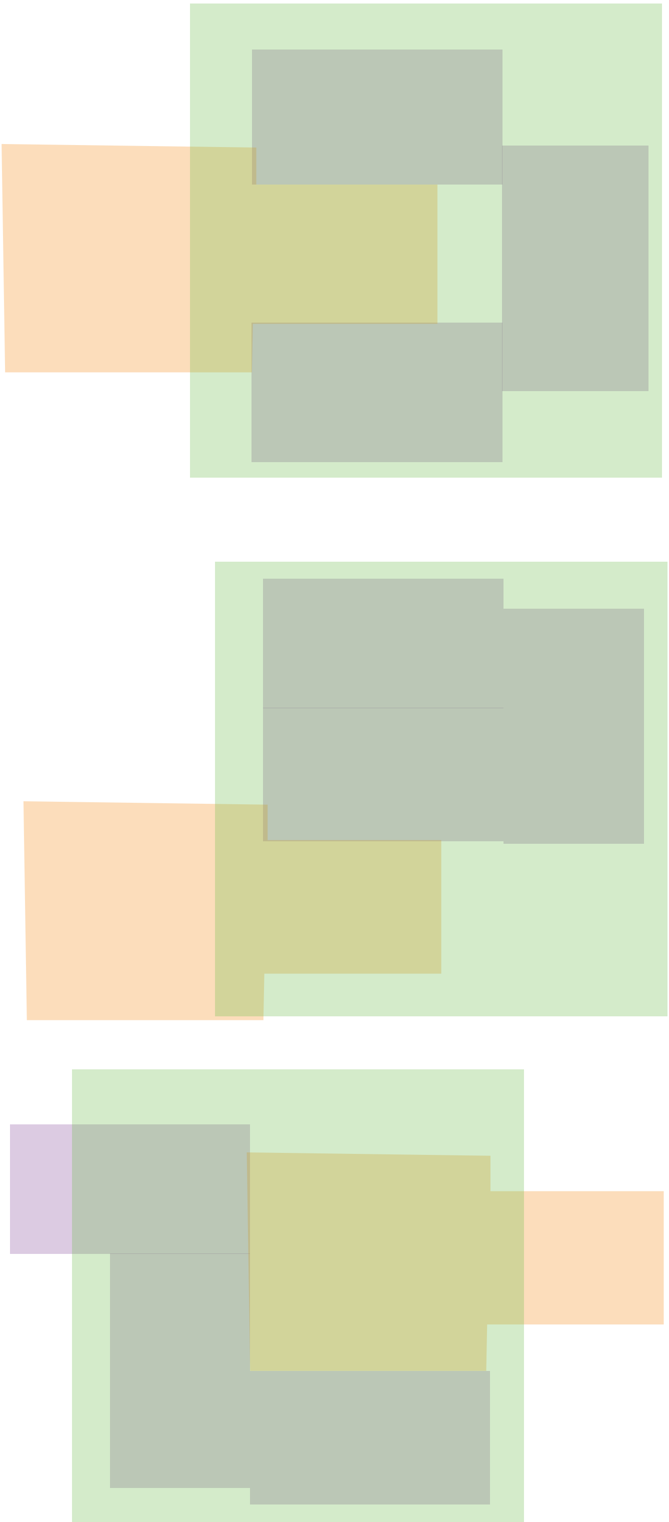


FIGURE 59 - Space Study

VOLUME STUDY BASED ON CENTER V. EXTENSION SPACE

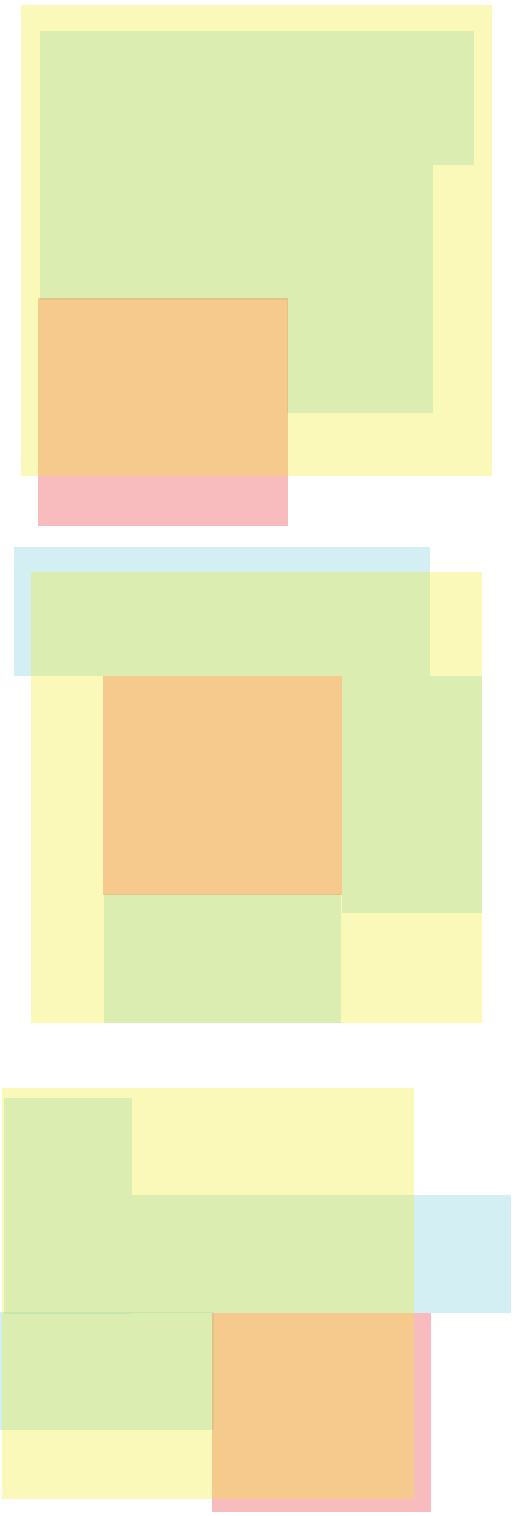
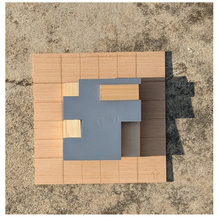


