

Safe Haven Orphanage and School

Savanette, Haiti



Master of Architecture Thesis Project by Brian Williams
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Safe Haven Orphanage and School
Savanette, Haiti

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Abstract

Pro bono work has always appealed to me. The prospect of being able to help those less fortunate with my knowledge and skillset is uplifting and gratifying. There is something truly rewarding about taking the architectural knowledge and training I have received and finding a solution to a problem for a nonprofit or a group of people that could not easily afford to hire someone. It gives me the opportunity to explore creative solutions with a low budget while still making something beautiful and thoughtful, that not only provides the spaces needed but also adds the detailing and uniqueness that gives the place and its users a sense of pride and pleasure.

This thesis seeks to present the programmatic needs, local building materials and resources, a study in efficient building, the local needs and customs, and ways to improve people's lives with an orphanage in Savanette, Haiti. The goal is to explore the fundamental needs of an orphanage and a school in a developing country and develop strategies to address these needs. A successful orphanage needs to provide comfortable housing but also a sense of safety and security, a loving environment where orphans can grow and heal, a self-sustaining community that can care for the facility, and a means to train and educate orphans for adulthood and the working world. Since education is such a central need for an orphanage, and since schools are limited in Haiti, it only made sense to open this up to children in the surrounding area as well.

The purpose of this thesis is to develop an architectural language of building components that can be utilized to answer the programmatic needs of the orphanage and school. This system creates the overall structural layout and is intended to be an easily constructible and expandable model while providing good design that is culturally sensitive.



Acknowledgements

I would like to thank all of my family, friends, classmates, professors, and advisors whose support and guidance made all the difference during my time at Virginia Tech. I would especially like to extend my thanks to all the professors who believed in me and encouraged me to push on, discover, and refine my designs. To my committee, H. Scott Gartner, Kay Edge, and William Galloway, for their immeasurable assistance, dedication, and steady guidance. To Hans Rott for leading my early efforts into my thesis and providing the initial guidance and constructive critiques that shaped the concept, location, and approach of my thesis. To D. Chip Clark for all his help allowing me to explore CNC modeling. Finally, I would like to thank all my classmates with whom I have had the pleasure of working and getting know over the last two years. We have been there to learn and teach each along the way. I could not have asked for a better group.

I would also like to thank my amazing wife and parents for their unconditional support of me and my family during my master's program.

Thank you!





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Introduction





Fig. 1



Fig. 2



Fig. 3

“The purpose of life is not to be happy. It is to be useful, to be honorable, to be compassionate, to have it make some difference that you have lived and lived well.”

— Ralph Waldo Emerson

Haiti as a country has repeatedly faced turmoil, especially since the arrival of Europeans. Nonetheless, it is a land of beauty, hidden treasures, and awe-inspiring sites, especially in the countryside. Since its colonization, Haiti’s political unrest has become commonplace. Most recently, in 2004, a revolt overthrew a corrupt government. The new, replacing government has proven to be just as corrupt. Then, on 12 January 2010, at 4:53pm local time, a worse fate fell upon Haiti and its people. Haiti was struck by an earthquake of 7.0 magnitude. Though Haiti record-keeping is poor, it is estimated that the death toll was between forty-six and eighty-five thousand, and more than 1.6 million were left homeless. This event opened the hearts around the world to Haiti, and an outpouring of support, both volunteer and monetarily, followed. Since then, Haiti has been inundated with help rebuilding, and several foreign aid workers have found the true beauty of Haiti. This has led Haiti to redefine itself in terms of government corruption, safety, and human rights.

Before the earthquake, the World Bank Organization estimated that there were over 360,000 orphans in Haiti. After the earthquake, a low guess is that this number doubled. Some organizations (e.g., UNICEF, the CIA) put the number as high as one million orphaned children either by loss of both parents or having only one parent who could not afford to care for them. Even using the lower number, this means that one in every eight children in Haiti is an orphan. To make matters worse, even for those children that are lucky enough to have a family, the educational system in Haiti is one of the worst in the world. How can a country rebuild itself if its future inhabitants are un- or under-educated? As of today, 50% of children do not attend school (World Bank 2013) and of those who do, it is estimated that approximately 30% of children attending primary school will not make it to third grade and 60% will abandon school before sixth grade (UNICEF 2008). These statistics are for a country as a whole and in the rural countryside, the picture only becomes more grim. People around the world have identified this as a real concern and have come together to create educational facilities in Haiti. As documented in a USAID study in 2007, 90% of primary schools are non-public and managed by communities, religious organizations or NGOs.



Fig. 4

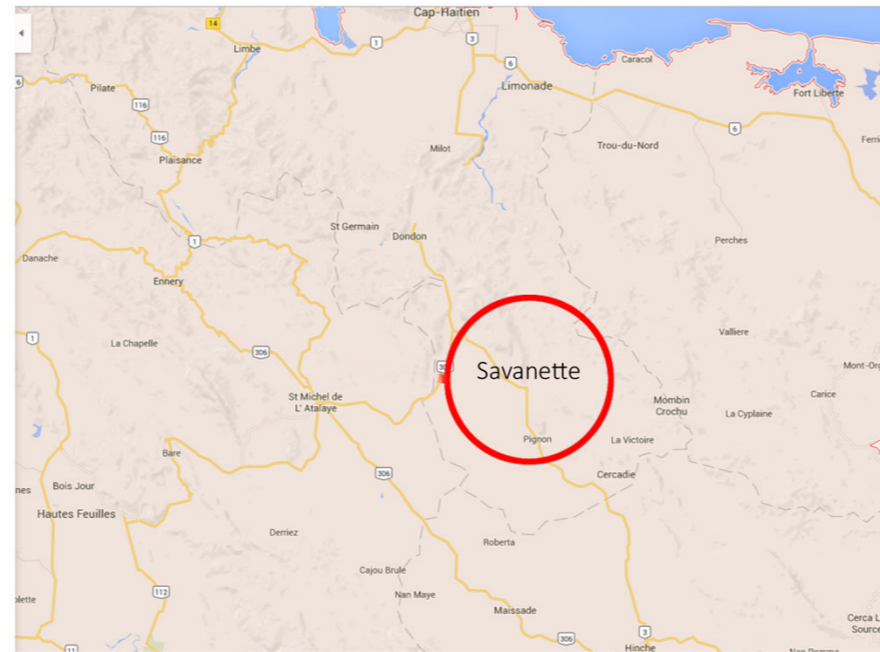


Fig. 5



Fig. 6

This thesis project is a response to these two major issues facing Haiti: orphaning and lack of education. The program address the need for an orphanage that is self-sustaining and comfortable for its inhabitants, and for a local school. Situated in the rural town of Savanette, full of history and natural beauty but lacking a local orphanage or school, I create the Safe Haven Orphanage and School. This town, though small and relatively secluded, has the infrastructure, land, and people in place to support the functions of the new charity.

Other Haiti statistics:

- Haiti ranks 168 out of 187 on the 2014 Human Development Index (UNDP 2015)
- 59% of the population lives on less than US\$2 per day (World Bank 2012)
- 24.7% lives in extreme poverty on less than US\$1.25 per day. (UNDP 2013)
- Poverty is mainly rural, at 75.2%, vs. 40.8% in urban areas. (MDG rpt 2013)



Fig. 7



**PUBLIC
ARCHITECTURE**

Fig. 8



Fig. 9

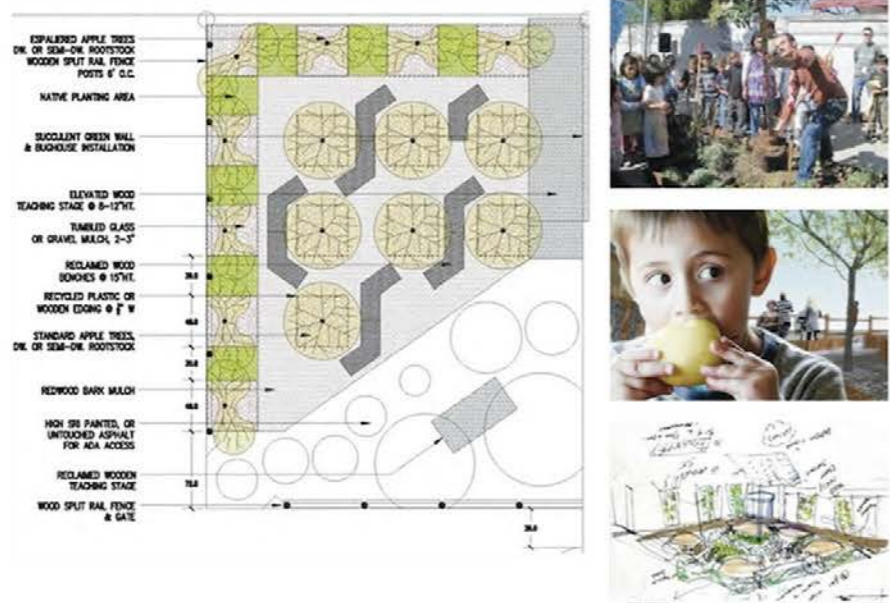


Fig. 10

Help the helpless. Help the poor. Help the needy. Help the orphan. Be the joy for they that suffer in latent. They might not have money to repay you. They might not be able to offer an equal returns of service but, the inner peace which they may get in their spirit for a moment shall be an awesome lifetime blessings to your body and spirit.”

— Ernest Agyemang Yeboah

Pro-Bono Architecture

Before attending graduate school, I worked in a professional architectural firm for nine years. In retrospect, the most personally rewarding projects I was completed during my time were those we did pro bono. Though the glamour of high-budget projects is appealing, there is something more truly rewarding about using my architectural knowledge and training to solve a problem for a nonprofit or group of people that could not easily afford to hire someone. It brought me great pleasure to find creative solutions with a low budget while still making wonderful, thoughtful architecture that not only provided the spaces needed but also added detailing and character that gave each project and its users a sense of pride and pleasure. All this really can occur only when there is a strong understanding of the programmatic needs, local building materials and resources, local needs and customs, and what is needed to improve people’s lives, as well as a study in how the program can be built efficiently.

Even a seemingly small effort can make people’s day-to-day experiences healthier, more engaging, and more life affirming. The product of grade design has lasting economic impacts that benefit some people directly but also the greater community around it indirectly. It is a symbiotic relationship where everyone can grow stronger, healthier, and happier. To date, architecture firms in general do not widely offer pro bono services; however, a movement is in the making as more and more architects recognize that their talents are needed everywhere. In 2005, with the support of a grant from the National Endowment for the Arts, Public Architecture formally launched a national campaign called “The 1% Program”. This program challenged architecture and design firms in the US to contribute 1% of their time to pro-bono projects. As they outline in their book, *The Power of Pro Bono*, this 1% of working hours seem very minimal to some but when combined with the entire profession, it would equate to over five million hours annually – the equivalent of a 2,500 person firm working full time.

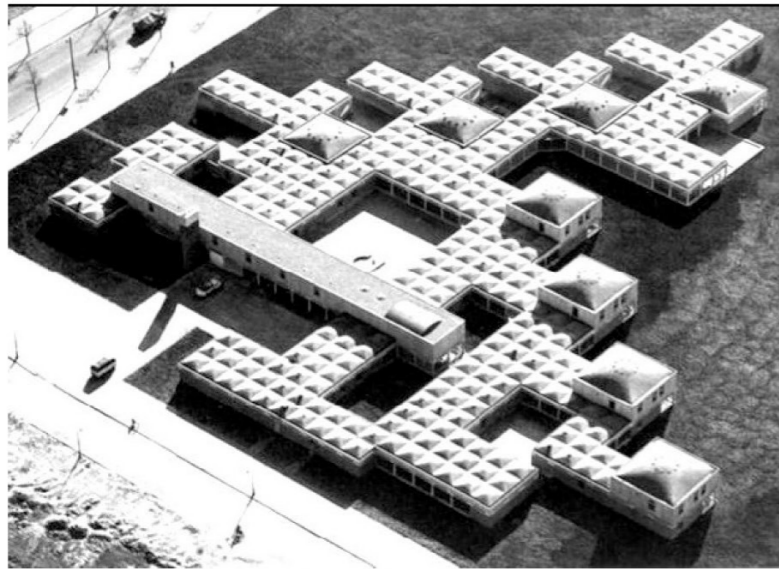
There are so many needs out there. I hope that this thesis can serve as some inspiration for other designers to remember that they hold a great gift of knowledge and skill, and though making money is important, there is always time to help.

Safe Haven Program

- Orphanage:
 - Children Housing
 - for 50 to 60 – mixed age, mixed sex
 - Bathrooms
 - Area for each to call their own
 - Worker Housing
 - Four small individual houses for main workers
 - Include sleeping area, living area, small kitchenette, bathroom
 - Volunteer Housing
 - Four to six duplex rooms, shared living space, bathrooms
 - Security
 - Dining Area
 - Kitchen Area – Food storage
 - Medical Office
 - Adoption Offices – main administrative office
 - Wood/ Metal Shop
 - Storage building
 - Gathering space – central gathering as heart of campus
- School
 - Classrooms for education and training – provide seats for all orphans as well as between 50 and 100 local children
 - Computer lab for training - security
 - Bathrooms
 - Gathering/ outdoor space - separate from orphanage's
- Site:
 - Security fence – Create a safe and healing environment. This is most important for the orphans growth
 - Playing field
 - Gathering space
 - Garden
 - Sheep/ goats
 - Mechanical and utility area
- Design considerations:
 - Ventilation, weather
 - Seismic activity
 - Local building practices and workforce
 - Ease of construction
 - Ease of material procurement
 - Rain water collection, solar panels
 - How can orphanage make money? How can it save money?



Precedents



Amsterdam Orphanage / Aldo van Eyck

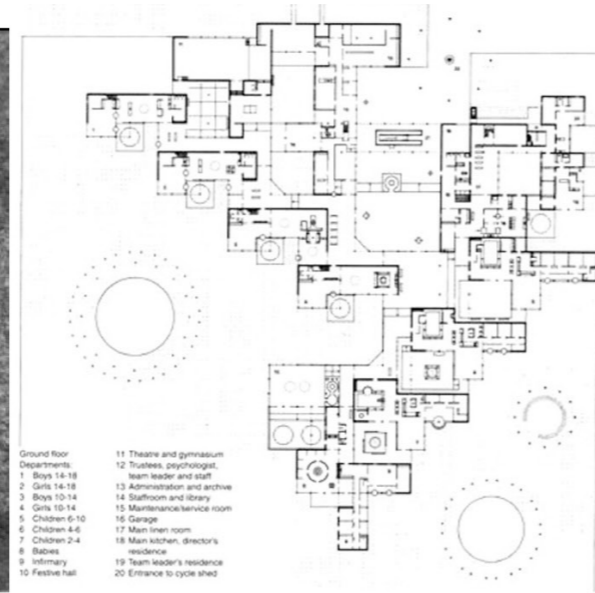


Fig. 11



William Jefferson Clinton Children's Center in Haiti / HOK

Fig. 12



Illinois Institute of Technology Campus / Ludwig Mies van der Rohe



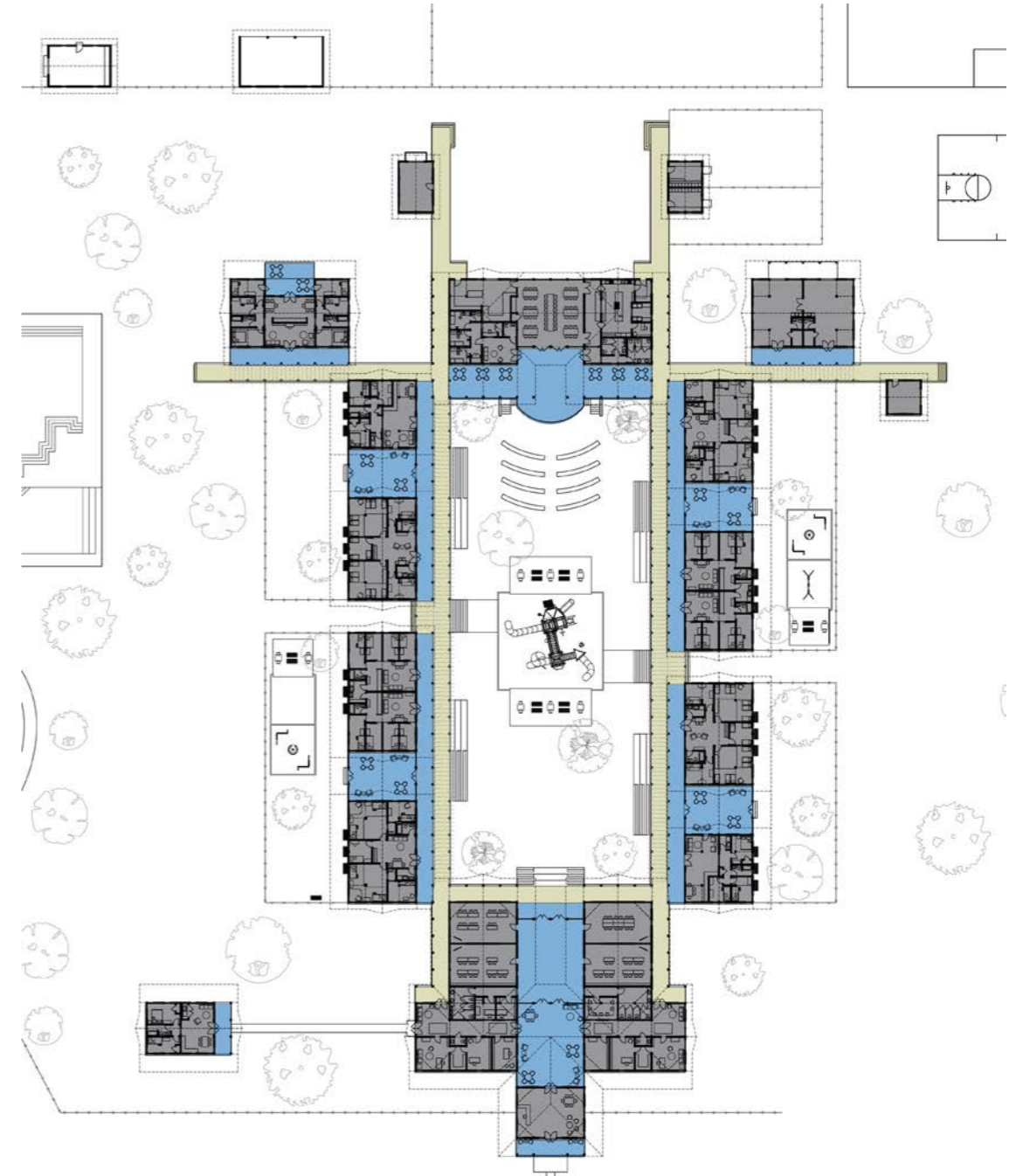
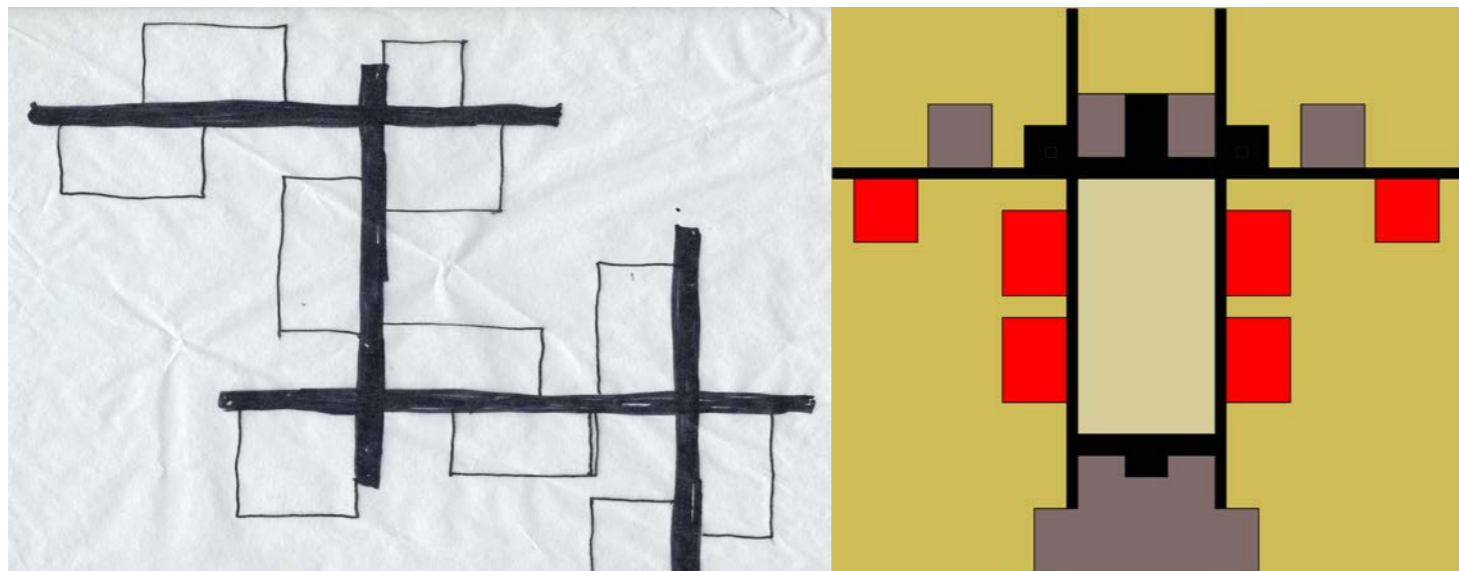
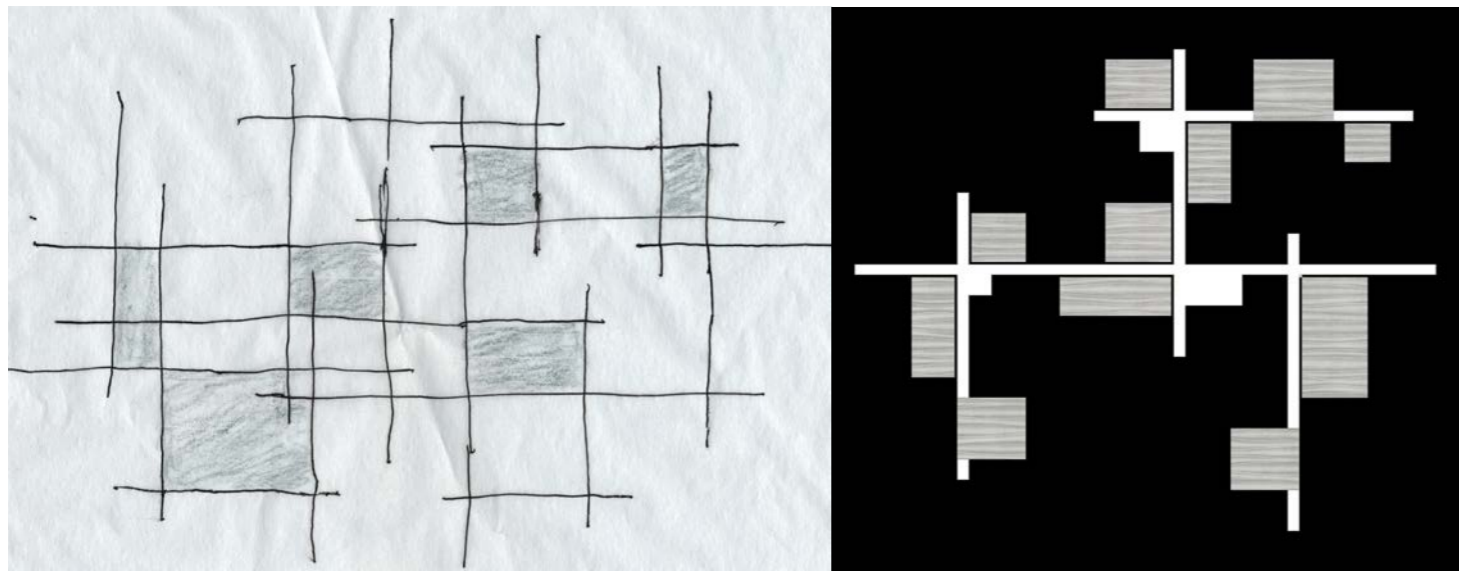
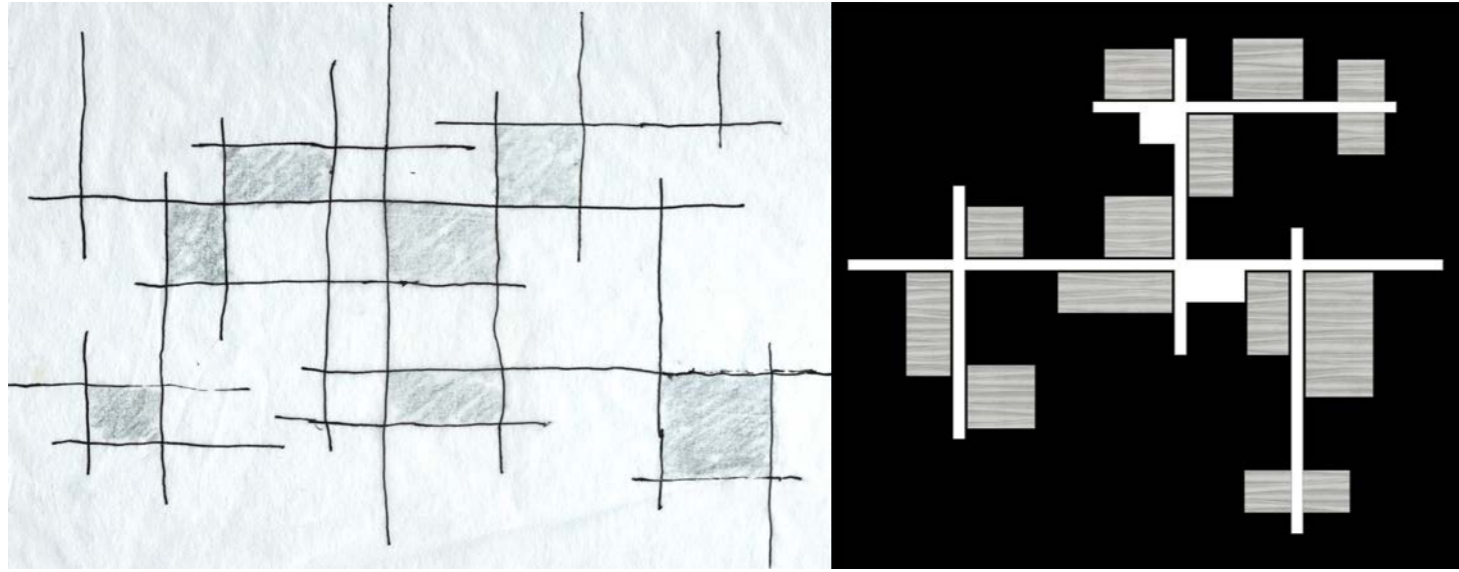
Fig. 13



Gheskio Cholera Treatment Center in Haiti / MASS Design Group

Fig. 14

Precedent studies should be a source of inspiration and not replication. Architects use these earlier examples as ways to tie their designs into a larger design sense and to utilize parts and details that have been known to work, thus lending credibility to a proposed detail. For this thesis, I chiefly utilized four precedent studies. First, Aldo van Eyck's Amsterdam Orphanage served as an early example of how to consider the function, layout, and detailing of an orphanage. Van Eyck's ability to tie in child-size details to create a safe and whimsical design led me through several early studies of how a child might interact with and enjoy the spaces in my own project. Next, Ludwig Mies van der Rohe's Illinois Institute of Technology Campus was an inspiration for working in a grid system when laying out a full campus. Following this precedent, my campus is laid on an 8'-0" grid (which is ideal for timber post and beam framing) and I used van der Rohe to guide me in staying true to the grid while breaking away from it at key parts. Third, HOK's William Jefferson Clinton Children's Center in Haiti served to help guide me in what other firms have been able to accomplish in Haiti and what sustainable and self-reliant concepts they have incorporated into their building. The Clinton Children's Center is located in the urban fabric of Port-au-Prince so it has a very different layout and design that what I am proposing for the rural setting of my thesis, but it helped to demonstrate how an orphanage can be laid out with the movement of children in mind. Finally, MASS Design Group's Gheskio Cholera Treatment Center in Port-au-Prince showed several examples of passive cooling techniques while still providing privacy and protection, as well as how a design can be turned over to local craftsmen and builders to have elements easily constructed and show local flare. Though these precedents may look different in many regards than my own design, they are reflected in a variety of related details and concepts within.



The layout of the campus started as an exploration of different arrangements of buildings and the paths that connect them. This soon led me to the question of if it should be a centralized or decentralized arrangement. After reading text and trying to imagine being an orphan here, a centralized plan was the clear way to go. Having a centralized gathering space as the heart of the campus gives a sense of protection and welcoming. An inhabitant can always be close to their peers and guardians which provides a needed sense of family most orphans are craving. Having an open space in the center rather than a building helps provide a safe place to play, gather, and learn. The placement of a playground in the center of this space draws in and allows them to engage with one another and provides them with a sense of joy and playfulness. Most orphans tend to grow up very fast and miss out on childhood since they tend to have to take care of themselves from a young age. This project gives them back this important time in their lives to just enjoy being a kid.



Color and Texture

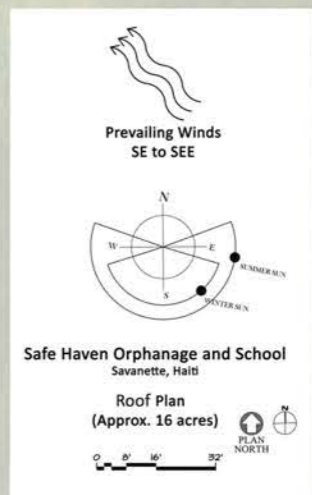
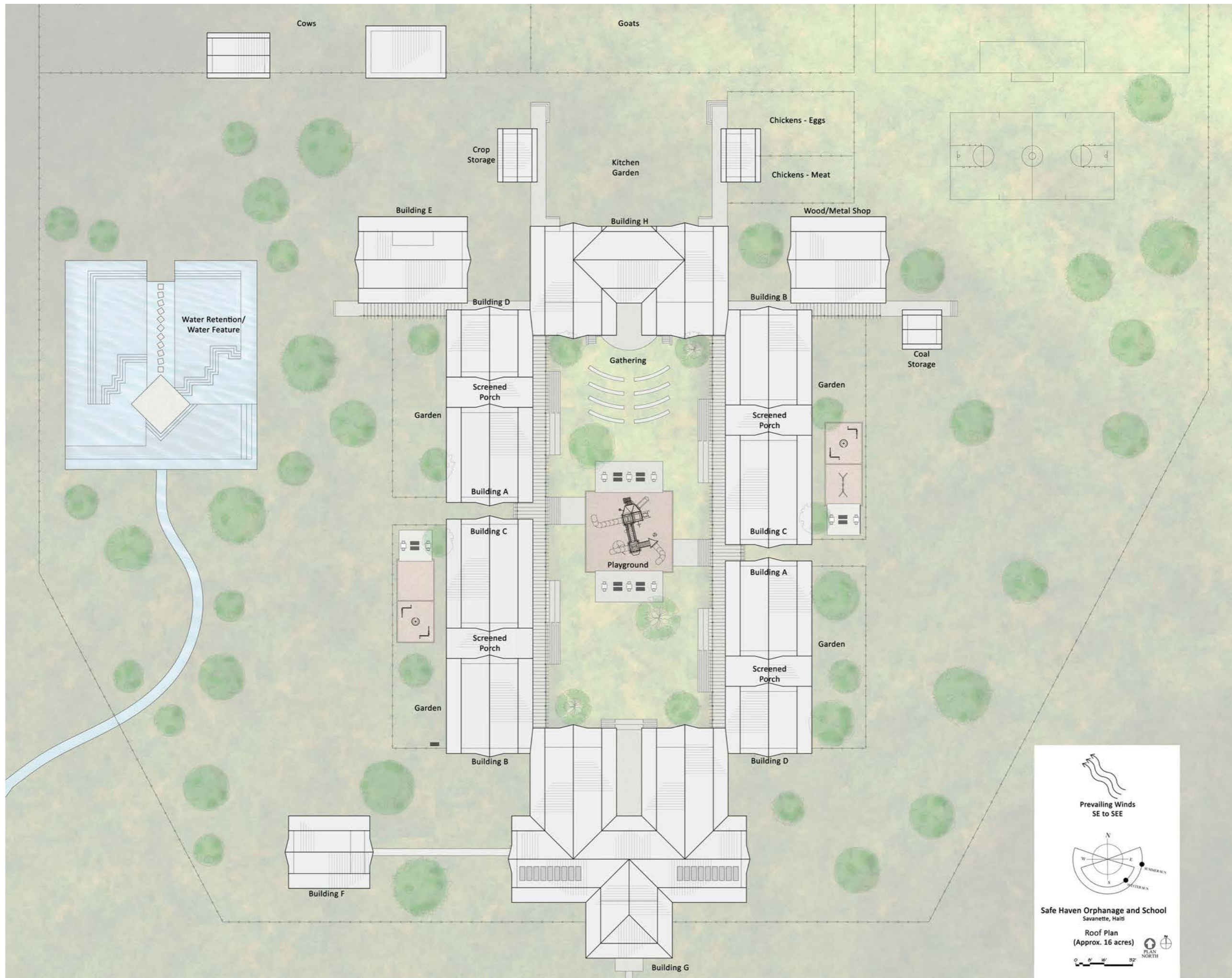
To highlight Haiti's rich artistic heritage, the design would use local materials and artwork, especially ironwork, murals, painting, and woodwork crafted by local artisans. Through this project, local craftsmen would be able to teach the next generation of craftsmen their trade as well as provide needed training for the older orphans. In exploring this concept, I began painting with oil base paints as well as a sand additive. I began to explore how the stucco might be applied to these buildings in different and unique ways. Each painting uses different techniques for creating rich textures and colors.

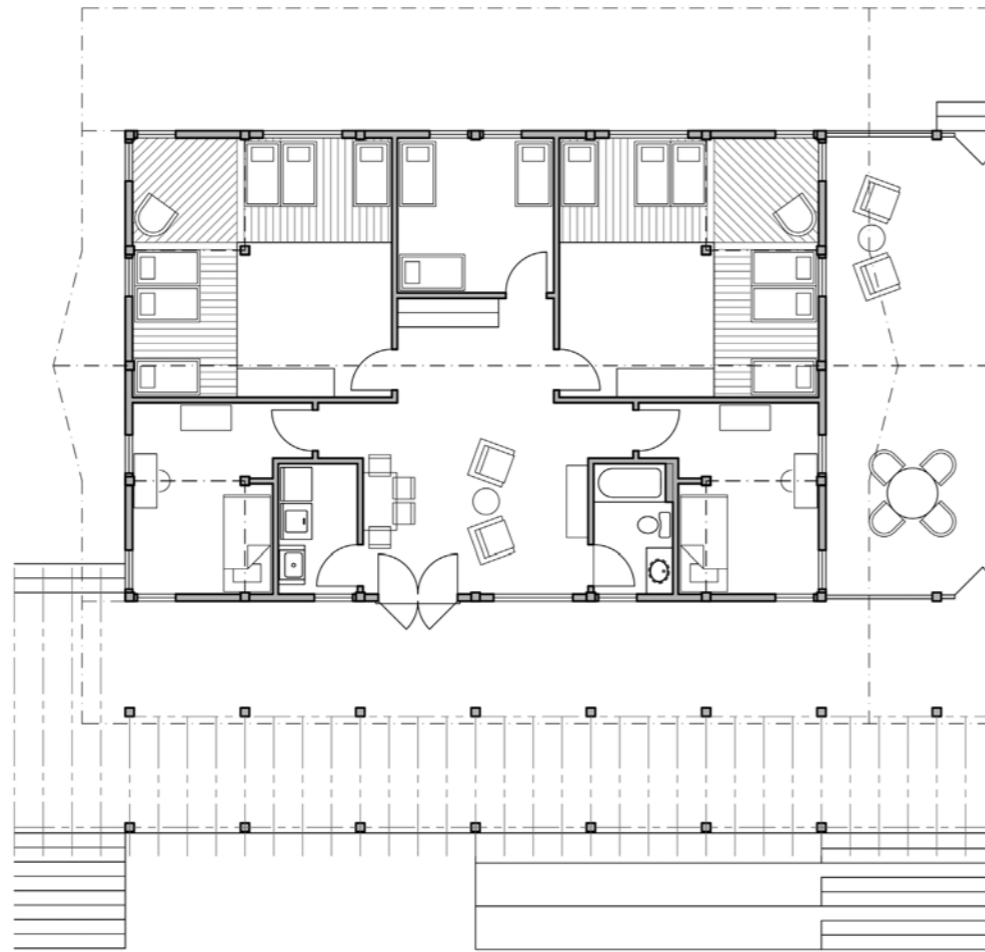
Design Documents



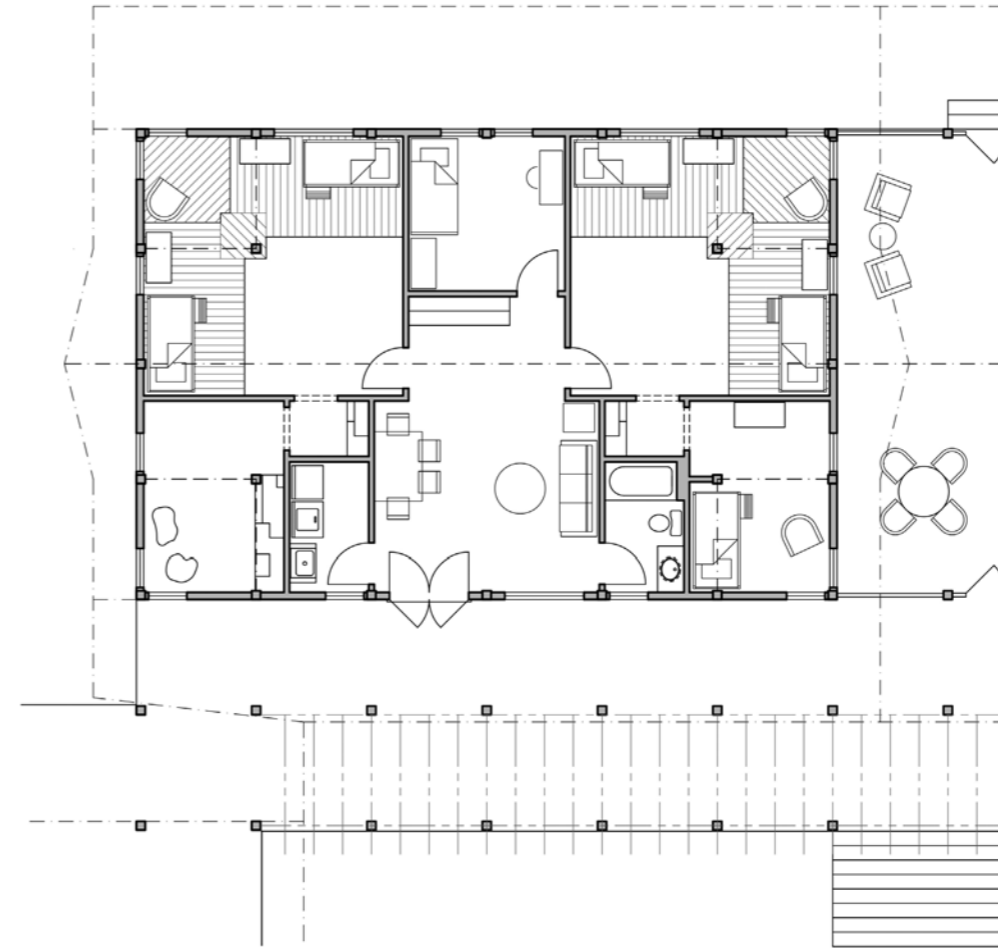
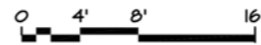




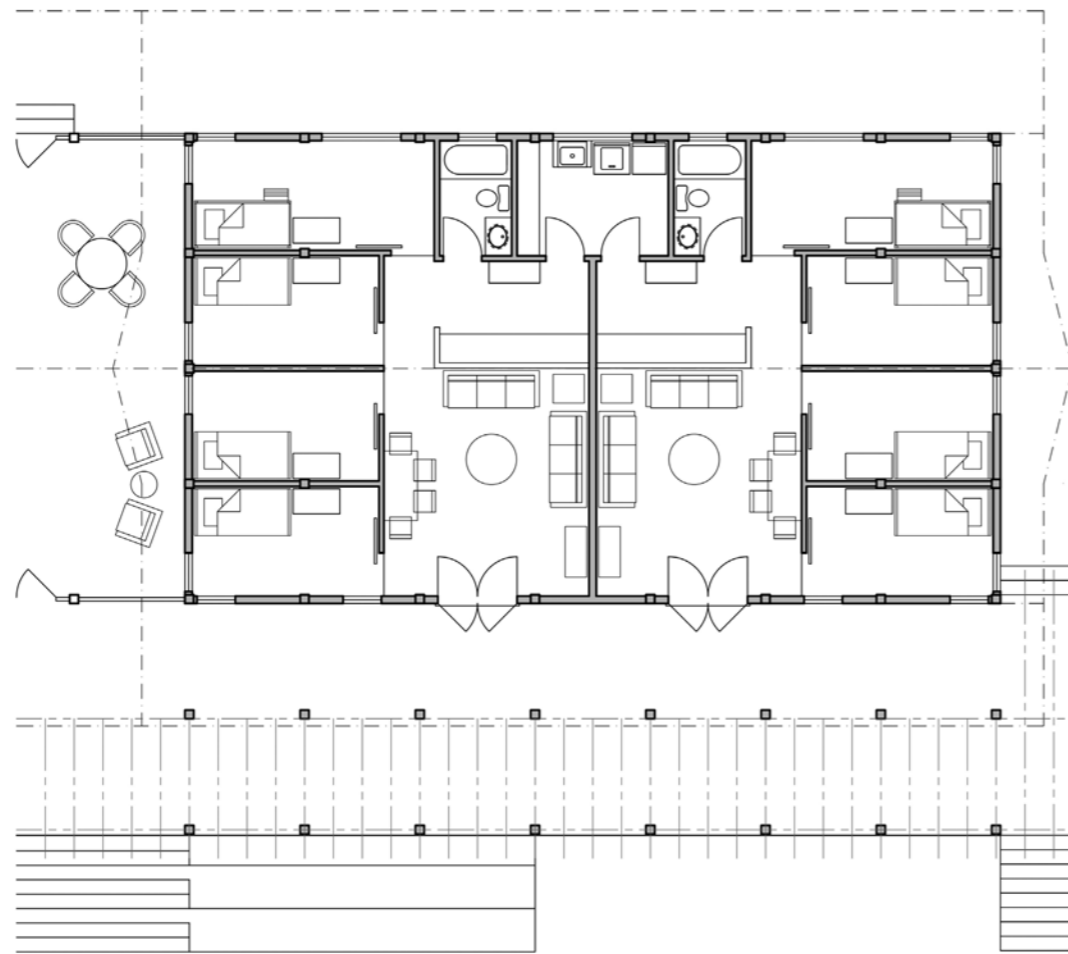




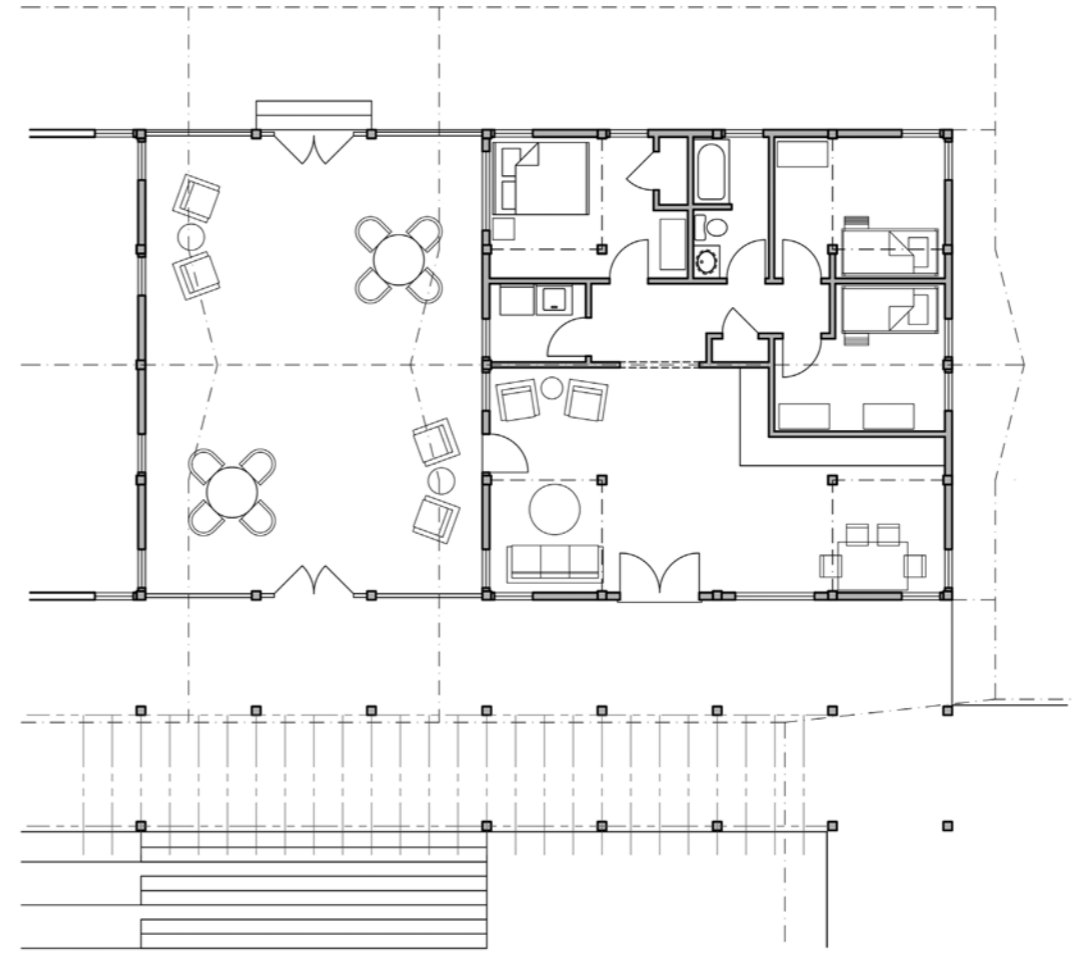
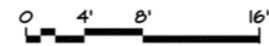
Building A - Infant Housing - 0 to 3 Years
 (20 children and 2 staff/older orphans)