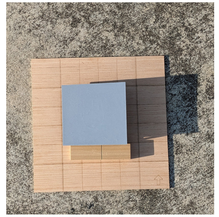
FIGURE 60 - Space Study

Model Photos

The model made of wood blocks and a 3D-printed grey roof separated from the blocks highlights the division of space in the design. The wooden blocks are arranged to create a front-back relationship, with a central coved exterior space appearing to exist within the design. This space serves as a focal point and is likely intended for socializing or other communal activities. The laser-scored grid constraints on the wood panel add an interesting visual element, emphasizing the importance of the grid in the design's organization. Overall, the model effectively showcases the relationship between the built structures and the outdoor space in the design.



The model of wood blocks and 3D printed roof is designed with a focus on quadrennial arrangement, dividing the space into four functional quadrants. The dog trough style is incorporated in two different directions, adding to the overall visual interest of the design. One notable feature of the model is the way in which some of the building elements cut through the roof, creating a unique interplay between indoor and outdoor spaces. The model also seems to emphasize the importance of a central, coved exterior space in the design, adding to the sense of harmony and balance. Overall, the model is a well-executed example of how thoughtful architectural design can create a functional and visually striking space.



The model features a central point of the box covered by a single slope roof, which highlights the focus of the architectural layout. The design is centered on this point and expands outward, highlighting the importance of this central space. This model also explores the concept of getting out from under the roof, with approximately one-third of the building running along the roof rather than under it. The use of wood blocks and a 3D-printed roof creates a tactile representation of the layout, with the laser-scored wood panel providing a clear representation of the grid constraints. Overall, this model provides a valuable insight into the spatial arrangement and functional elements of the building.

FIGURE 61 - Photo Top ALL

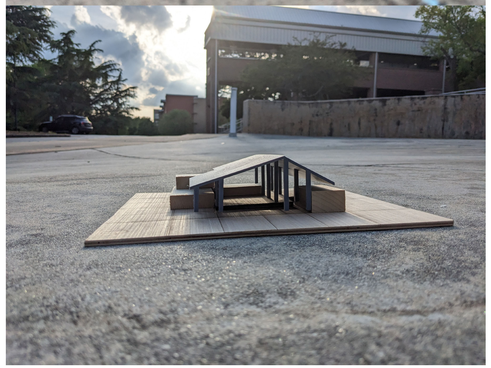
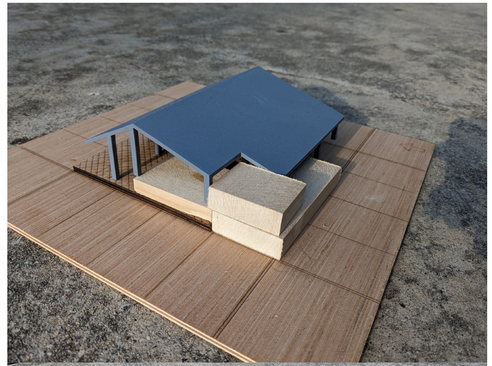
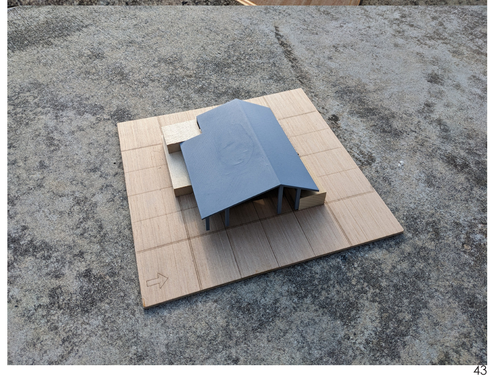
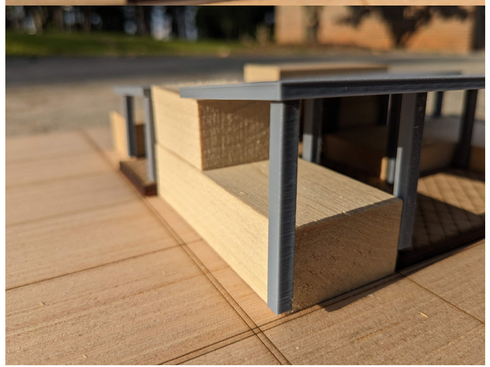
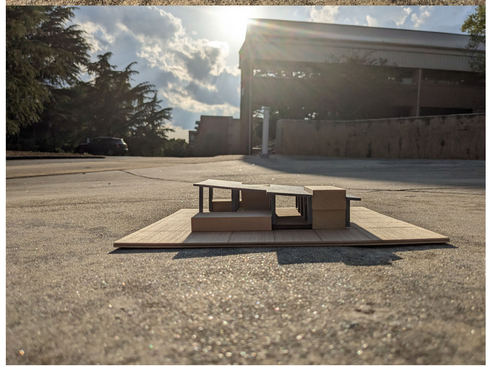