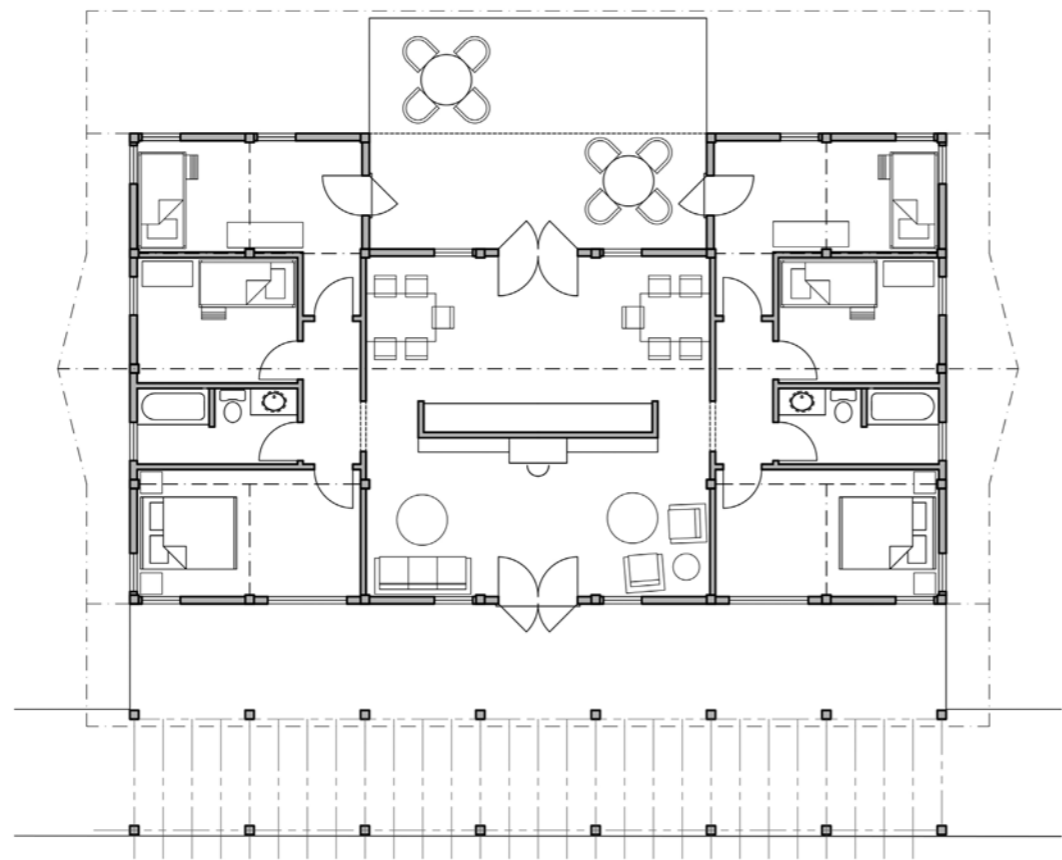
Building B - Child Housing - 4 to 12 Years
 (12 children and 1 staff/older orphans)



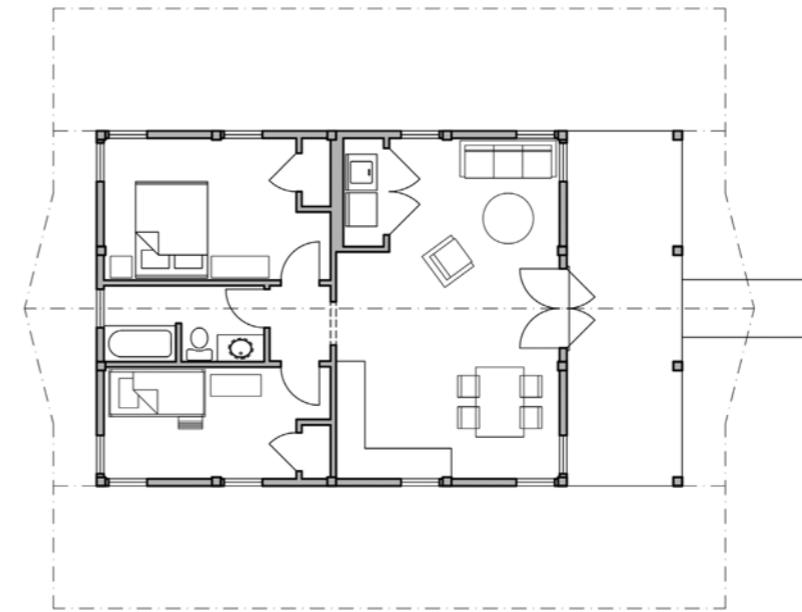
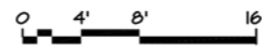
Building C - Teen Housing - 13 to 18 Years
(10 children)



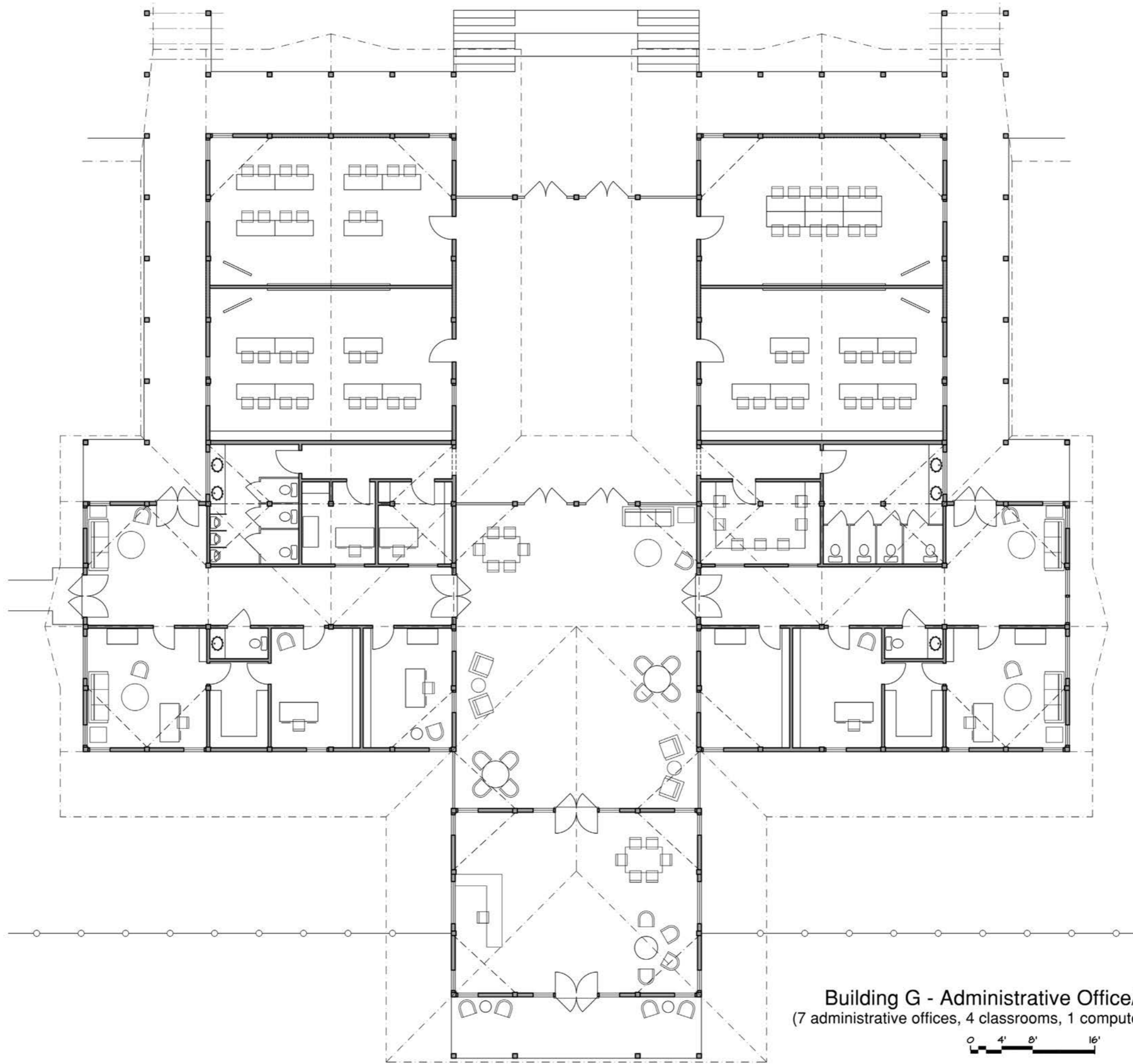
Building D - Staff Family Housing
(2- 3 bedroom houses)



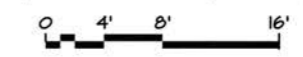
Building E - Volunteer Dormitory
 (6 bedrooms - can house up to 12)

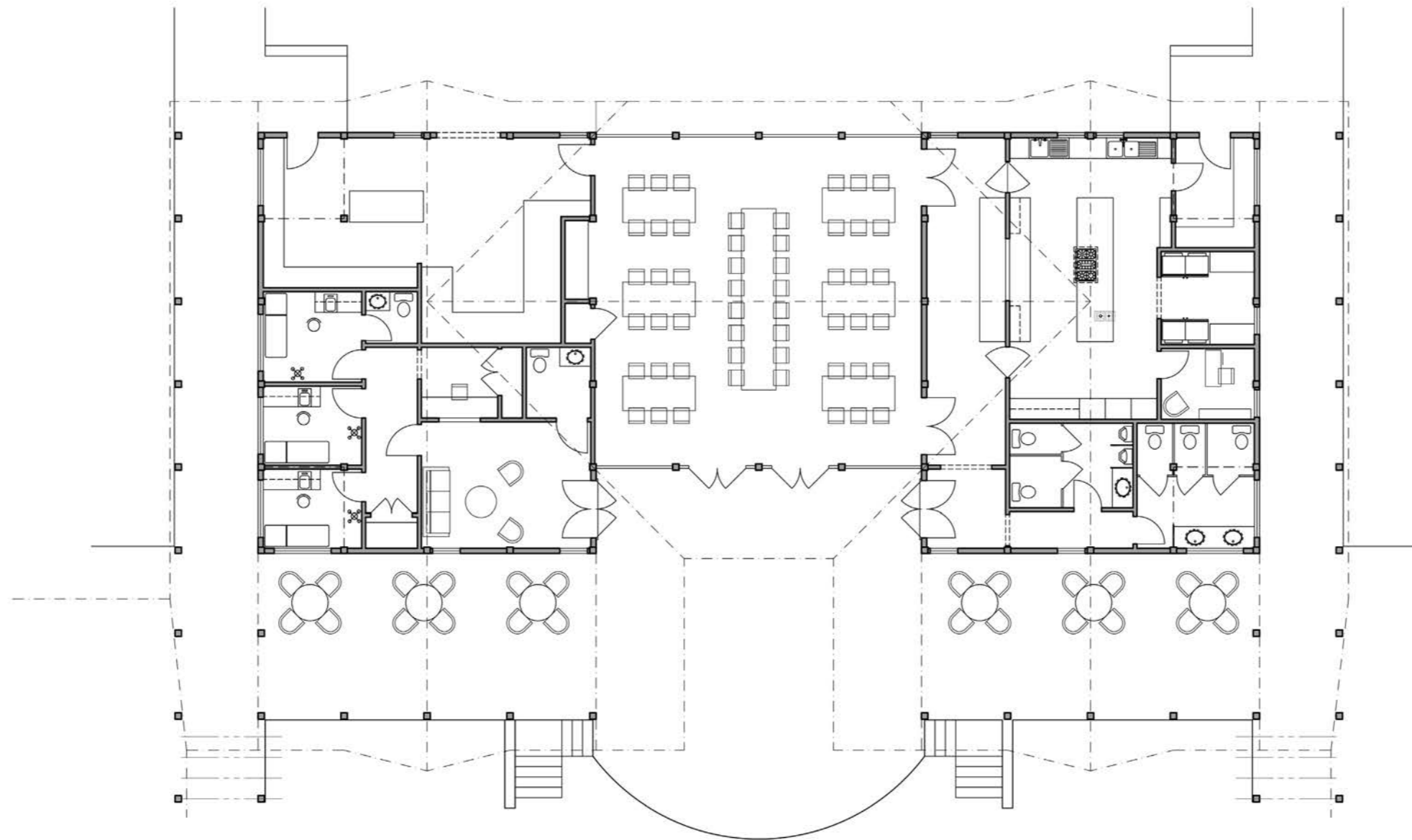


Building F - Family Guest House
 (2 bedrooms)

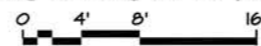


Building G - Administrative Office/School House
 (7 administrative offices, 4 classrooms, 1 computer lab, 2 teacher offices)





Building H - Dining Hall/Clinic/Food Storage
(dining seating for 54 people)

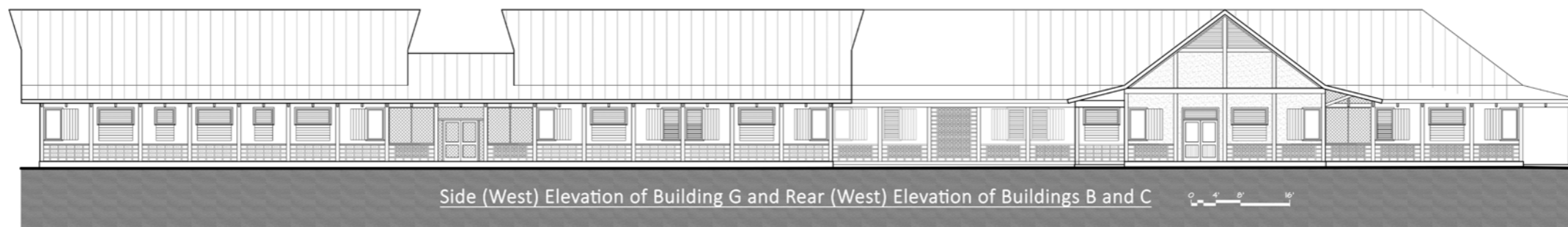




Front (South) Elevation of Building G



Rear (North) Elevation of Building G and Section at Building B and Screened Porch

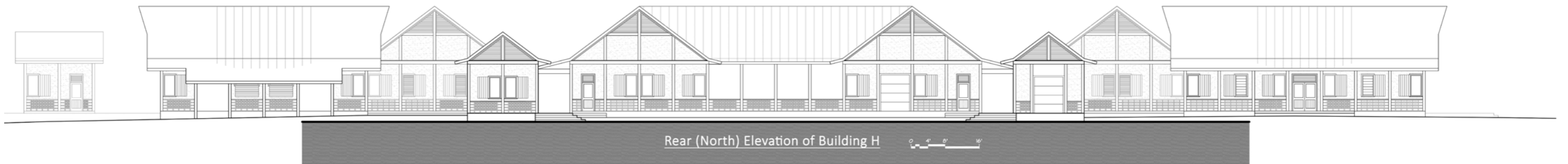


Side (West) Elevation of Building G and Rear (West) Elevation of Buildings B and C

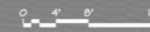


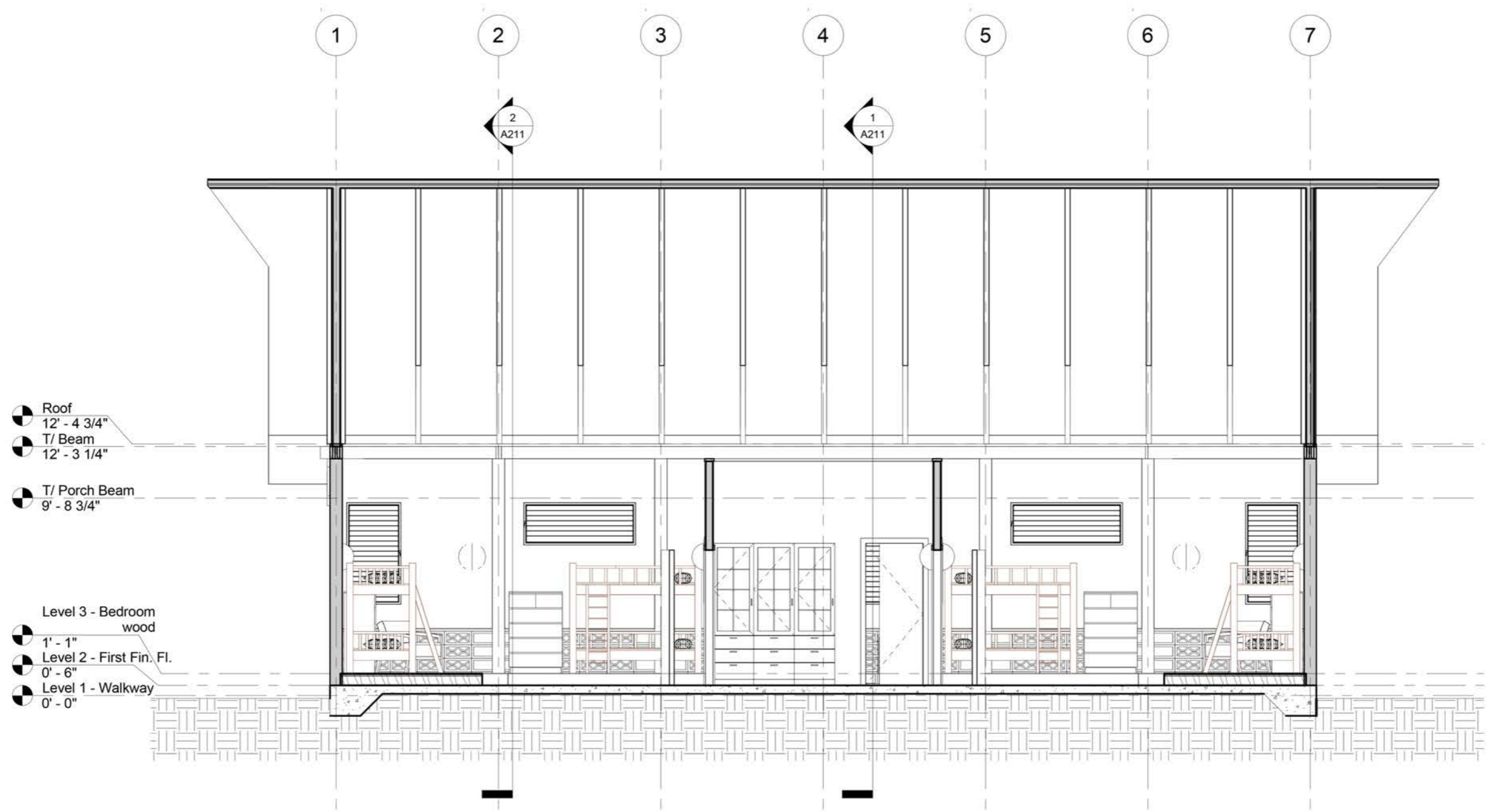
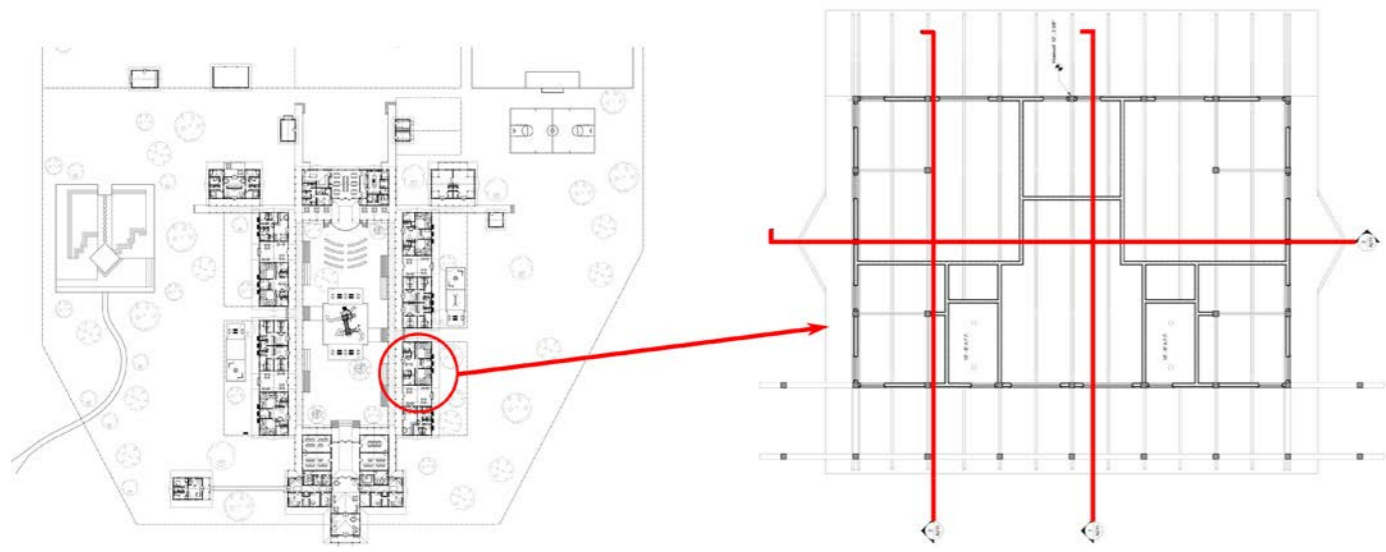


Front (South) Elevation of Building H and Section at Building B and Screened Porch



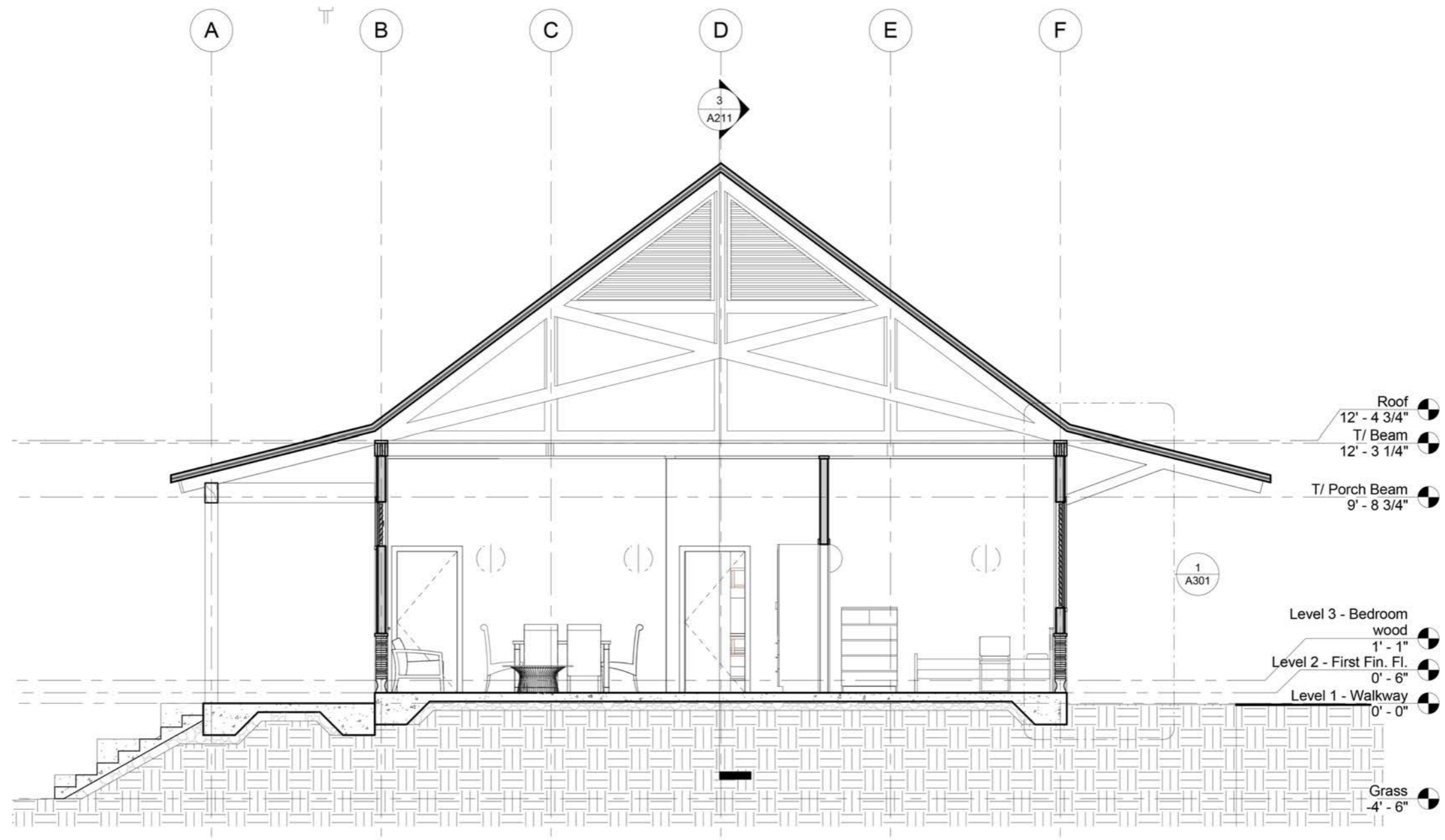
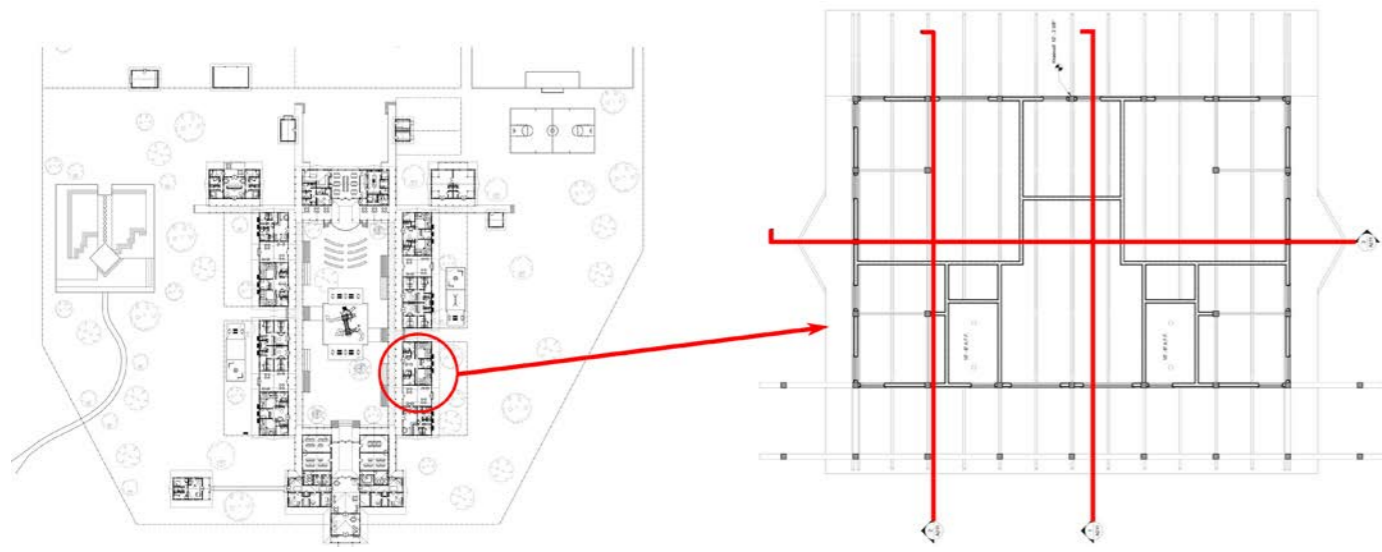
Rear (North) Elevation of Building H

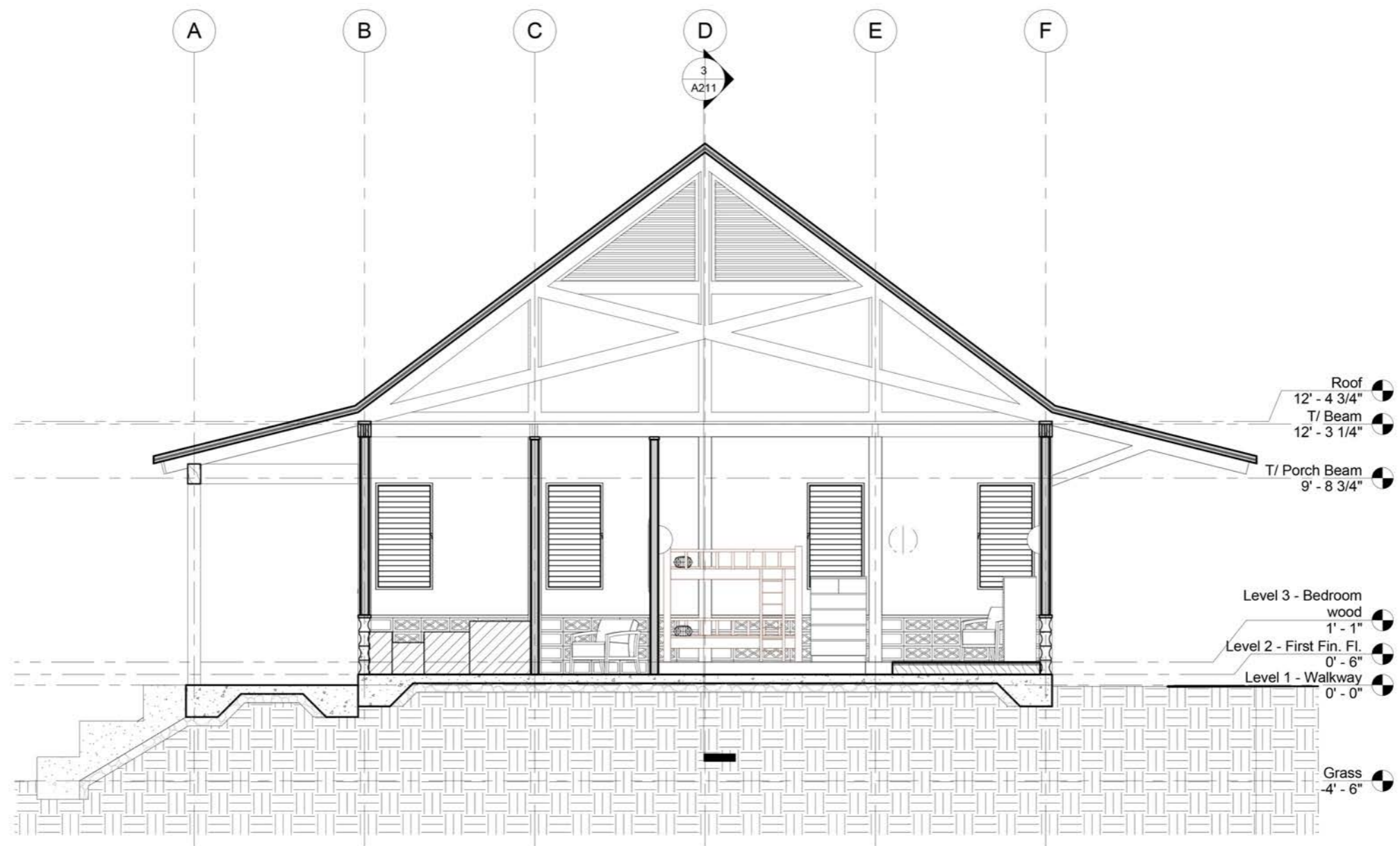
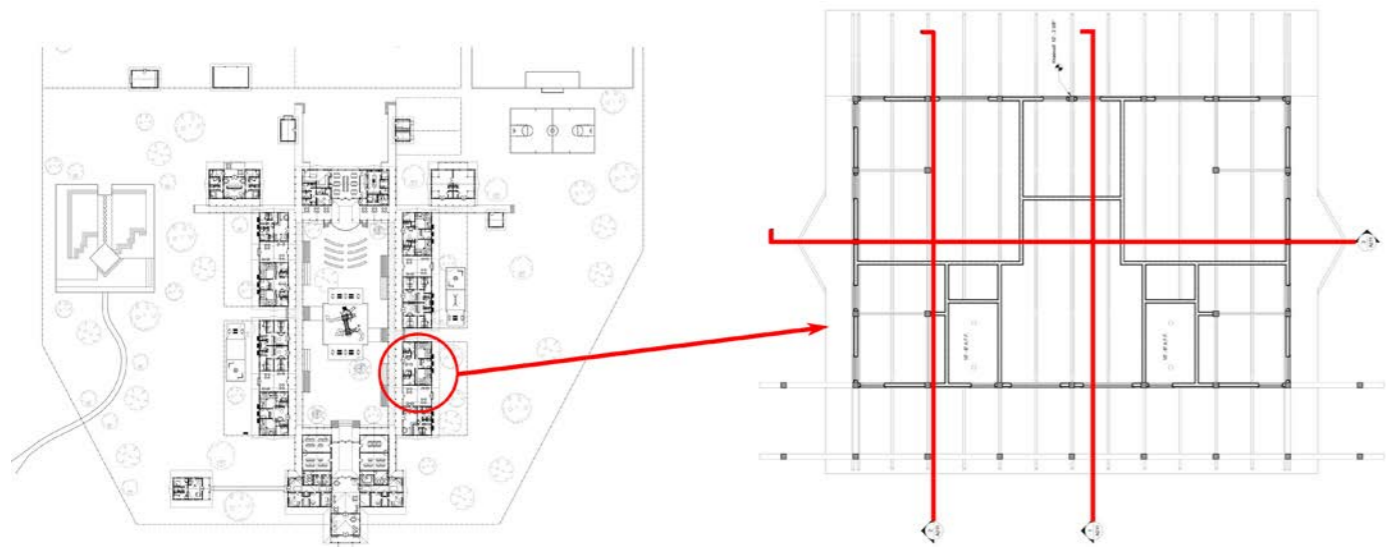


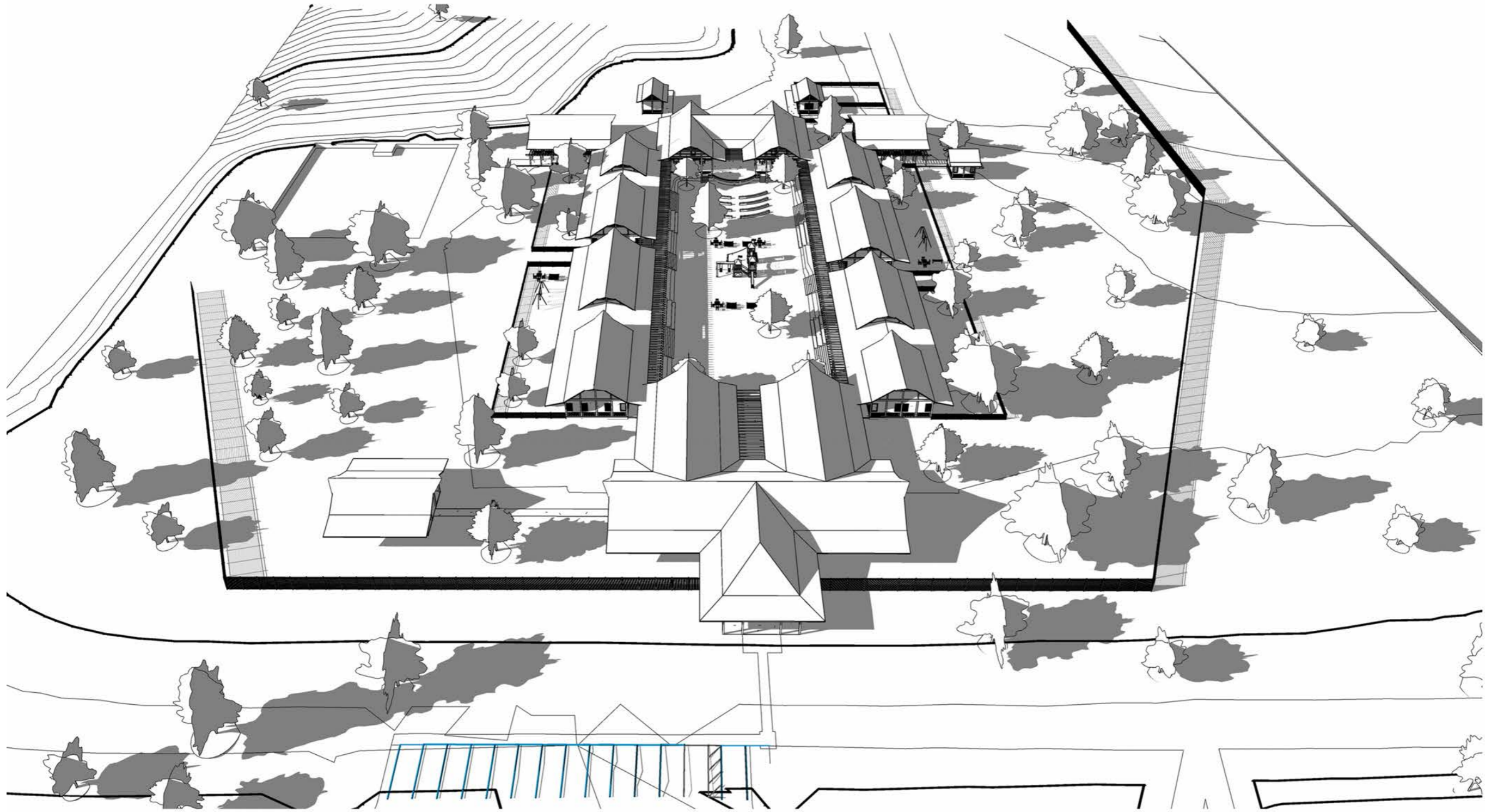


- Roof
12' - 4 3/4"
- T/ Beam
12' - 3 1/4"
- T/ Porch Beam
9' - 8 3/4"

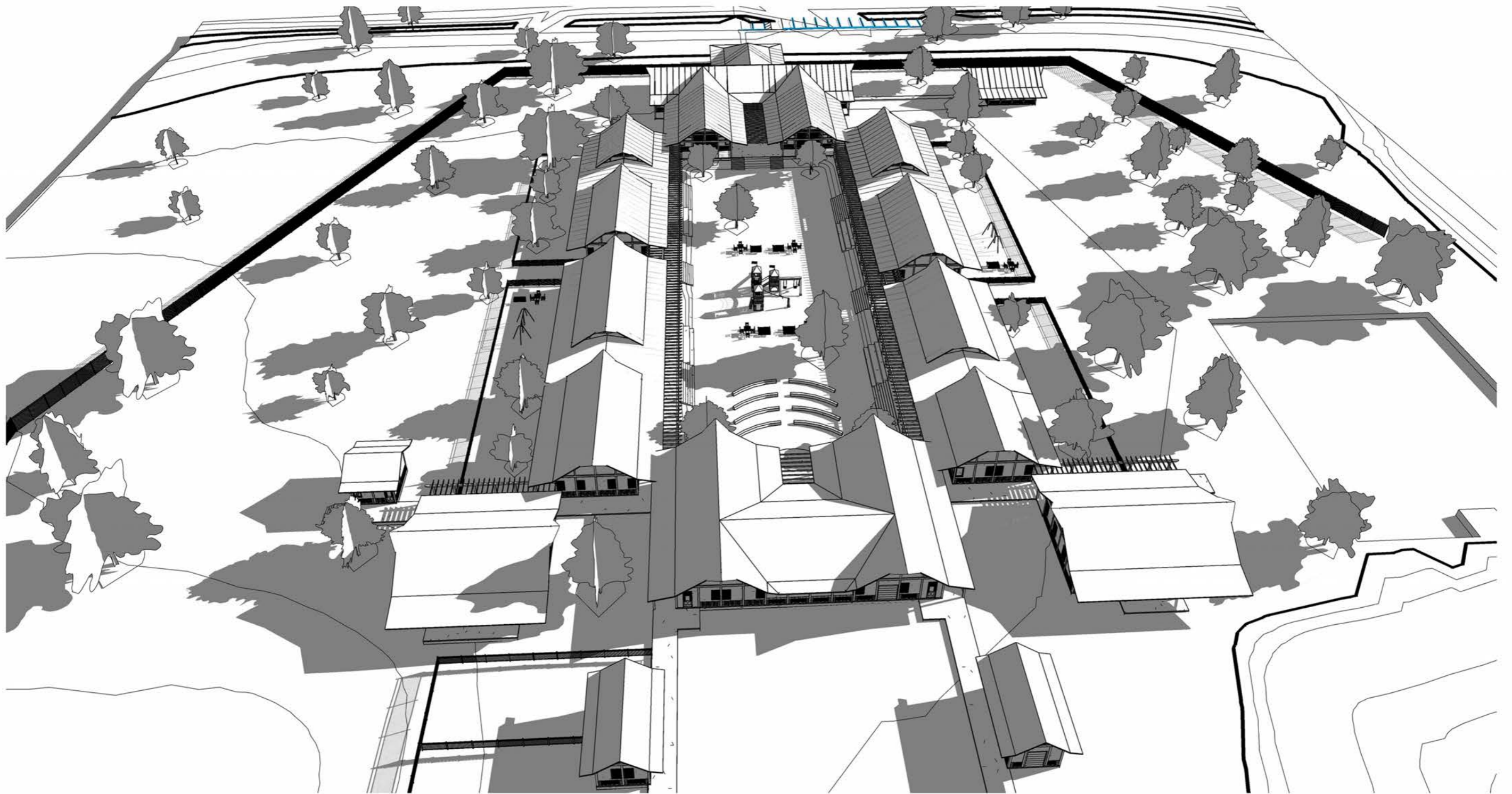
- Level 3 - Bedroom
wood
1' - 1"
- Level 2 - First Fin. Fl.
0' - 6"
- Level 1 - Walkway
0' - 0"



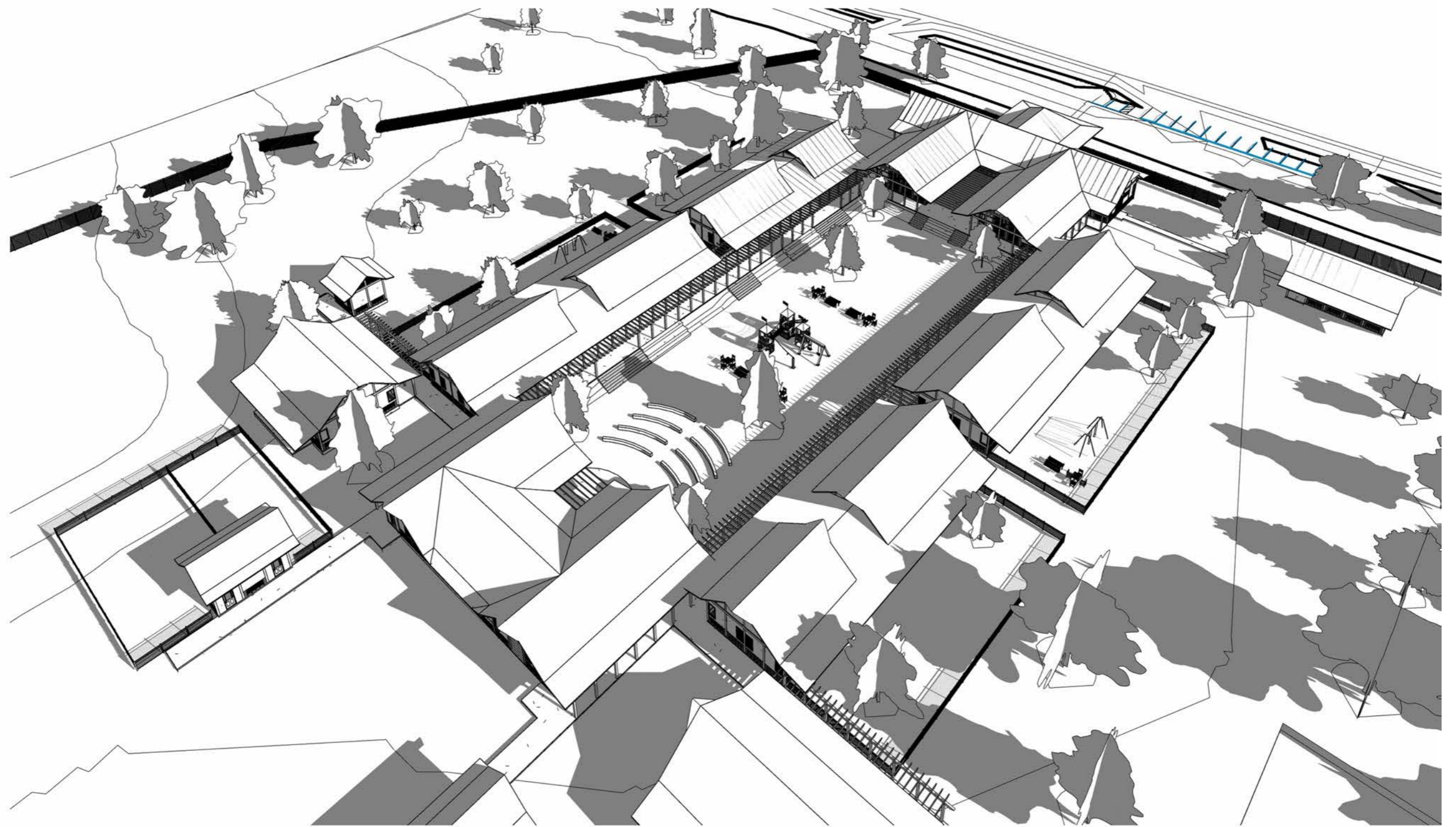




Axonometric View Looking North Towards Building H -
Equinox Solar Study - Evening light and shadows



Axonometric View Looking South Towards Building G -
Equinox Solar Study - Evening light and shadows



Axonometric View Looking South East -
Equinox Solar Study - Evening light and shadows