FIGURE 62 - Photos Iteration 1









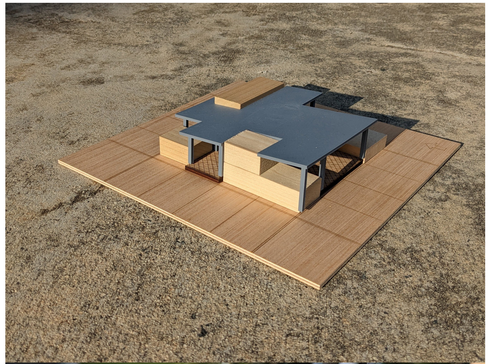
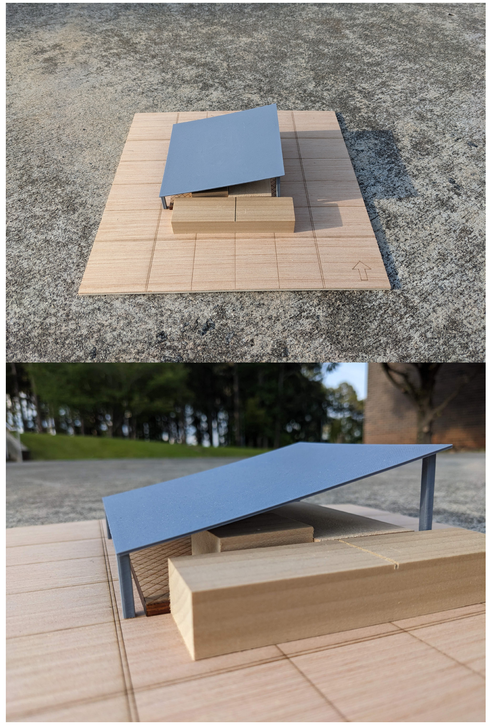
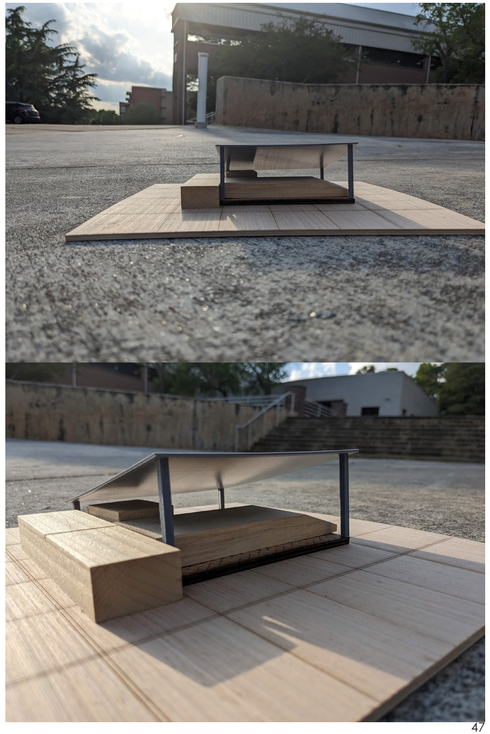


FIGURE 63 - Photos Iteration 2

FIGURE 63 - Photos Iteration 3





Set 2 After Models

Process Work

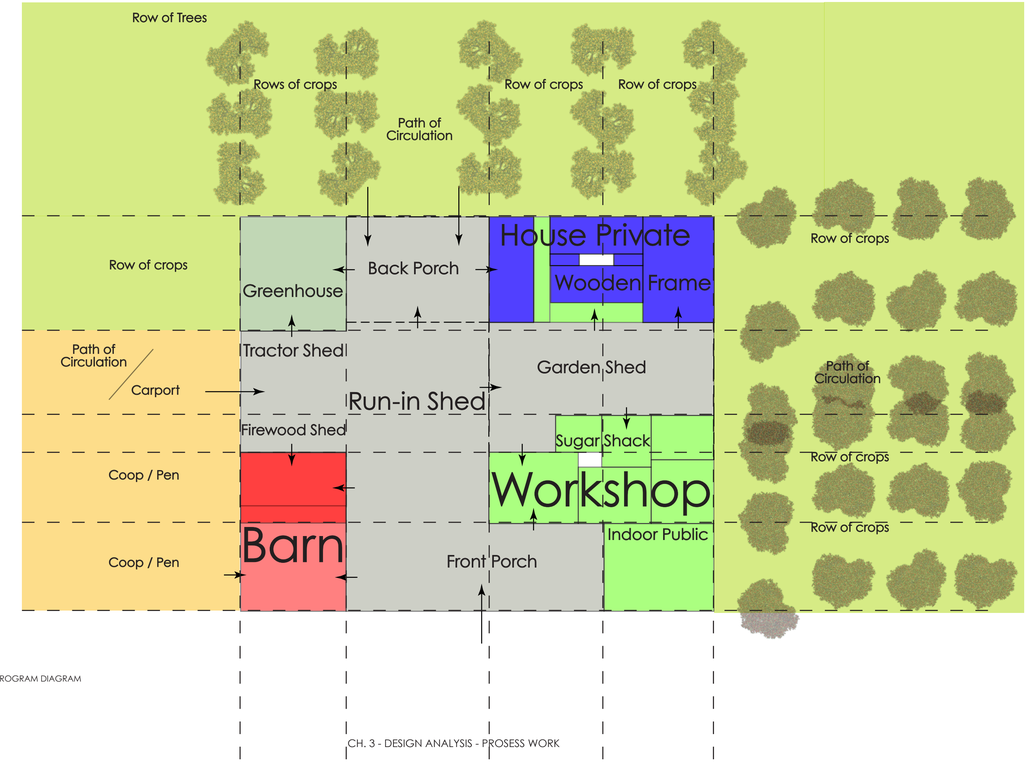
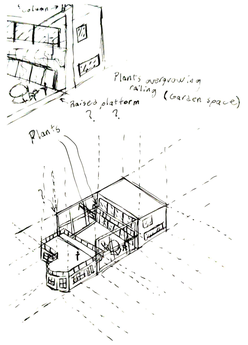
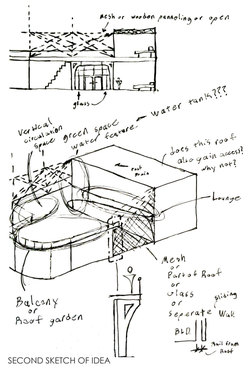


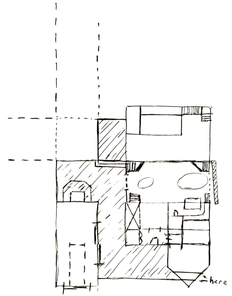
FIGURE 64 - BUILDING PROGRAM DIAGRAM



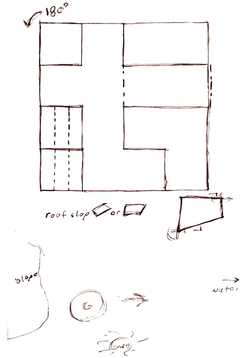
FIRST SKETCH OF IDEA



SECOND SKETCH OF IDEA

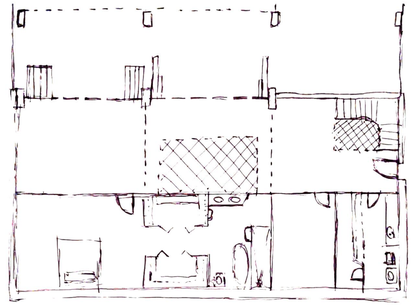


INITIAL OVERALL SKETCH

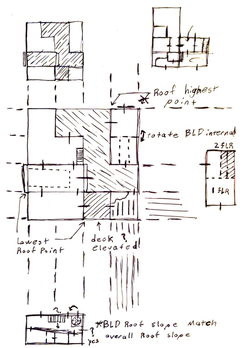


PROBLEM SOLVING SKETCHES

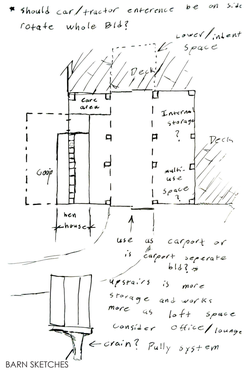
FIGURE 65 - Sketches of iteration



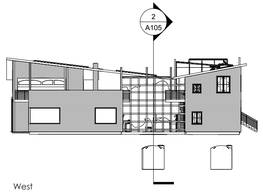
INTIMATE LIVING SPACE ITERATION



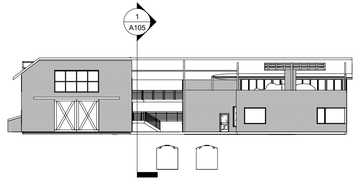
OVERALL IDEA REWORK



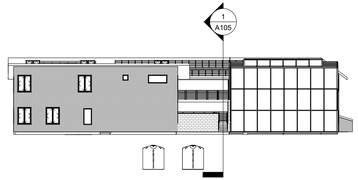
BARN SKETCHES



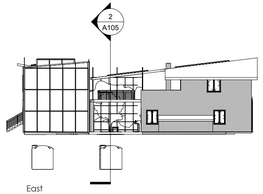
West



North

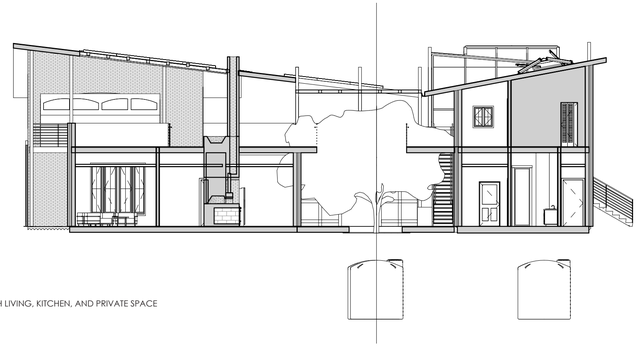


South

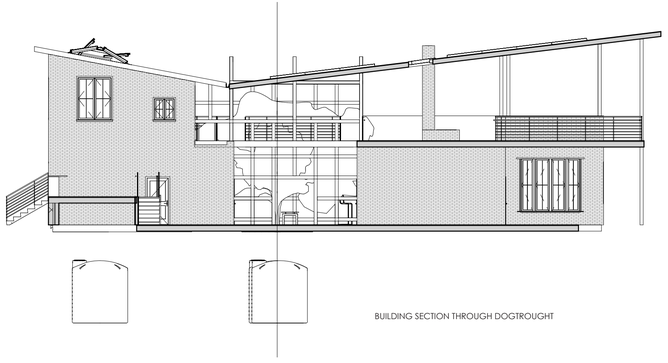


East

FIGURE 66 - Elevations



BUILDING SECTION THROUGH LIVING, KITCHEN, AND PRIVATE SPACE



BUILDING SECTION THROUGH DOGTROUGHT

FIGURE 67 - Sections