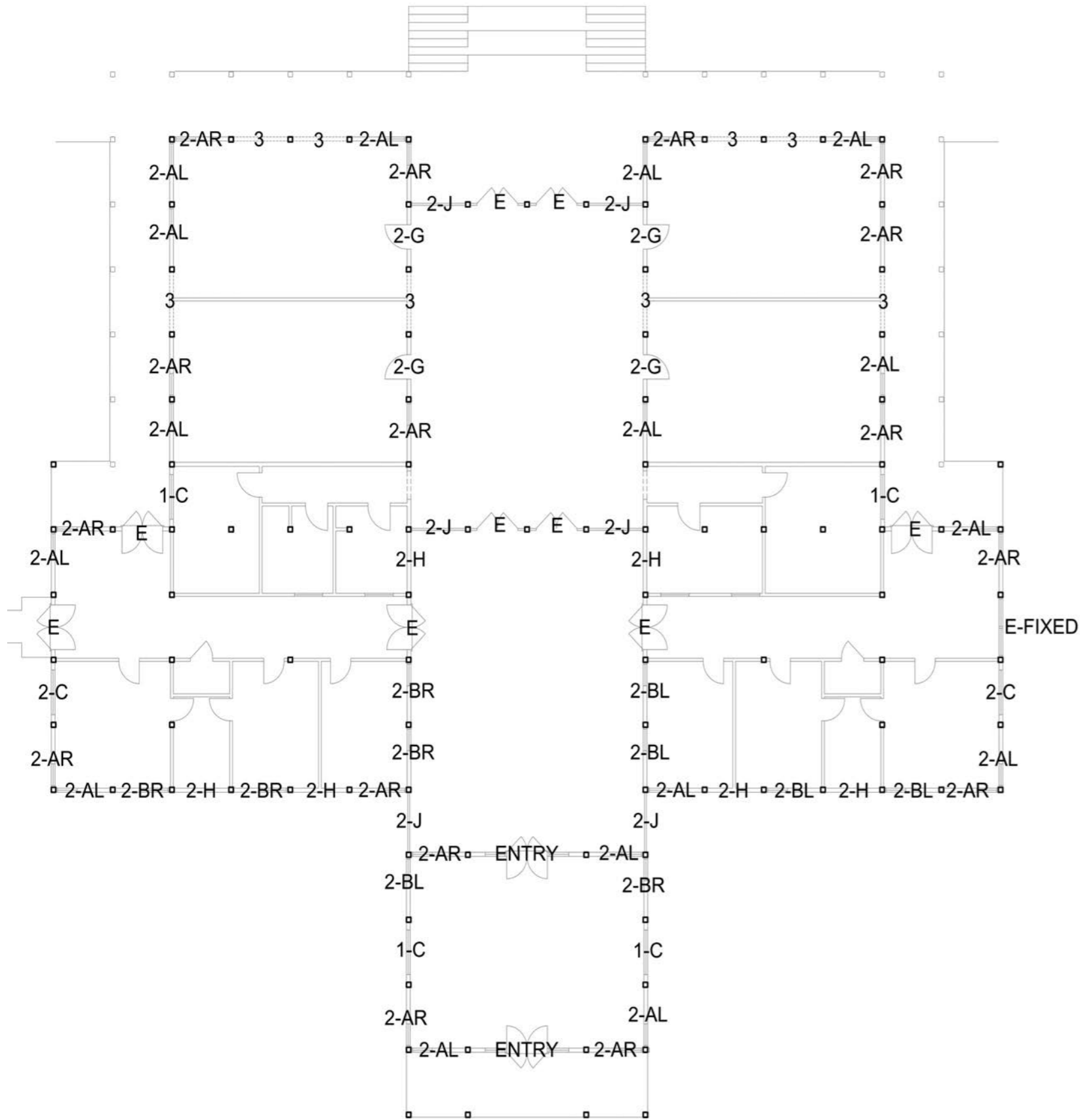
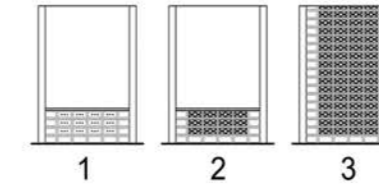
System of Building Components



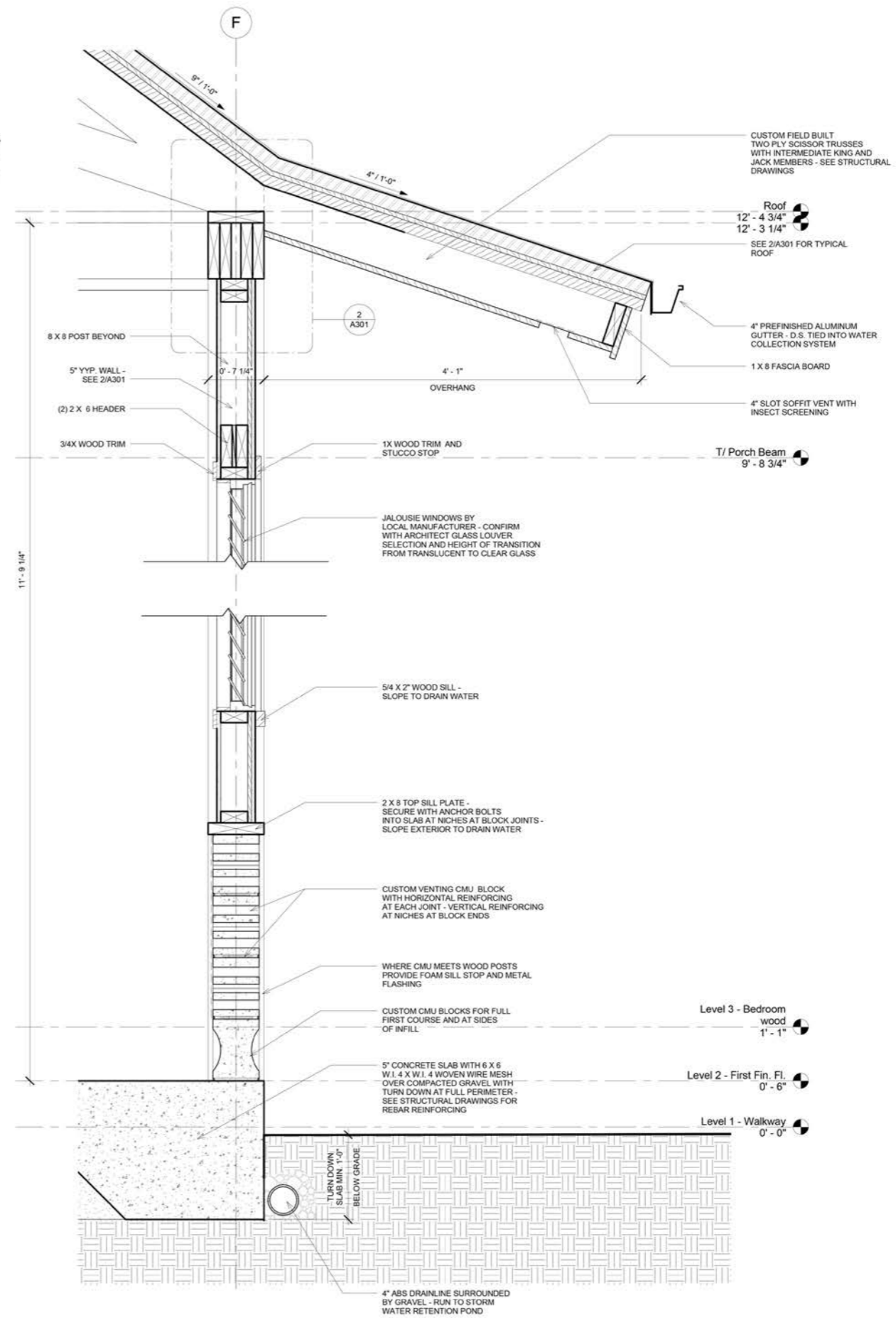
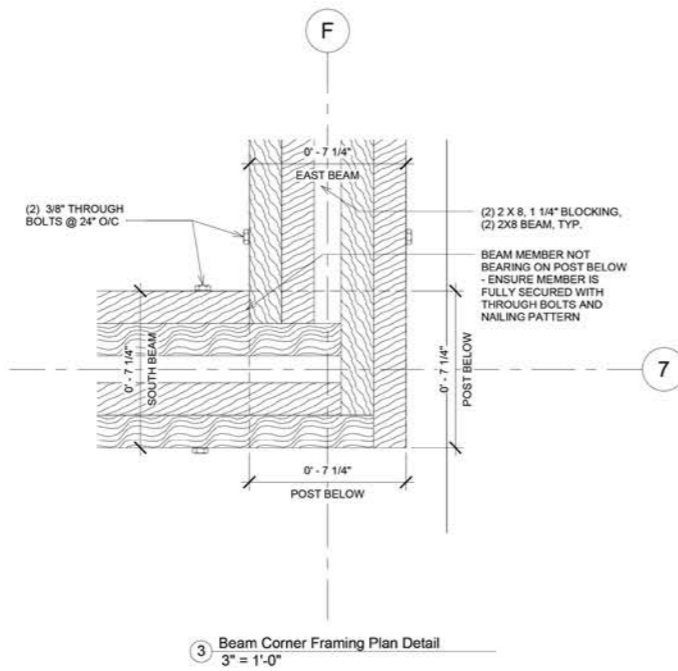
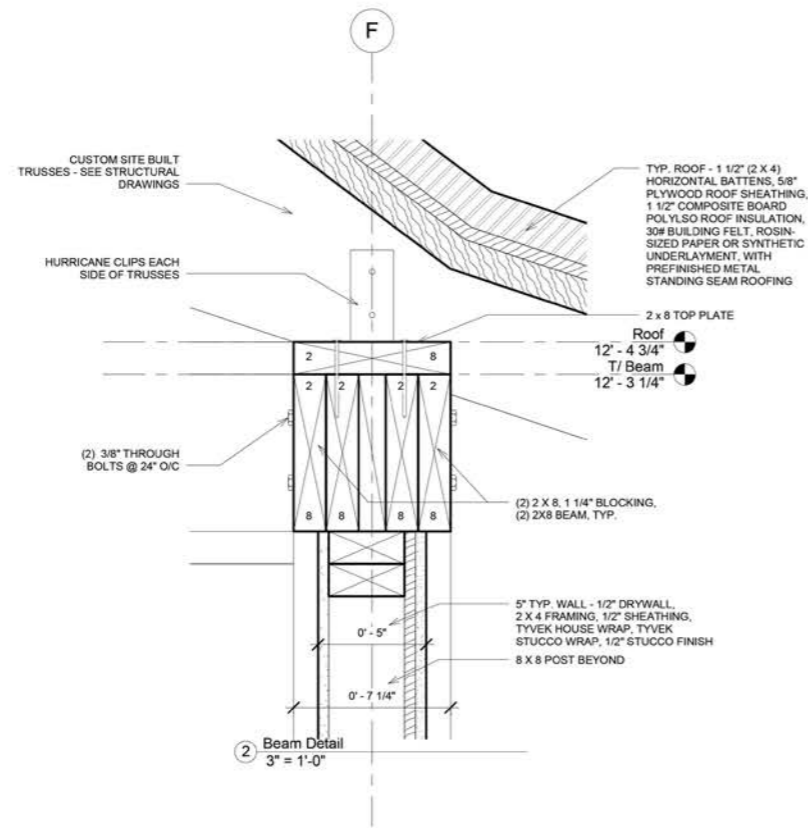
Wood Infill Tops

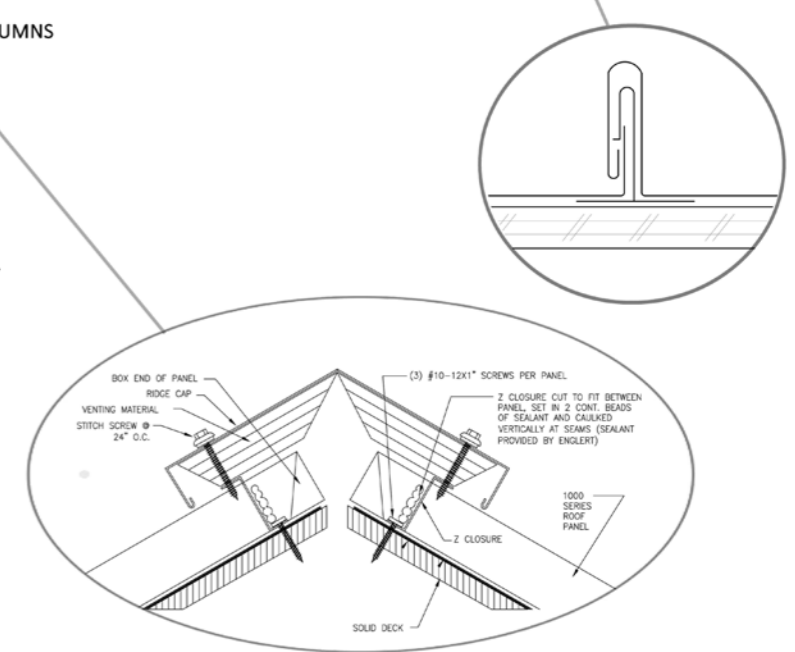
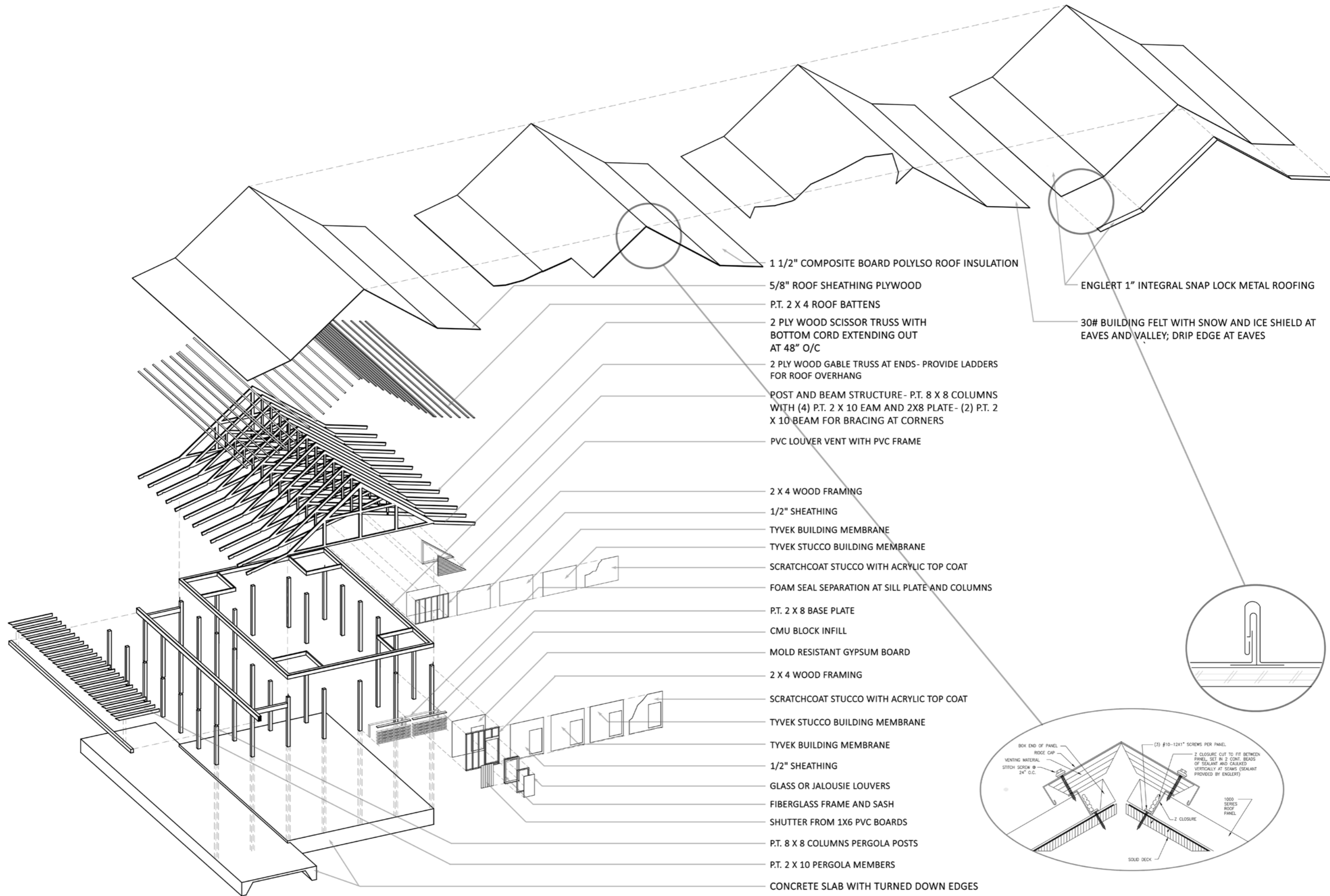


CMU Infill Bottoms

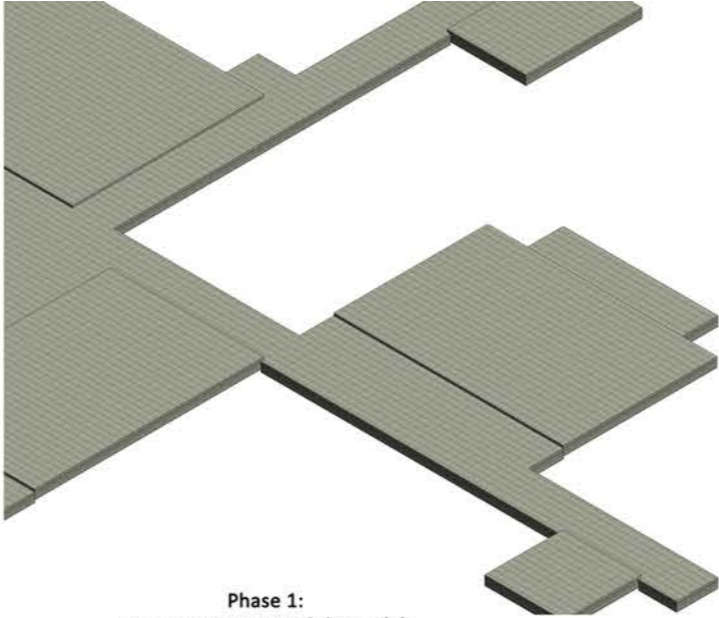


By utilizing a system of typical building components, a standardization begins to emerge. Since this project will be constructed with volunteer and local untrained labor with the oversight of trained professionals, this standardization can help create an easy way to view the building and how to construct it. The columns are laid out on an 8'-0" grid. In between each column is one of the selected in-fill wall systems. This standardization further helps to reduce waste, creates a short construction time and costs due to taking an assembly line approach to the construction, and creates a safer work place due to having smaller normalized sections of the building to focus on.

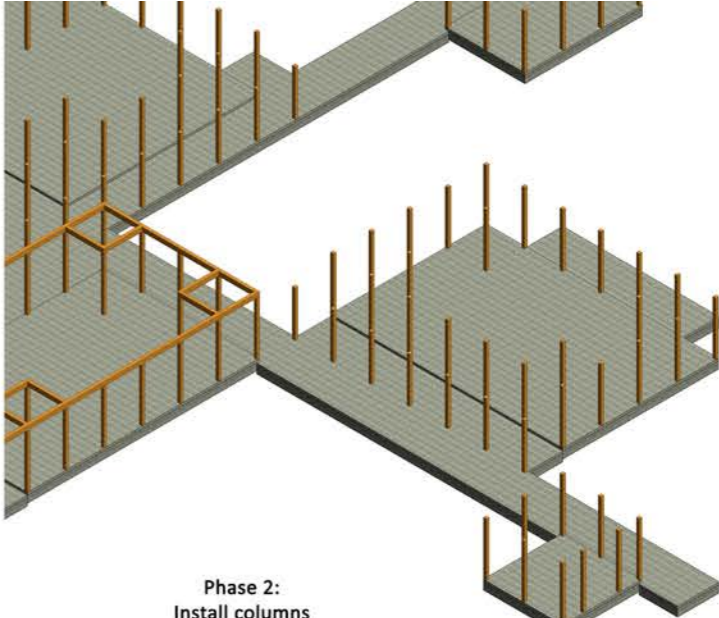




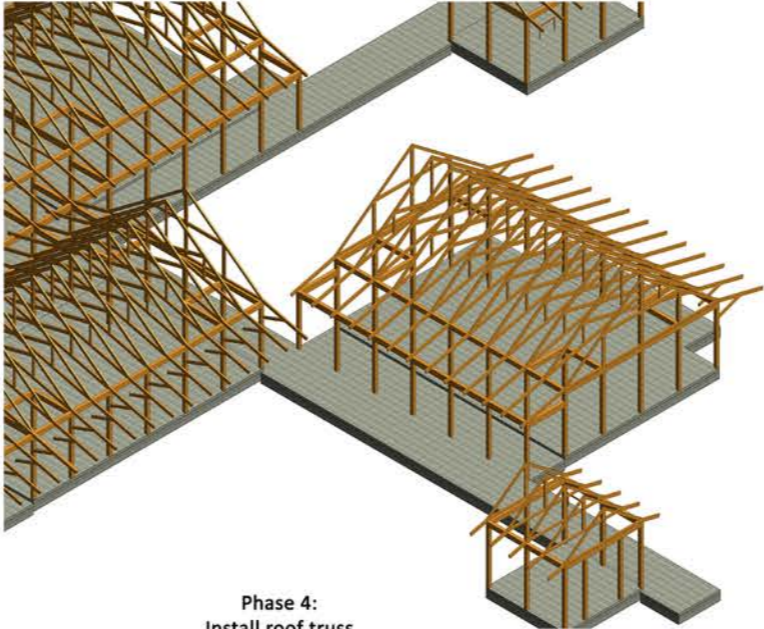
By looking at the project as a system of components, it can easily be translated into a work breakdown structure and schedule for construction. Each part is constructed with its predecessors and successors in mind. The whole project, or just a single building, can be seen as a series of stages where each component is added. This further allows clarity on the construction end and helps explain to volunteers or untrained laborers how the buildings will go together. It can also be used as an example of how the system of components can be used to expand the campus.



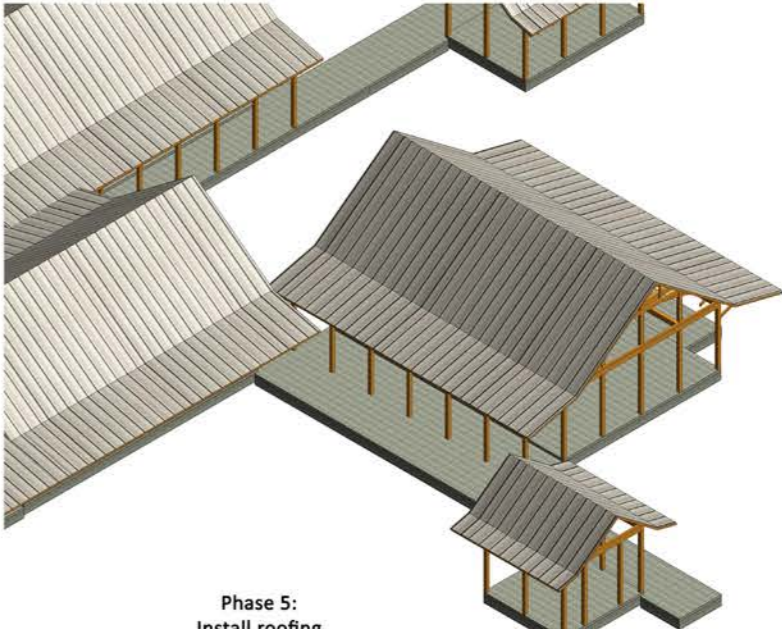
Phase 1:
Pour concrete turned down slab



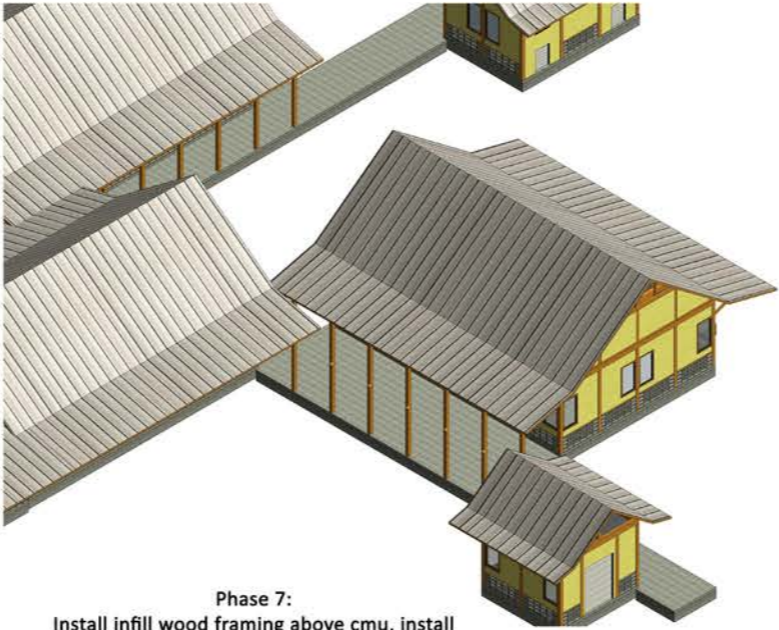
Phase 2:
Install columns



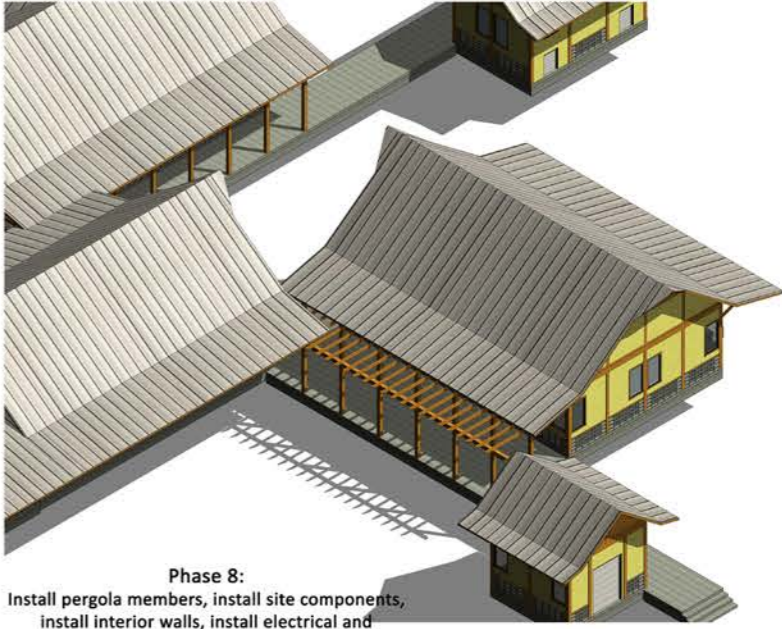
Phase 4:
Install roof truss



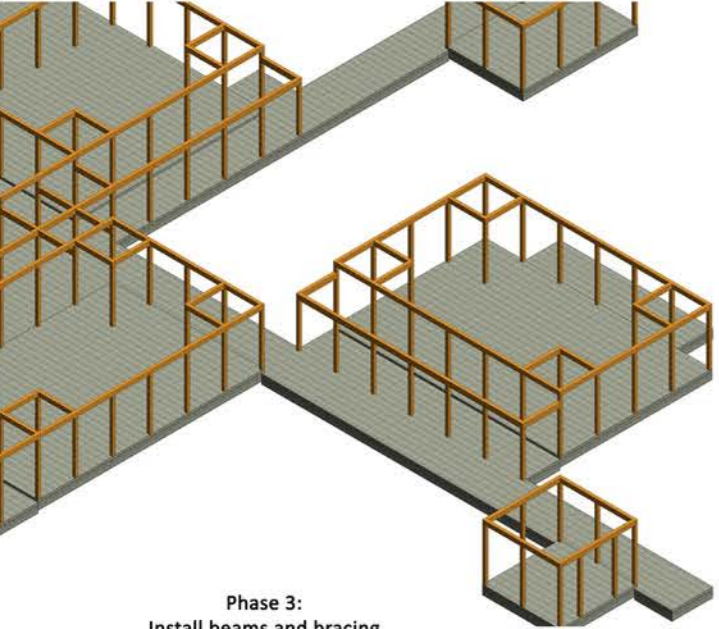
Phase 5:
Install roofing



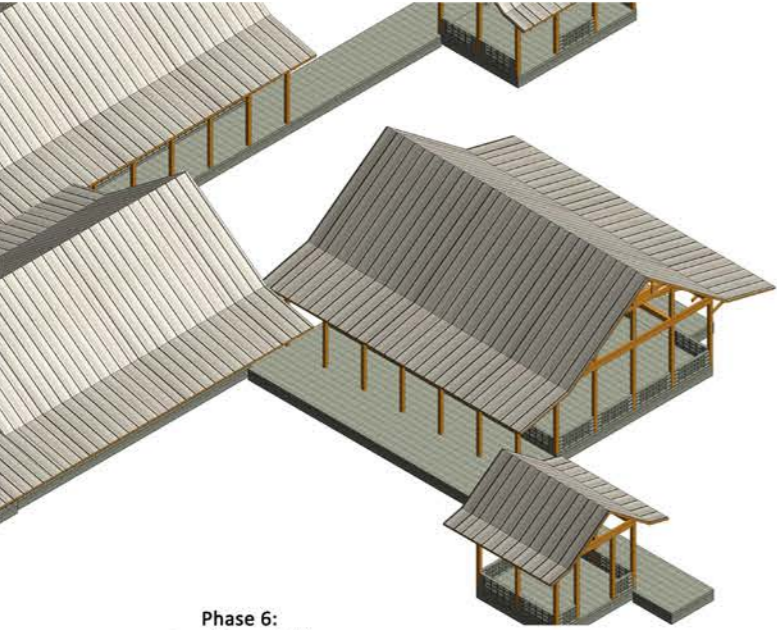
Phase 7:
Install infill wood framing above cmu, install windows and doors, finish infill walls with stucco, and begin installing columns for pergola



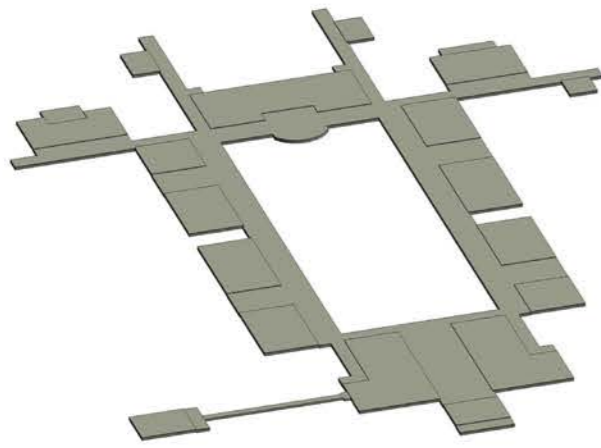
Phase 8:
Install pergola members, install site components, install interior walls, install electrical and plumbing, and move in furnishings



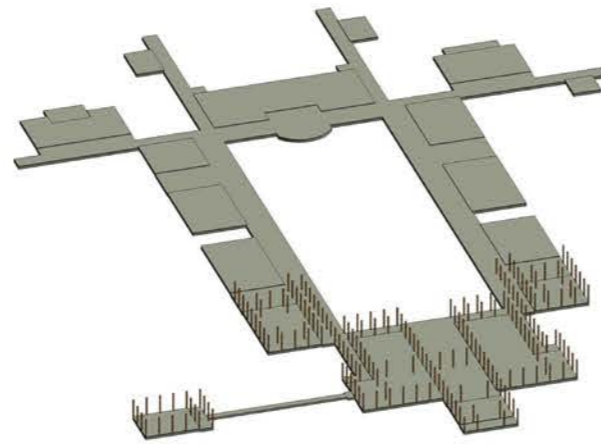
Phase 3:
Install beams and bracing



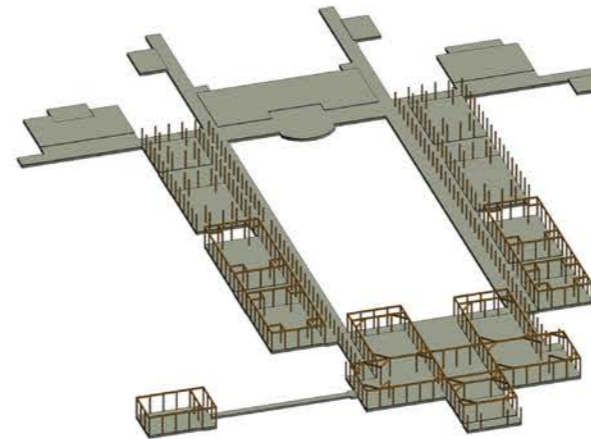
Phase 6:
Install cmu infill



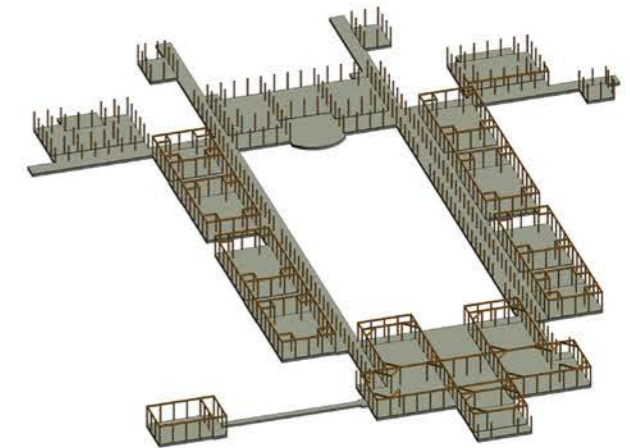
Phase 1:
Pour concrete turned down slab



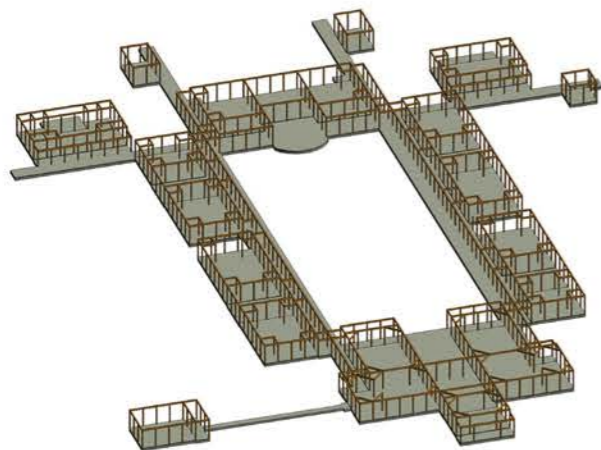
Phase 2:
Begin installing columns - working from administration building towards farm buildings



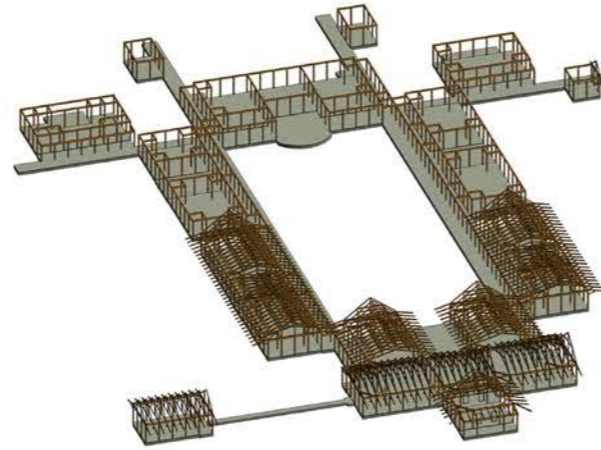
Phase 3:
Continue installing columns - begin installing beams and bracing



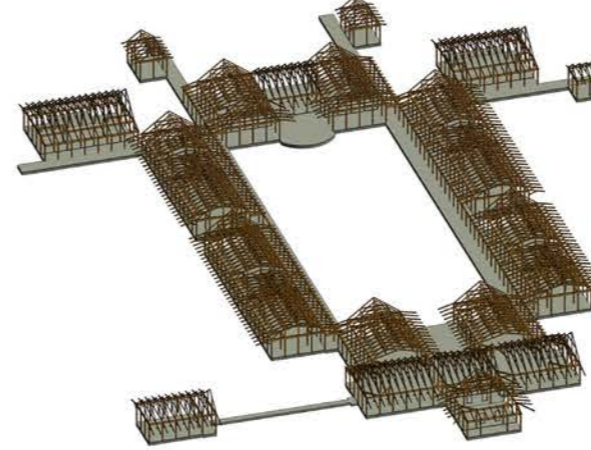
Phase 4:
Continue installing columns - continue installing beams and bracing



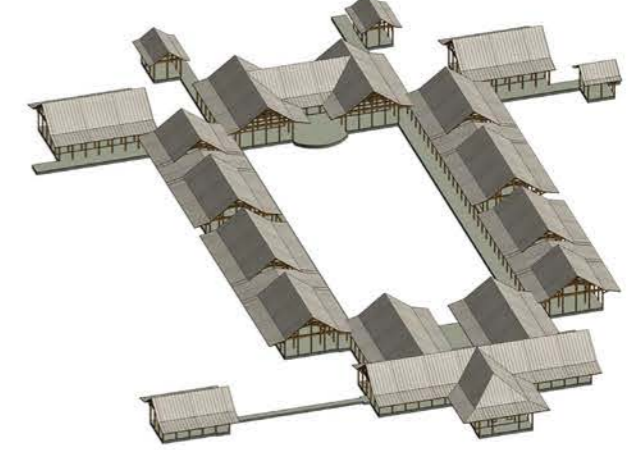
Phase 5:
Finish installing columns - finish installing beams and bracing



Phase 6:
Begin installing trusses



Phase 7:
Finish installing trusses



Phase 8:
Install roofs



Phase 9:
Install cmu infill



Phase 10:
Install infill wood framing above cmu, install windows and doors, finish infill walls with stucco, and begin installing columns for pergola



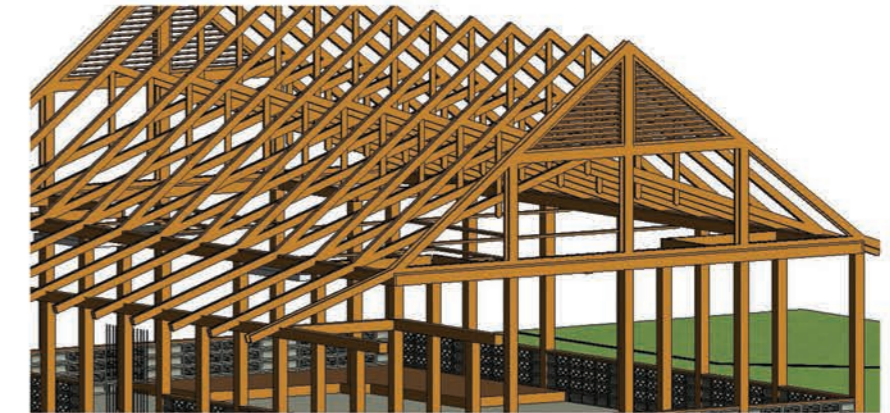
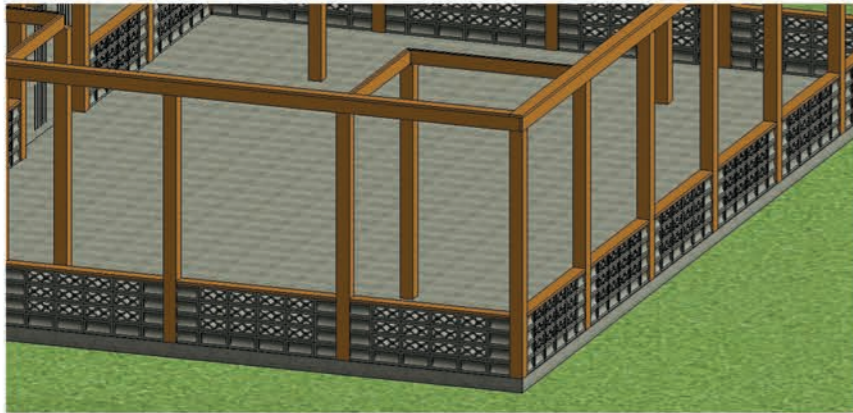
Phase 11:
Install pergola members, install site components, install interior walls, install electrical and plumbing, and move in furnishings

Post and Beam Structure with In-Fill Walls and Custom Truss Roof

Post and Beam

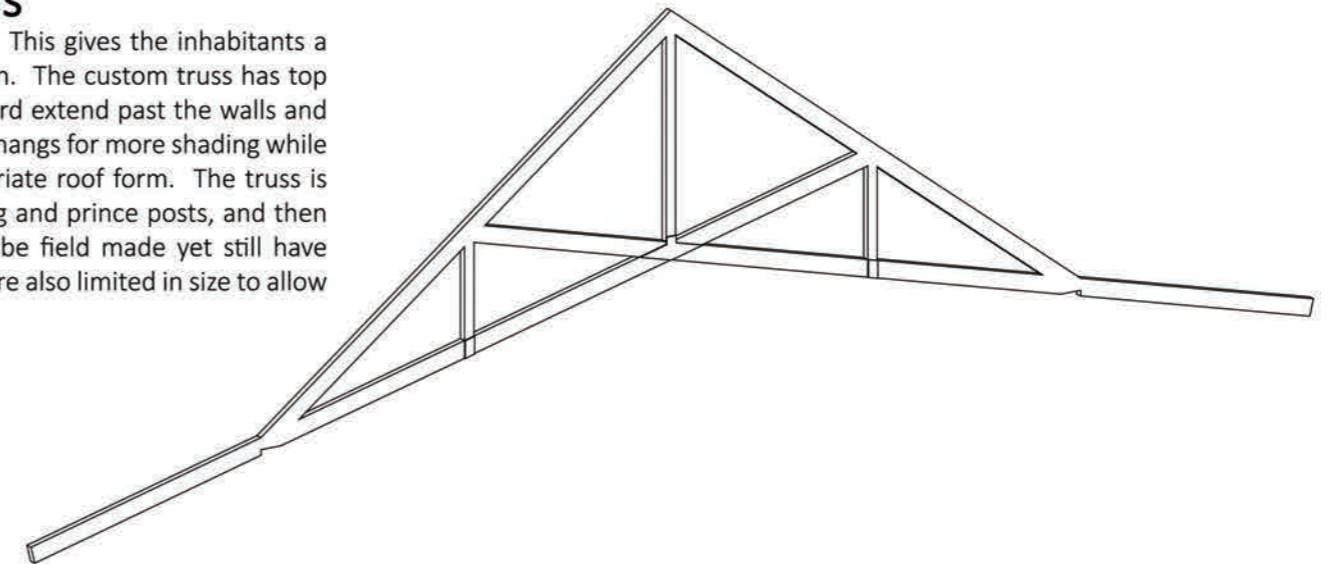
The post and beam structure of the buildings has allowed me to plan out a 8'-0" grid and position buildings and pathways around it. This will allow the orphanage and school to be easily built in phases or expanded in the future. The main reason I implemented a post and beam strategy was that it allows many structural and construction benefits including:

1. It can rapidly be erected and using a common spacing and lumber sizes it can create an efficiency of construction. Having typical size beams, posts, and in-fill allows can even lend itself to prefabrication and mass-production.
2. It creates an open floor plan that can easily be retrofitted into different purposes. The trusses bear on the outer walls and the main structure is easily identifiable.
3. If properly engineered, it has a better seismic survivability (Gotz, Karl-Heinz; et al. (1989). Timber Design & Construction Sourcebook. McGraw-Hall.)
4. It can allow the carpenters and labors to creatively decorate the members including carvings, time markings, etc.



Custom Scissor Truss

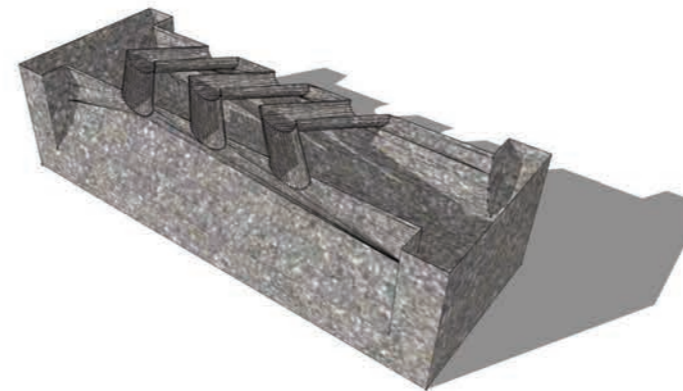
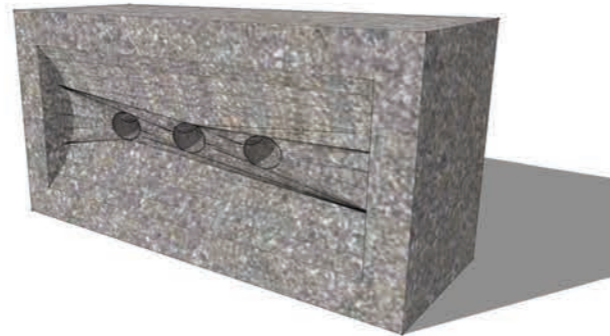
Allows for generous airy vaulted ceilings throughout the space. This gives the inhabitants a more comfortable feeling as well as helps with passive ventilation. The custom truss has top chords that form the larger 9/12 roof structure. The bottom chord extends past the walls and forms the 4/12 overhangs. This allows the roof to have longer overhangs for more shading while still providing a taller cornice height and creates a more appropriate roof form. The truss is made up of three parts – a scissor truss, a layer that has the king and prince posts, and then another scissor truss. This larger layered truss will allow it to be field made yet still have exceptional strength to withstand hurricane winds. The trusses are also limited in size to allow field workers the ability to easily lift them into place.



Passive Ventilation and Privacy

Ventilating Block In-fill

along the lower portion of the infill walls will allow air to enter the building lower and move up through the roof louvers and ridge vent. This passive air movement will keep the buildings cooler. After researching ventilating cmu block and looking at several design variations I found that though they were aesthetically appealing they would not allow for the privacy needed in the private areas of the orphanage such as the bedrooms or bathrooms. I am experimenting with creating a custom ventilating privacy block that will have venting slots at a 45 degree angle then switch back so that air can still enter the rooms but the eye will not be able to see through the openings into the rooms. Insect screening will be installed behind the block.



Jalousie Windows

with lower slots with privacy glass and upper slots with translucent Low-E glass. These windows allow the occupant to control the level of airflow desired as well as the level of privacy. Jalousie windows maximize natural ventilation by allowing airflow through the entire window area as well as having the additional advantage of the ability to leave them at least partway open in most heavy rains, maintaining desirable ventilation whether a sun shower or prolonged tropical storm. This type of window is historically used throughout Haiti and several local manufactureres are available. Further security may be added through vertical metal bars on the inside of the windows.