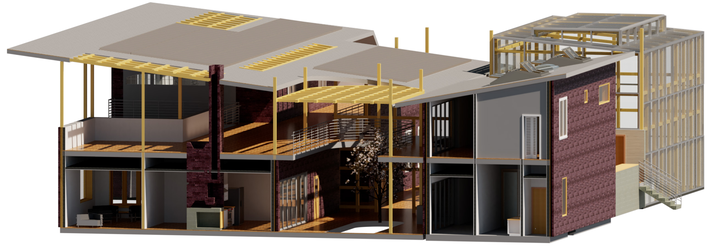
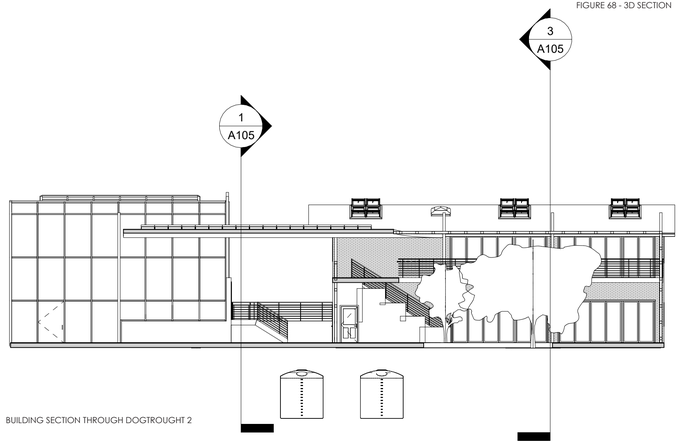


FIGURE 68 - 3D SECTION



BUILDING SECTION THROUGH DOGTROUGHT 2

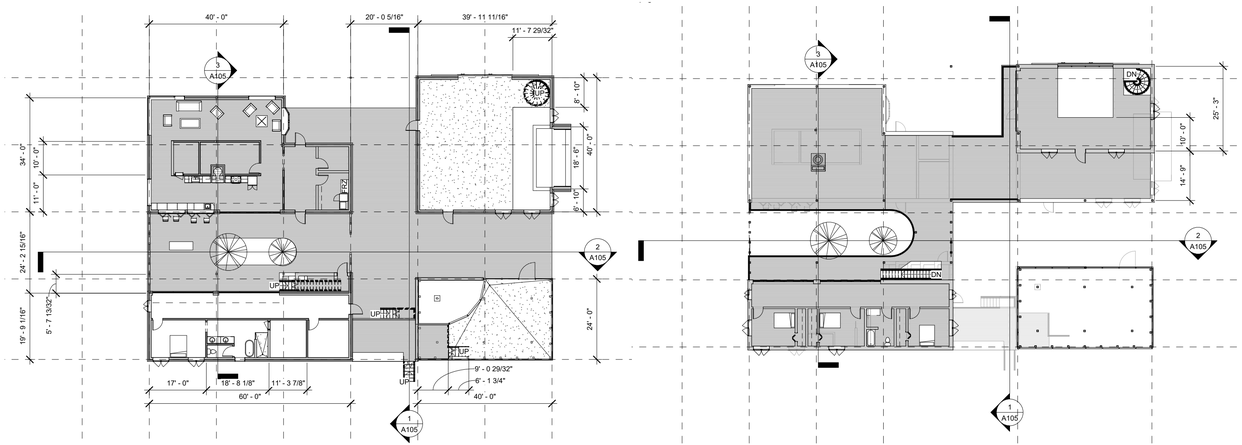


FIGURE 69 - Floor Plans

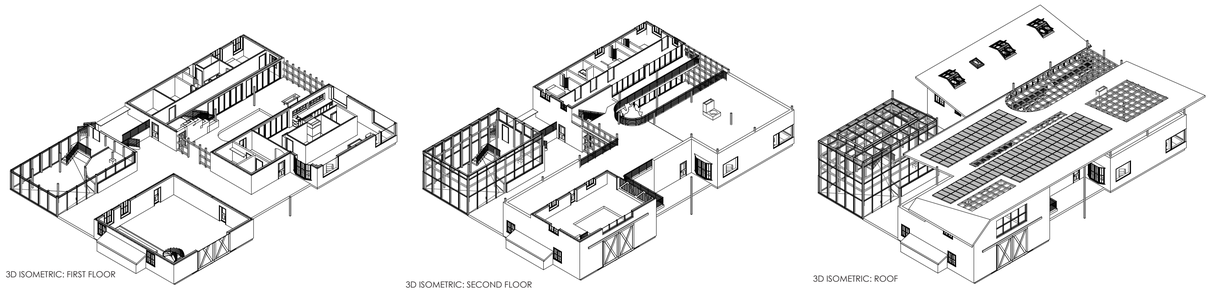


FIGURE 70 - 3d Floor Plans

Renders

An aquaponic system is a closed-loop system that combines aquaculture (fish farming) and hydroponics (growing plants in water without soil) to create a sustainable and efficient way to produce both fish and plants. The fish waste is converted by bacteria into nitrates, which then become nutrients for the plants to grow. In turn, the plants absorb the nitrates and filter the water, which is then recycled back into the fish tank. This symbiotic relationship between the fish and plants results in a highly productive system that requires minimal input and creates minimal waste.

To keep the fish in the aquaponic system, the ideal environment is a Bass Pro fish tank. This is due to its similarities to aquarium fish tanks, which are well-suited for fish health and growth. Additionally, the tank is designed to be spacious and easy to clean, which is essential for maintaining a healthy fish population in the aquaponic system.

The roof of the greenhouse is designed to open up, similar to the green room of the Biltmore House, to allow rainwater to be collected and used to water the plants in the aquaponic system. This not only reduces water usage but also allows for natural and sustainable irrigation. By incorporating these design elements, the aquaponic system can operate in a highly efficient and sustainable manner, providing both fish and plants for the homesteading community.

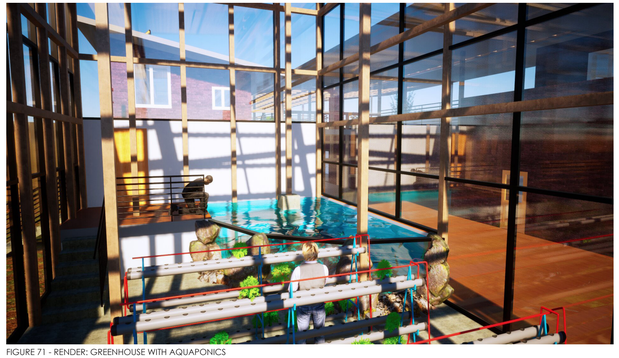


FIGURE 71 - RENDER: GREENHOUSE WITH AQUAPONICS

FIGURE 72 - RENDER: SECOND FLOOR BALCONY SPACE

FIGURE 73 - RENDER: DOGTROUGHT BETWEEN LIVING AND BED ROOM

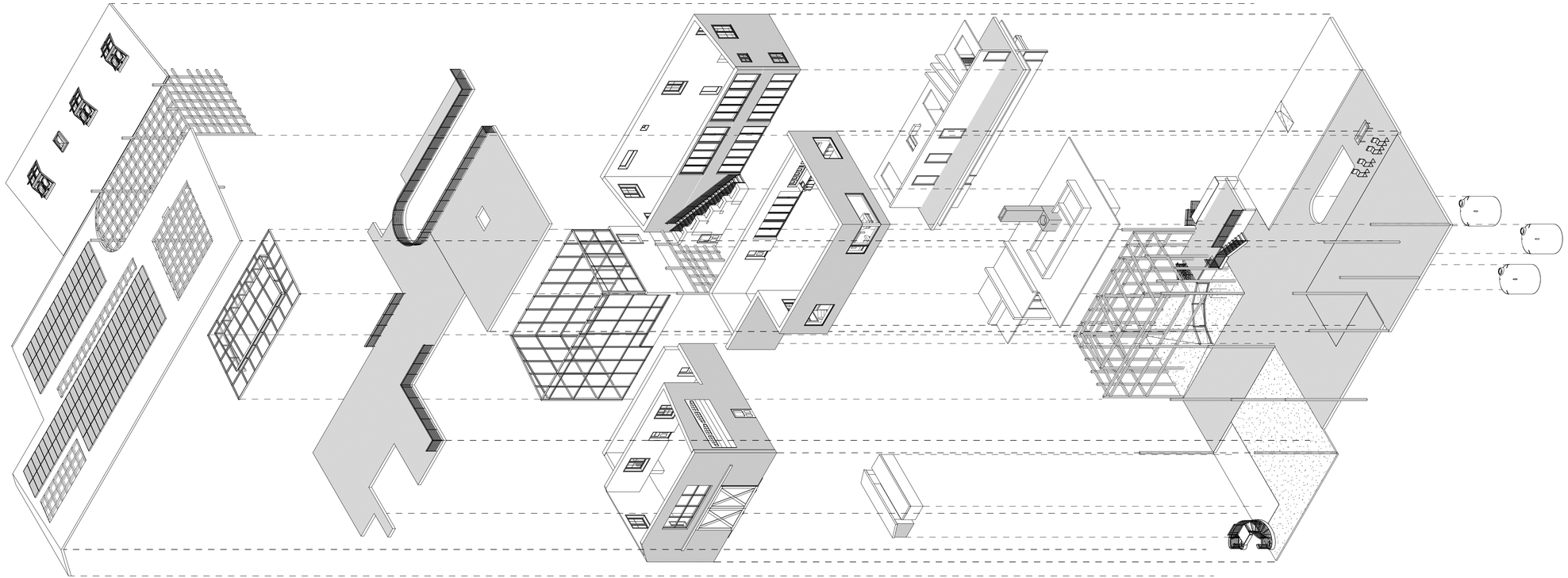
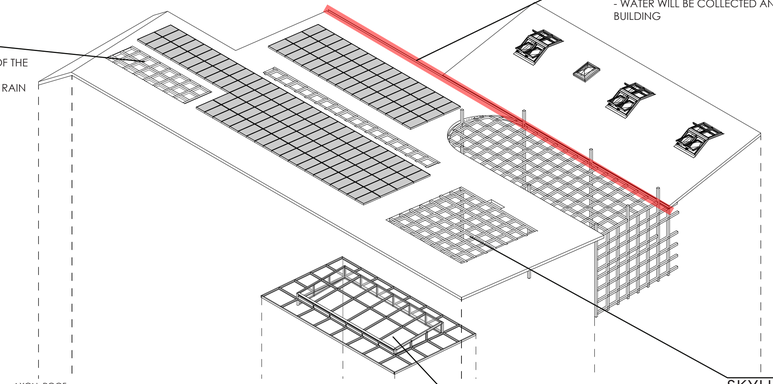


FIGURE 74 - AXON: EXPLODED AXON FULL BLEED

SKYLIGHT
- LIGHT UP COVERED PORTIONS OF THE BUILDING WITH NATURAL LIGHT
- LATTICE HAS GLASS TO PREVENT RAIN FROM COMING IN.