Fig. 15



Fig. 16



Fig. 17



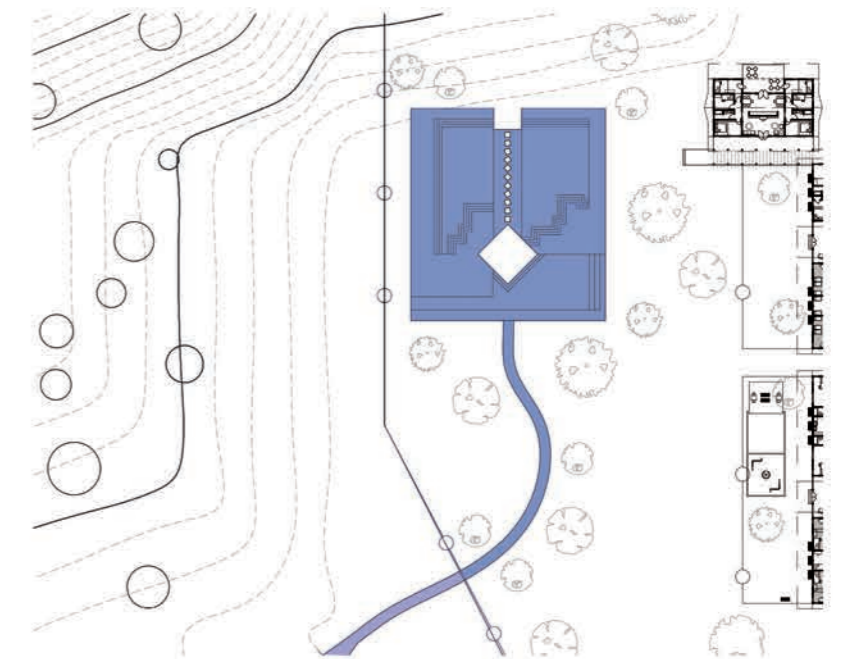
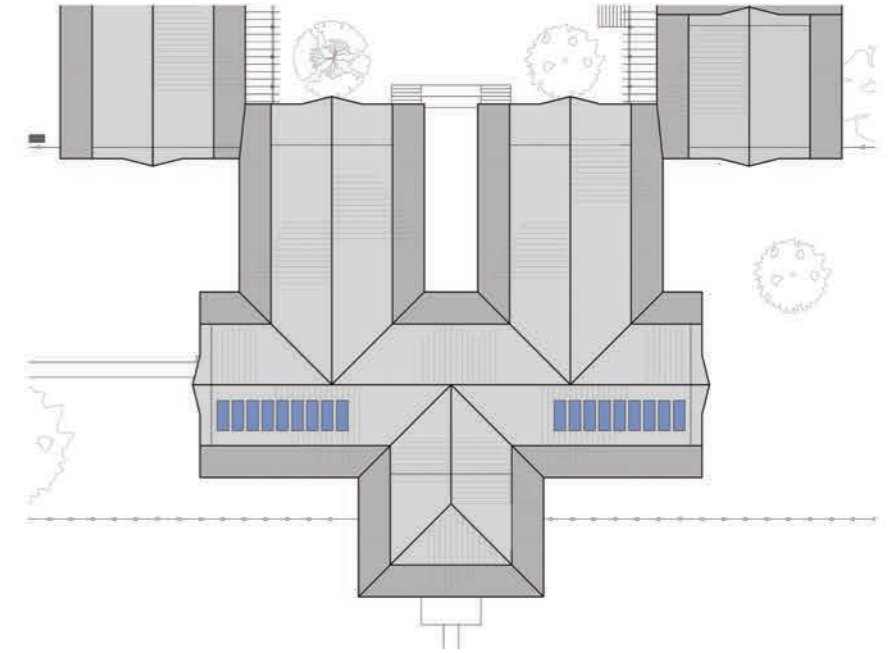
Fig. 18

Self Reliant- Farming, Solar Power, and Water Retention

The Safe Haven Orphanage and School has been designed to be a self-sustainable organization. Two key issues that were reviewed were the after effect of the devastating earthquake and how long it took to return to a livable way of life with utilities and food restored and how hard it is to keep a nonprofit orphanage open and keep donations coming in. The initial design and construction will create a community of orphans that can farm their own food – from the cows and goats in the fields to the multiple acres of vegetable gardens. The excess food can be sold as a way to bring in income to the orphanage.

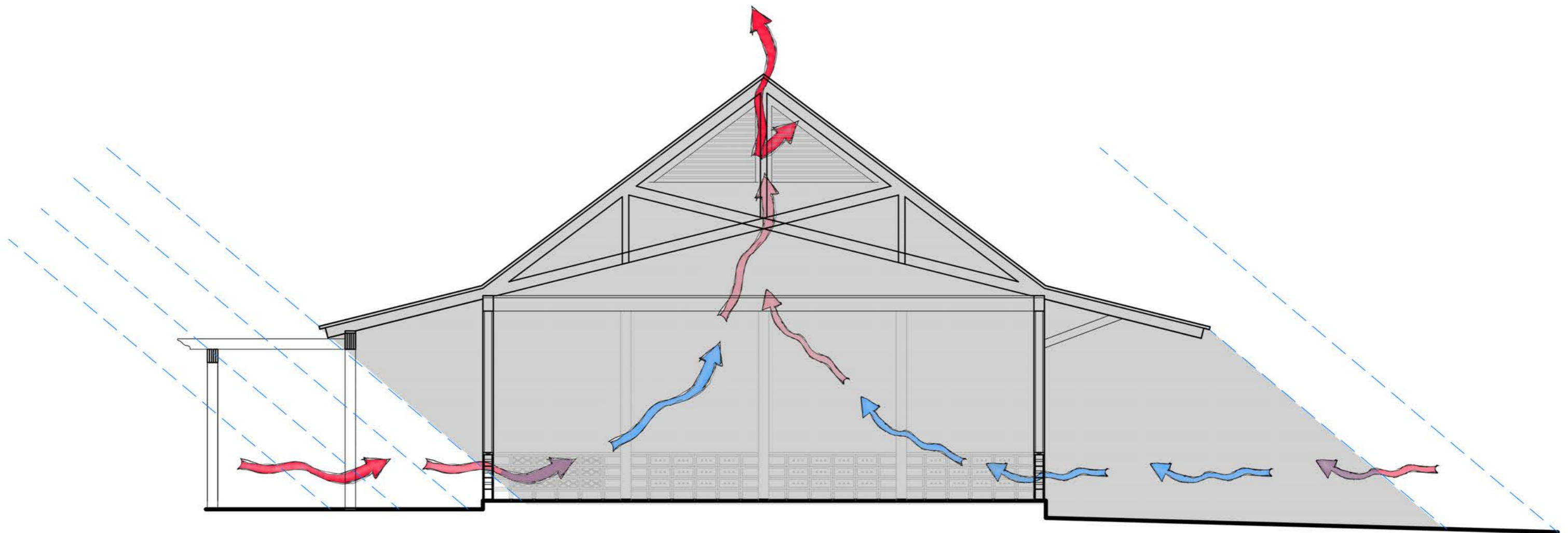
Nestled at the base of a mountain allows for a great opportunity to capture rain water coming off the mountain. Savanette has an average rain fall of 54 inches a year. There are two rainy seasons, April–June and October–November. All the rain water will be captured from the roofs. All this water is held in a large water retention pool that can be used to water the farm as well as feed a large cistern with bio filtration to turn the water into potable drinking water for the orphaned.

The south facing roof of the administration building will create a perfect area to install a solar array that can either create enough electricity for the compound or significantly offset the costs of the needed electricity. There is also a metal and wood shop so that orphans can be trained in how to maintain their buildings and solar panels. The compound will include an engineered septic system past the farm pastures to further protect the ground water and environment.

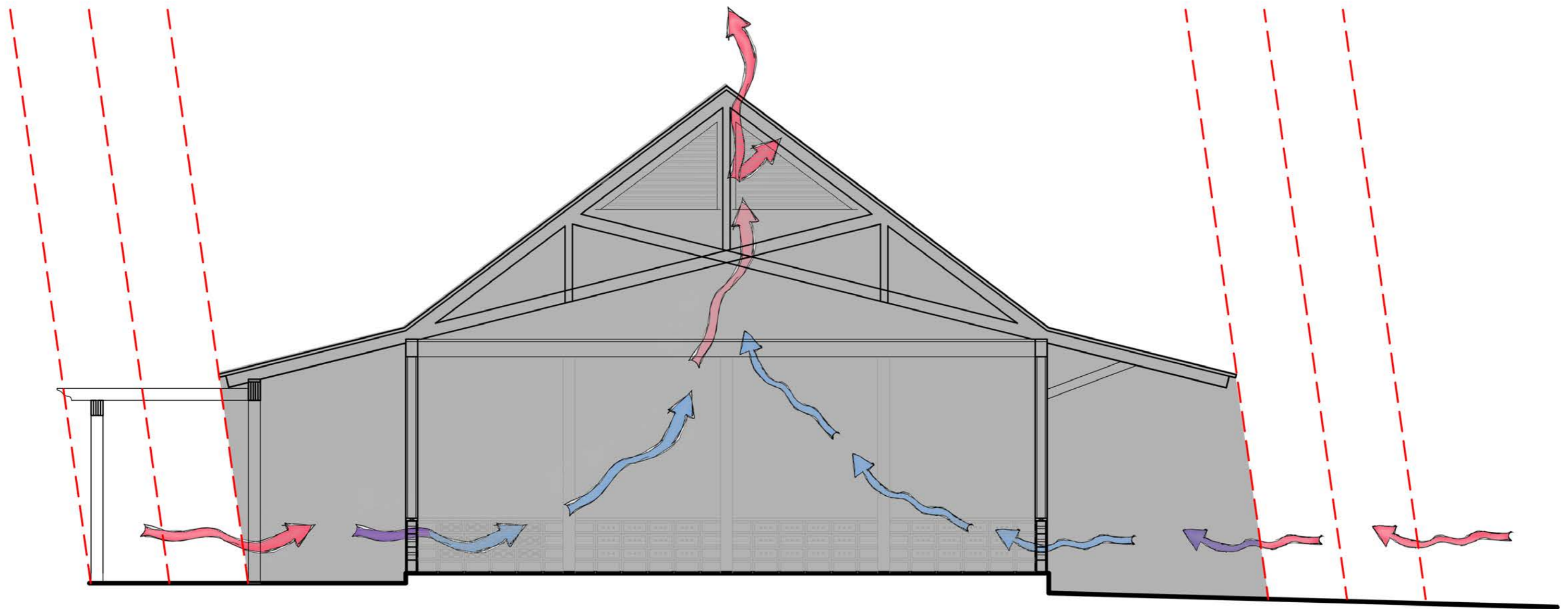




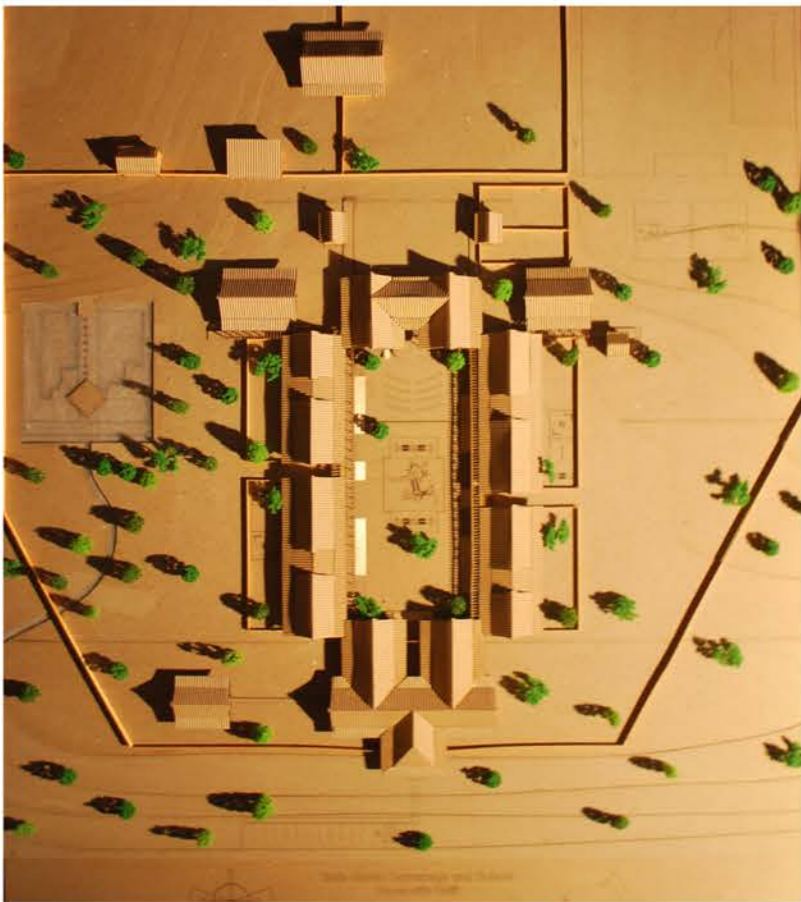
Program Plan - The buildings provide private spaces that are passively ventilated to keep their inhabitants comfortable year round as well as define a central gathering terrace that is the heart of the site plan. These buildings included extra long overhangs to create covered, shaded outdoor living spaces as well as screened porches between buildings. These screened porches also help with the passive cooling by creating a “dogtrot” breezeway. The breezeway provides a cooler covered area for sitting and living. The combination of the breezeway and open windows in the rooms of the buildings create air currents which pulled cooler outside air into the living quarters efficiently. Beyond the outside shaded living areas is a partially/ fully shaded circulation path.



Winter Sun/ Ventilation - The buildings are designed with low venting block in-fill walls as well as operable windows above. In the winter, the sun angle on the south side is much lower and able to reach slightly into the buildings. This helps keep the air warm enough to be comfortable to the inhabitants. As the air enters the building it cools off then warms and rises to vent out the ridge vent and the gable vents. The air on the north side is cooler but is not as strong coming into the buildings.



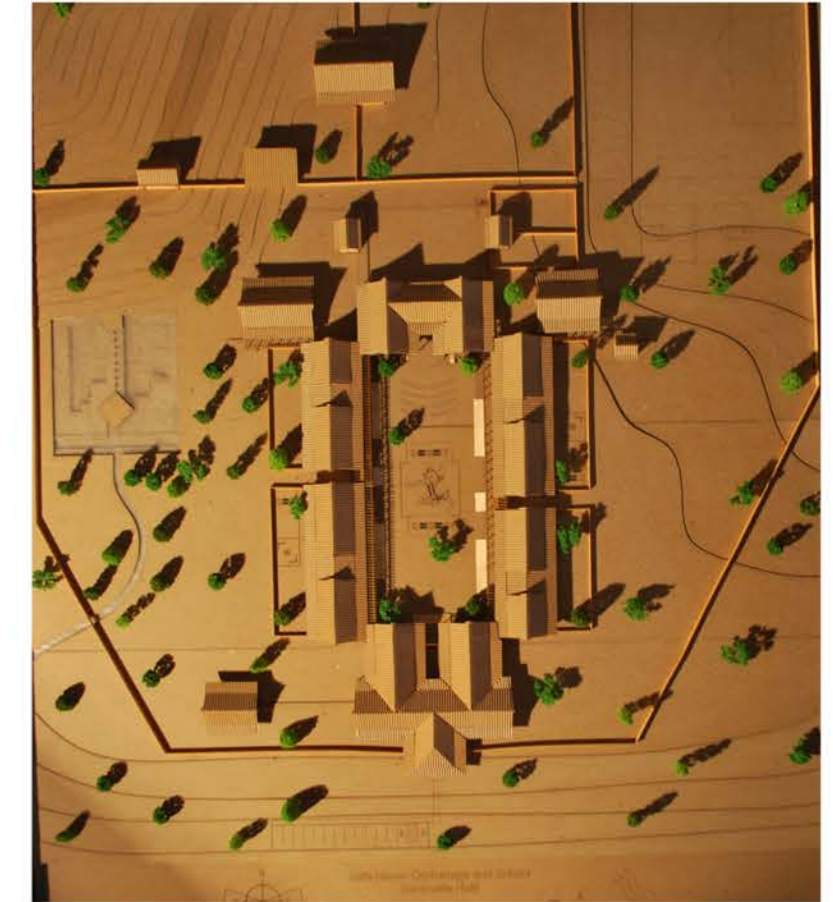
Summer Sun/ Ventilation - The buildings also have extra long overhangs as part of the passive cooling strategy. Properly designed shading system can effectively contribute to minimizing the solar heat gains. By shading the building structure, the heat gain captured through the windows and envelope will be reduced. The hot summer air is cooled by the shaded areas and then enters the buildings low. This is where the inhabitants live and will need to stay comfortable. Extra generous roof heights also help keep the air cool low and the air to warm gradually and exit the roof at the ridge vent and the gable vents.



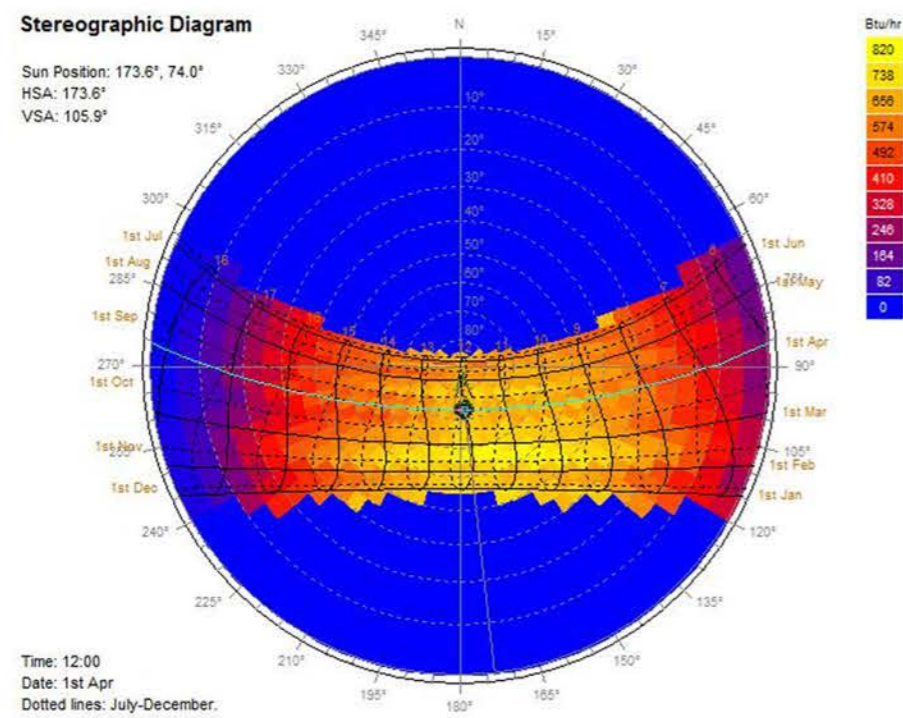
Solar Study Model- Sun at 7:00 AM on Equinox



Solar Study Model- Sun at Noon on Equinox

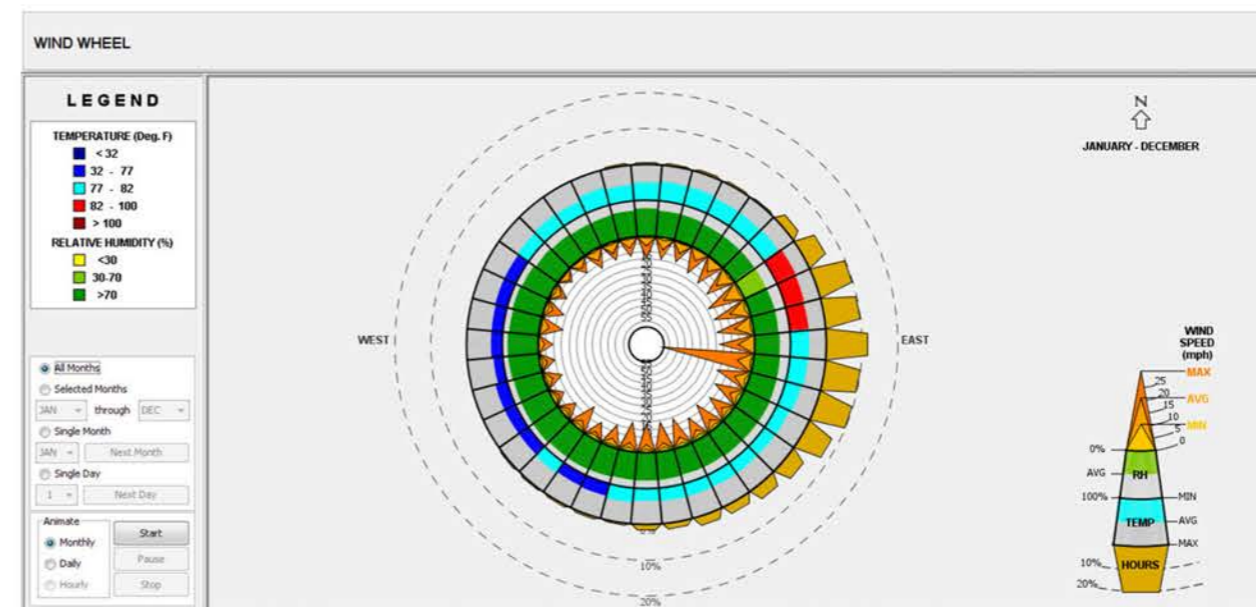


Solar Study Model- Sun at 7:00 PM on Equinox



Year Sun Study Diagram for Savanette
 (Image from Autodesk Ecotect Analysis Software)

Fig. 19



Prevailing Wind Chart- Prevailing winds in Savanette are from the SE to SEE
 (Image from Climate Consultant 5 Software)

Fig. 20

Renderings



The world of architecture and construction is ever evolving, trying to find new efficiencies in an industry that has not been able to enjoy the same revolution in efficiency that other industries have had. This is in part due to the fact that architecture and construction deal with one time projects and what you learn throughout the process is not always carried over to the next project. However, a major advance in the past decade is the wide spread application of Building Information Modeling with software like Autodesk Revit and Autodesk Navisworks. The past two semesters has allowed me to learn, explore, and utilize this software. This software provides several benefits including learning to design and detail in three dimensions, life like visualizations of a project, and information modeling like sun studies, thermal studies, and light studies. I have tried to explore it further by utilizing it to create augmented reality simulations. These simulations allow a user or client to move their head around and experience what it would be like standing in that part of the project. This tool is becoming more and more valuable as more in the industry turn to it and it has been vital for me to learn while here.