LOWEST POINT OF ROOF
- GUTTER RUNS ALONG THE LOWEST POINT TO COLLECT WATER.
- WATER WILL BE COLLECTED AND SENT TO STORAGE TANK UNDER CENTER OF BUILDING



AXON: ROOF

SKYLIGHT FOR DOG TROT
- ALLOWS NATURAL LIGHTING TO PERMEATE THE BUILDING AND PROVIDE NATURAL LIGHT DURING SPRING, SUMMER, AND FALL
- PANELS CAN ALSO BE OPENED TO LET RAIN IN LIKE GREENHOUSE ROOF.

GREEN HOUSE ROOF
- ROOF CAN OPEN AND CLOSE TO LET IT RAIN IN GREENHOUSE.
- WHEN ROOF IS OPEN AQUAPONIC GARDEN CAN BE NATURALLY BE WATERED
- FLOOR IS ALSO DESIGNED TO DRAIN TO WATER TANKS

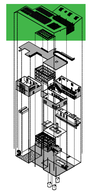
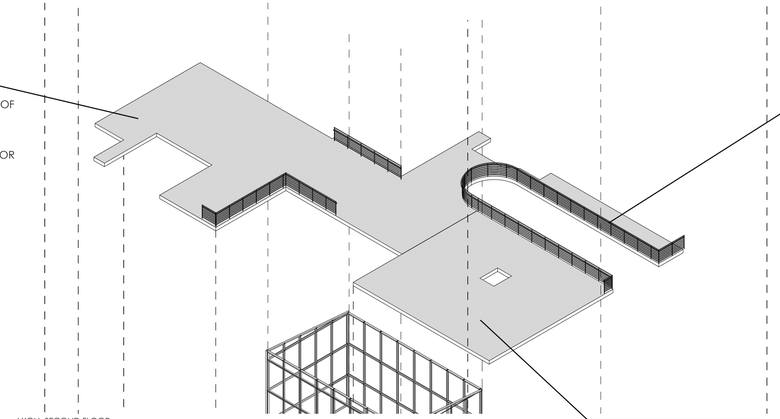


FIGURE 75 - Axon divided up

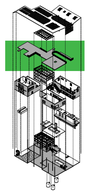
BARN DECK
- UPPER BARN WILL BE STORAGE. THE OPEN DECK WILL ALLOW THE MOTION OF STORED GOODS EASIER THROUGH THE BUILDING.
- GARAGE DOOR AND DROPPABLE RAILING IN FRONT WILL ALSO ALLOW FOR EASY MOVABILITY OF SUPPLIES.



AXON: SECOND FLOOR

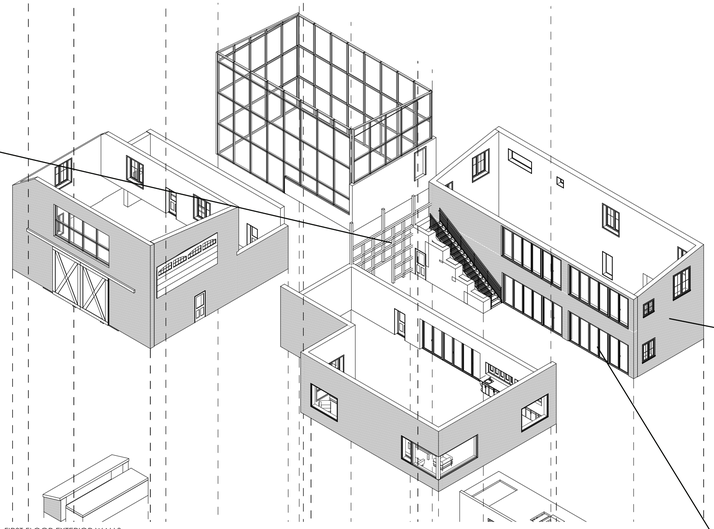
RAILING
- SAFETY
- PIPING COULD BE MADE OF STRONG REUSED PLASTIC.
- PIECES COULD BE 3D PRINTED AND ALSO US A HYDROPHOBIC SYSTEM THIS IN TURN ALLOWS FOR MORE FARMING

UPPER DECK SPACE
- OPEN SPACE CAN HAVE PLANTER BOXES AND GROW MORE FOOD
- COULD BE USED FOR ENTERTAINING FRIENDS OR AS AN OUTDOOR CLASSROOM FOR KIDS AROUND THE FIRE PIT LOCATED ABOVE THE PIZZA OVEN IN THE KITCHEN.



LATTICE WALL

- ENCLOSES LIVING SPACE AND PRIVATE SPACE DOG TROT.
- DOORS IN WALL FOR CIRCULATION
- POSSIBLE PLANT GROWTH IN FUTURE



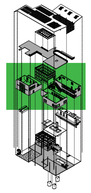
AXON: FIRST FLOOR EXTERIOR WALLS

PERSONAL SPACE WALLS

- MADE OF EITHER COB OR SIPs
- SOLAR HEAT ABSORPTION

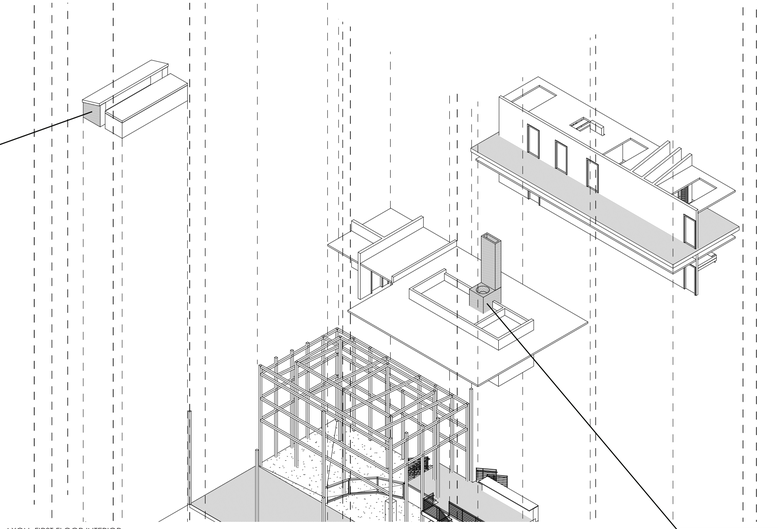
GLASS OPEN DOORS

- DOORS OPEN TO BRING THE OUTSIDE INSIDE THE SPACE.
- CIRCULATION MAXIMIZATION THROUGH THE FOLDING OF THE DOOR LIKE A BI-FOLD DOOR



COOP SPACE

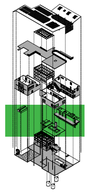
- PROTECTED SPACE IN HOUSE FOR CHICKENS AT NIGHT SO THEY DON'T GET EATEN BY ANIMALS



AXON: FIRST FLOOR INTERIOR

FIRE BASED OVEN FOR KITCHEN

- FOR HOMESTEADING YOU NEED A KITCHEN BASED AROUND A FIRE OVEN.
-A PIZZA OVEN IS THE BEST TYPE OF OVEN FOR THIS STYLE OF LIFE.
-STRUCTURE GOES UP TO THE SECOND FLOOR TO BE ANOTHER FIRE PIT
- FIREWOOD STORAGE IS ALSO LOCATED UNDER THE PIZZA OVEN OPENING.

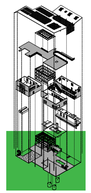


GREENHOUSE FRAME
- GREENHOUSE HOLDS AQUAPONIC SYSTEM
- STRUCTURE WILL ALSO HOLD THE MECHANISM TO OPEN ROOF TO ALLOW RAIN TO ENTER BUILDING.
- MAIN PURPOSE IS CULTIVATION OF FISH AND PLANTS

FISH TANK
- LITERALLY A BASS PRO FISH TANK
- WILL KEEP FISH FOR AQUAPONIC SYSTEM
- CULTIVATE SALMON, BASS, COD, ETC.
- MECHANICAL SYSTEM IS IN RAISED PLATFORM.

BARN
- COOP ATTACHED TO BARN TO PROTECT CHICKENS AT NIGHT.
- REST OF BUILDING WILL BE STORAGE OR WORKSPACE RELATED TO ANIMAL CARE.
- LOOKING AT CHANGING MATERIAL TO COB OR WOOD FRAME CONSTRUCTION.
- WILL DOUBLE AS GARAGE FOR VEHICLE IN ADDITION MECHANICAL BAY.

WOOD COLUMN
- COLUMNS HOLD UP ROOF STRUCTURE ABOVE BUILDING
- COLUMNS FOLLOW GRID



AXON: FOUNDATION AND WATER TANK

PERSONAL SPACE
- BED & BATH ROOM
- SPACE'S MAIN FOCUS IS SLEEPING
- STORAGE IS ALSO AN ELEMENT OF FOCUS FOR THIS SPACE.

GREEN SPACE DOG TROT
- PROMOTE GREENERY AND OUTSIDE INTERACTION WITHING THE HOME.
- GREEN SPACE ALSO WORKS WELL FOR DINNING
- EXPERIENTIAL SPACE

LIVING SPACE
- SPACE CAN ENTERTAIN GUEST THAT VISIT BUT ALSO WORK TO TEACH CHILDREN LIFE SKILLS THAT YOU WILL USE ON A DAILY BASIS TO GROW.
- KITCHEN, WORKSPACE, MUD ROOM, AND MORE STORAGE IS ALSO LOCATED IN THIS SPACE.

RAIN WATER CONTAINERS
- CONTAINERS WILL HOLD RAIN WATER.
- CONTAINERS WILL CONNECT TO THE GUTTER SYSTEM TO COLLECT ALL WATER FROM ROOF.
- CONTAINERS ARE UNDER THE BUILDING TO KEEP THEM OUT OF THE WAY AND ALLOW FOR EASY CONNECTION TO THE REST OF THE HOUSE.
- MAIN ACCESS AN MAINTENANCE UNDER RAISED DECK

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