Interior - Building C Living Room



Interior - Building G Classroom



Interior - Building H Dining Hall



Screened Porch/ Outdoor Living Room



Interior - Building C Bedroom



Interior - Building C Bedroom



Exterior - View Looking Towards Building G



Exterior - View Looking Down Pergola Towards Farm



Exterior - Looking Across Water Retention



Exterior - Looking Across Water Retention Towards Building E



Exterior - Looking Across Gathering
Towards Building G



Exterior - View Looking Towards
Playground from Building H



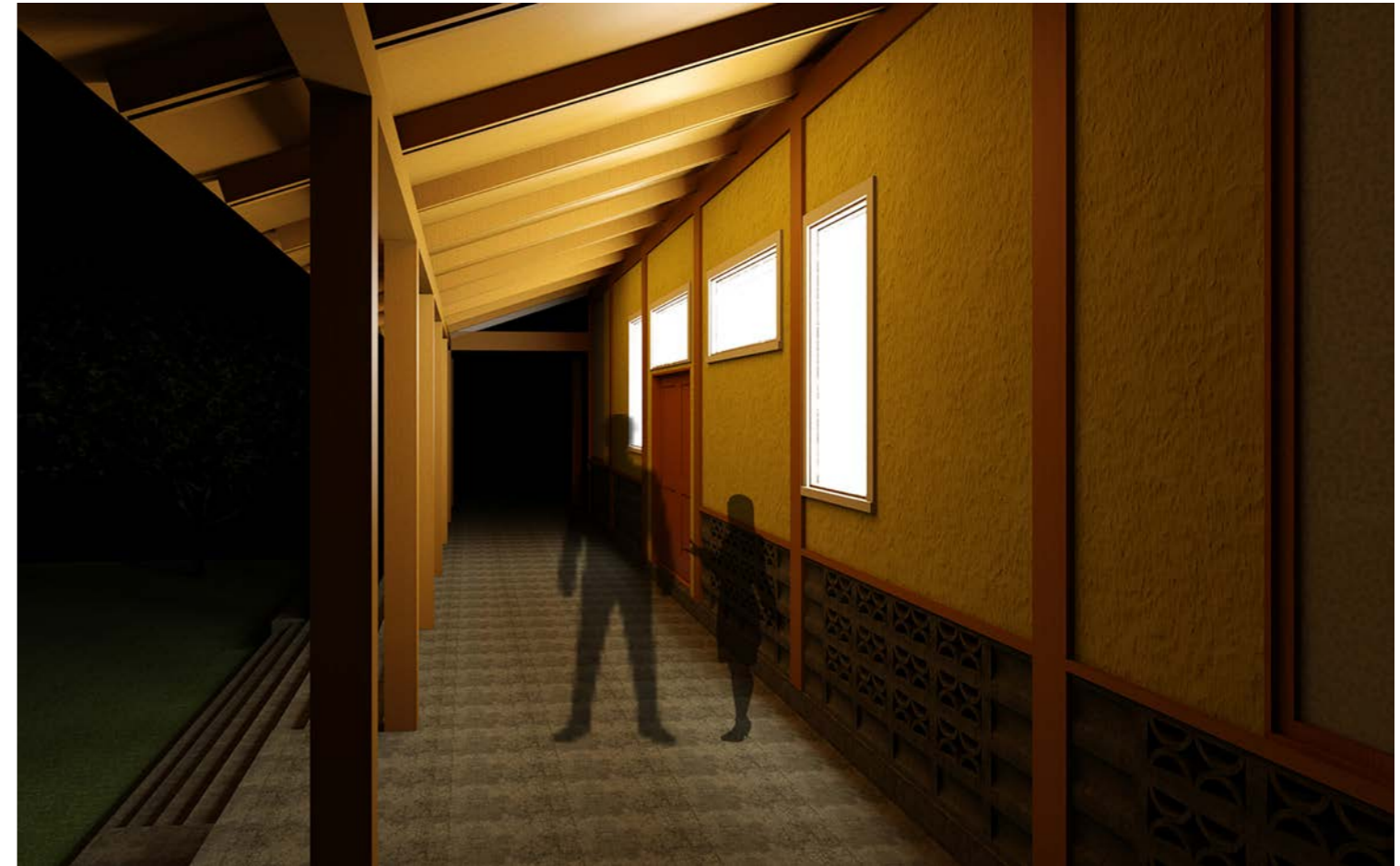
Exterior - View Looking Towards Building H



Exterior - Looking Towards Rear of Building D

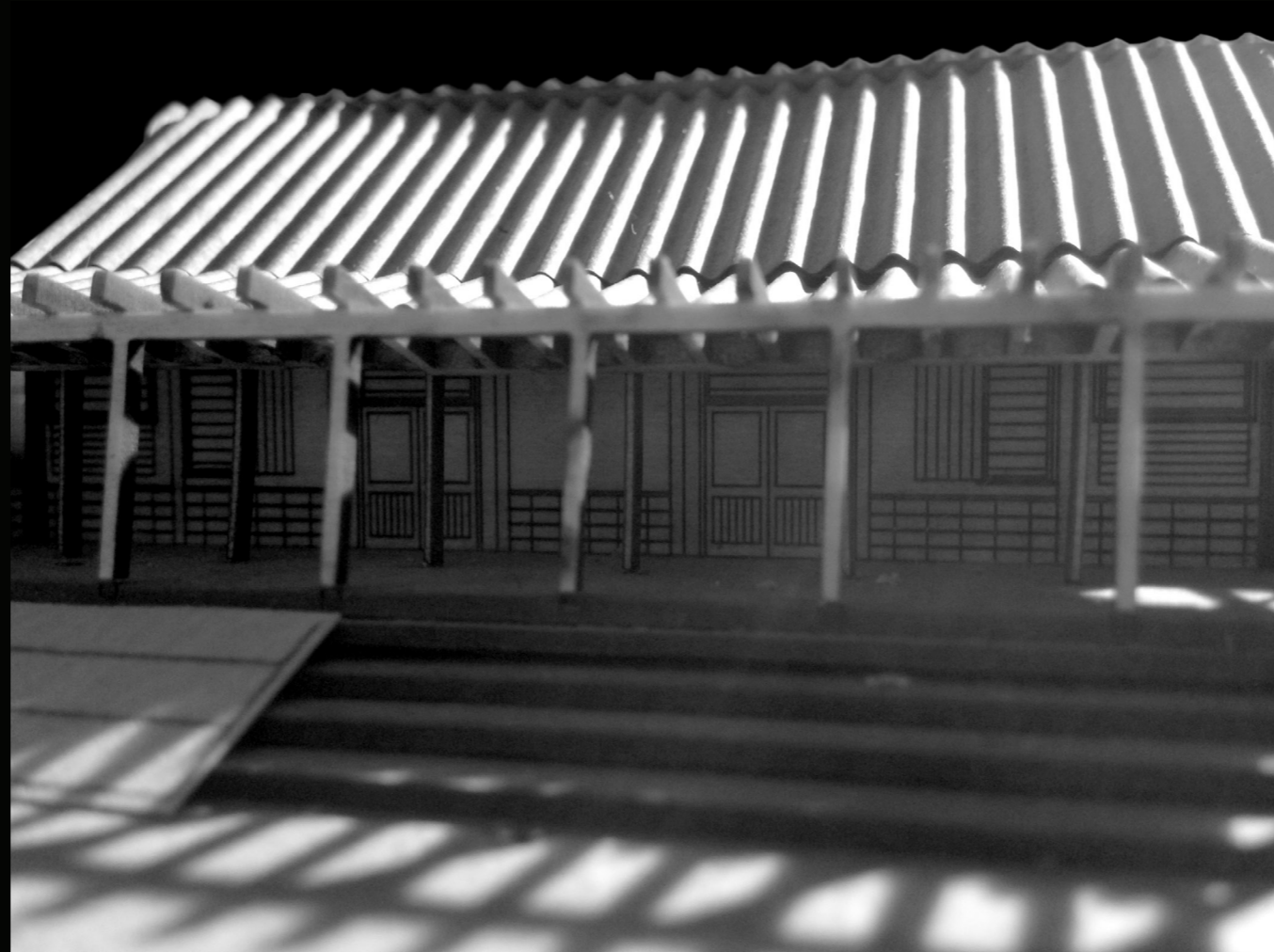


Night View - Looking Towards Building G

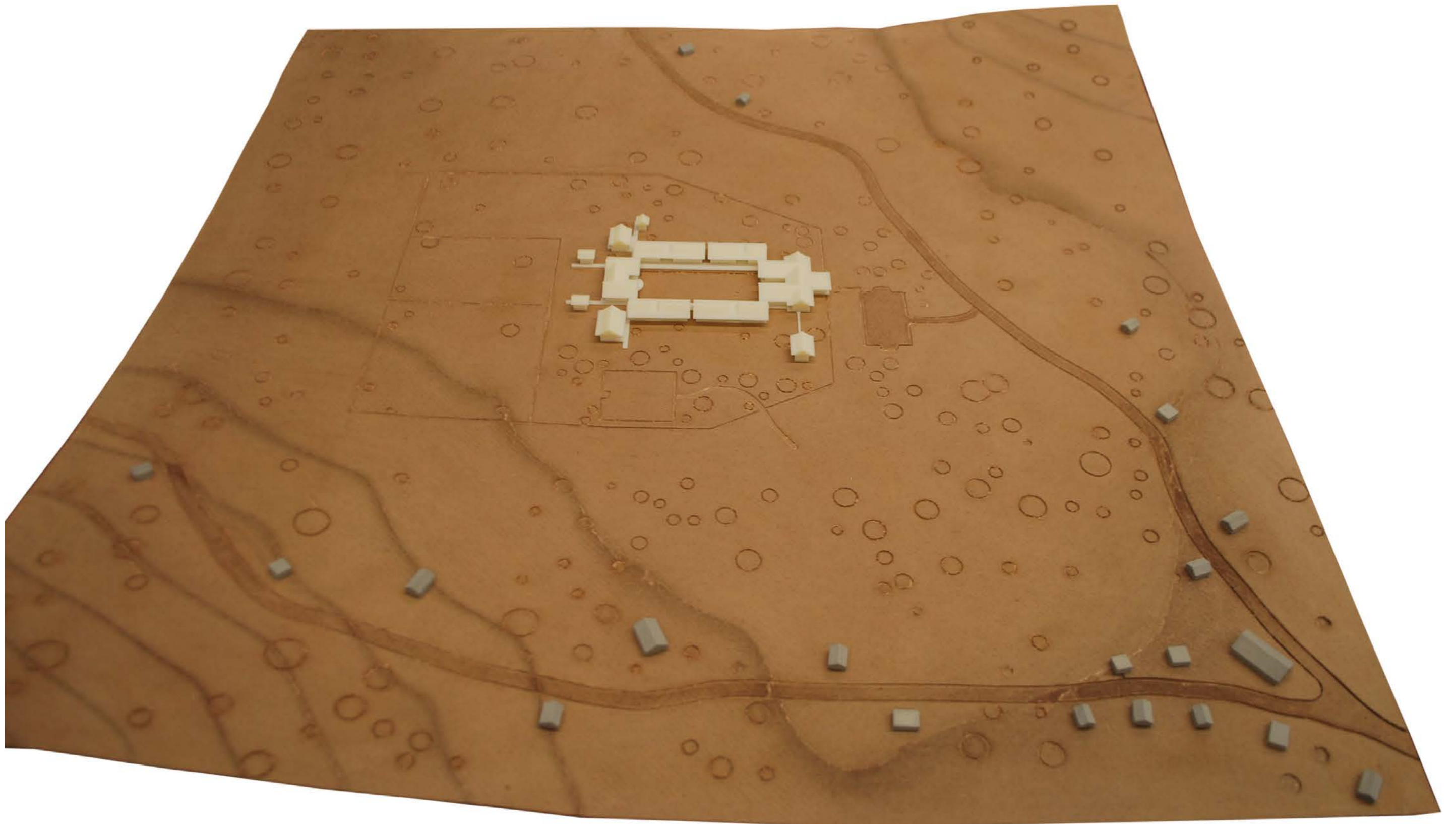


Night View - Looking Down Corridor

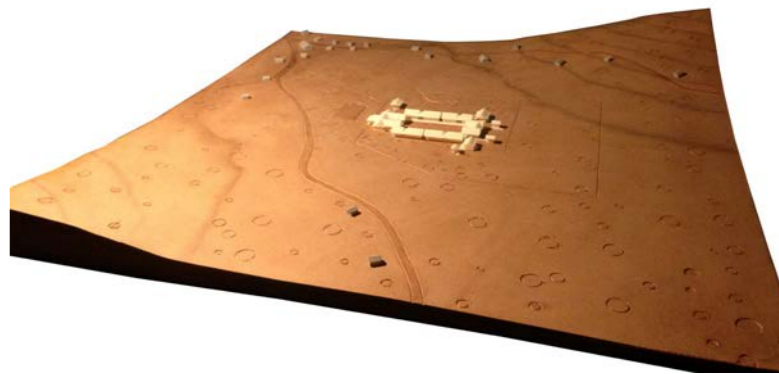
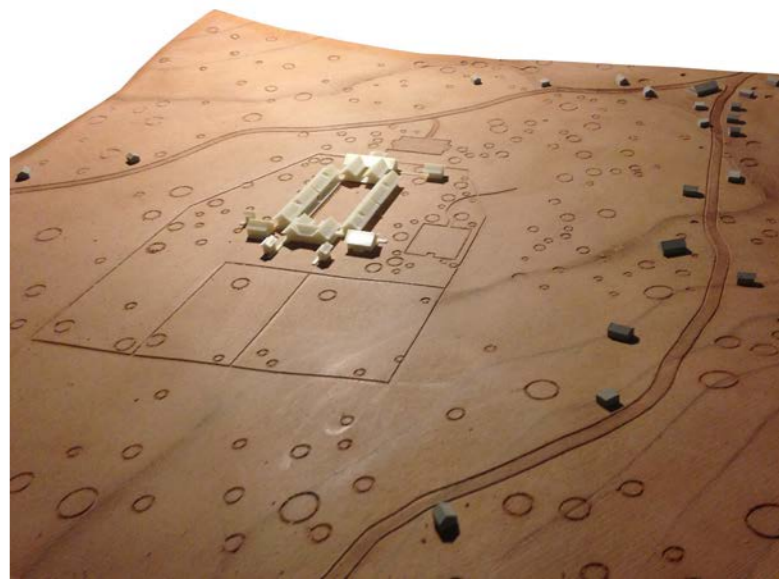
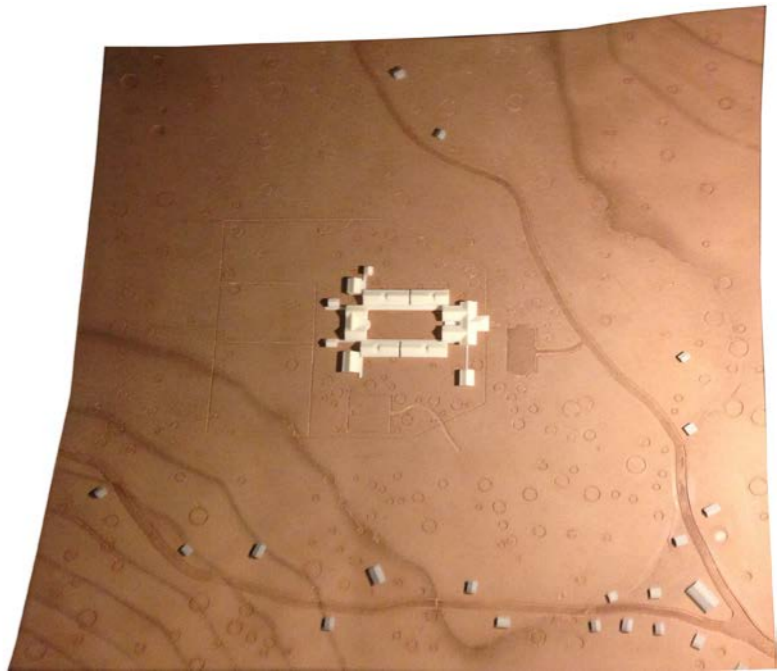
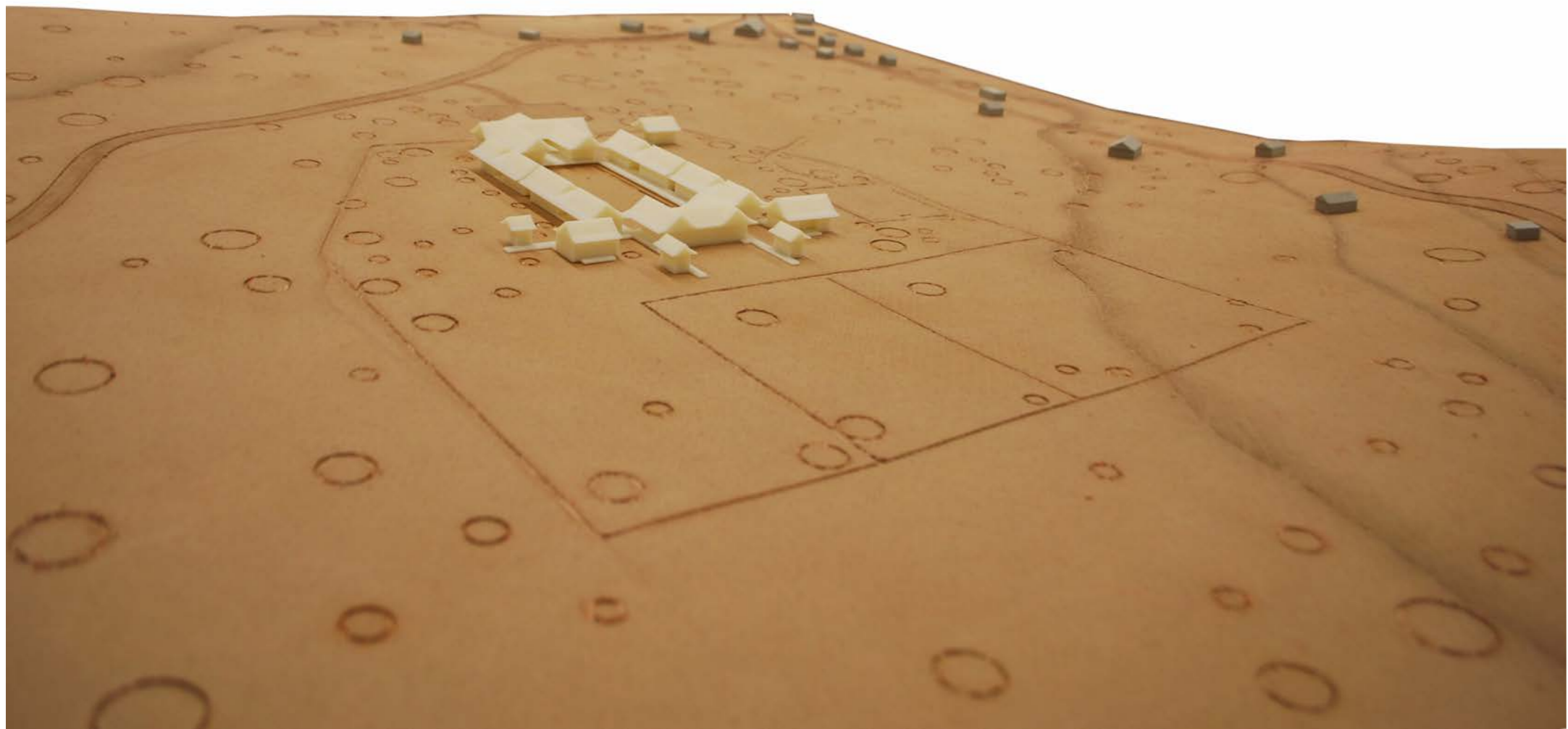
Models

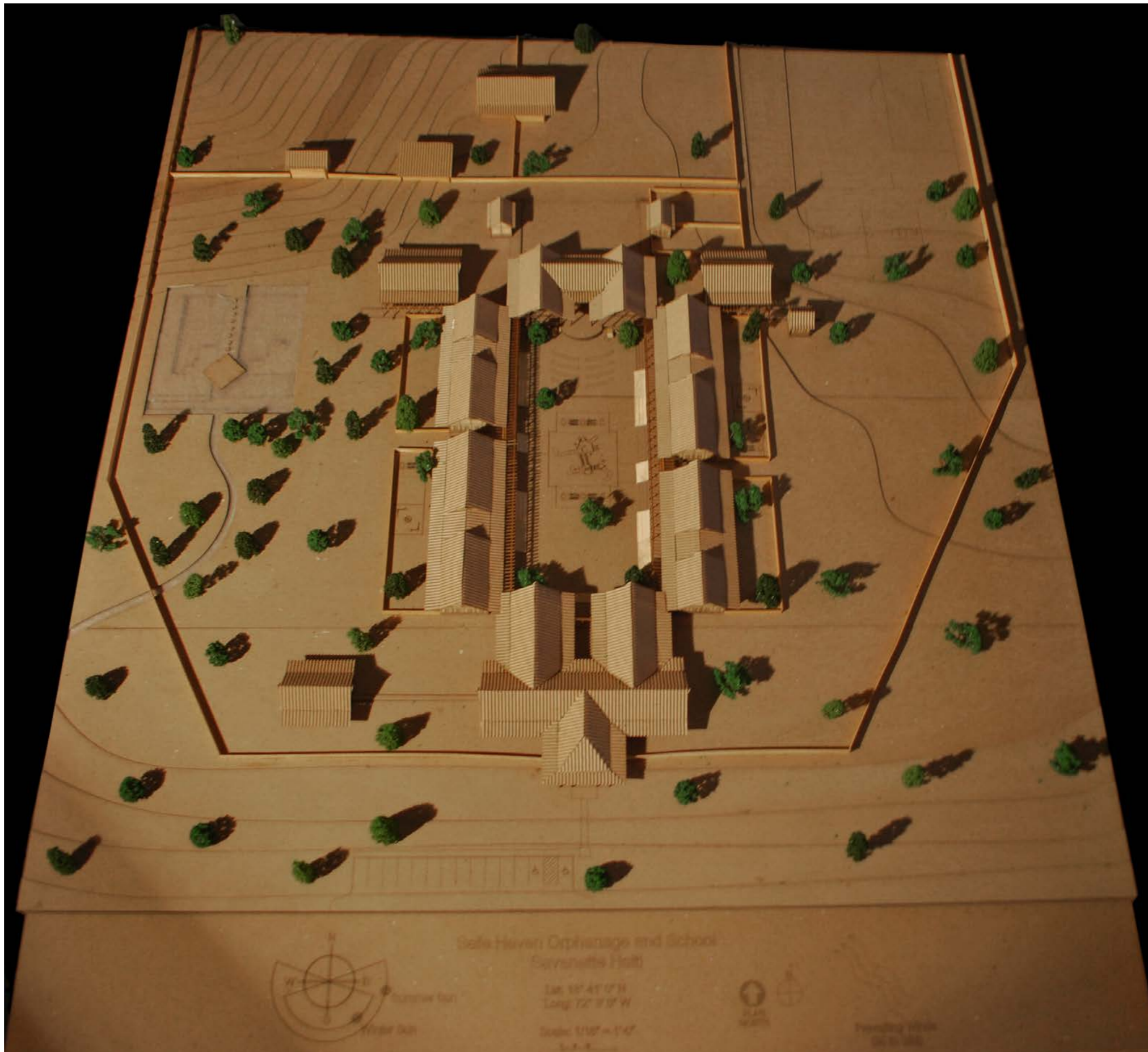


One of the greatest design tools available to a student of architecture or professional is the physical model. With it, one can explore the full three dimensions for the first time and start to understand what areas might need further exploration. Drawings, either by computer or by hand, do not provide the same insight. It is too easy in a drawing to forget one area, like the plan, while drawing in another, like a section. Three-dimensional model explorations are extremely beneficial during the early stages of the design process to allow one to make initial design decisions, and larger full models during final stages provide important visualizations and explorations into what the project will look like and how it will be constructed. For this project, many initial models were explored including full scale block explorations, studies in layout, and explorations in details and construction. As the project design became solidified, three important models were developed – a 1/2" to 1'-0" model of building C, a 1/16" to 1'-0" full campus model, and a 1" to 40'-0" full site model. Each of these models helped me realize important design and construction elements of the project as well as allow me to explore different modeling methods including laser cutting and CNC routing.

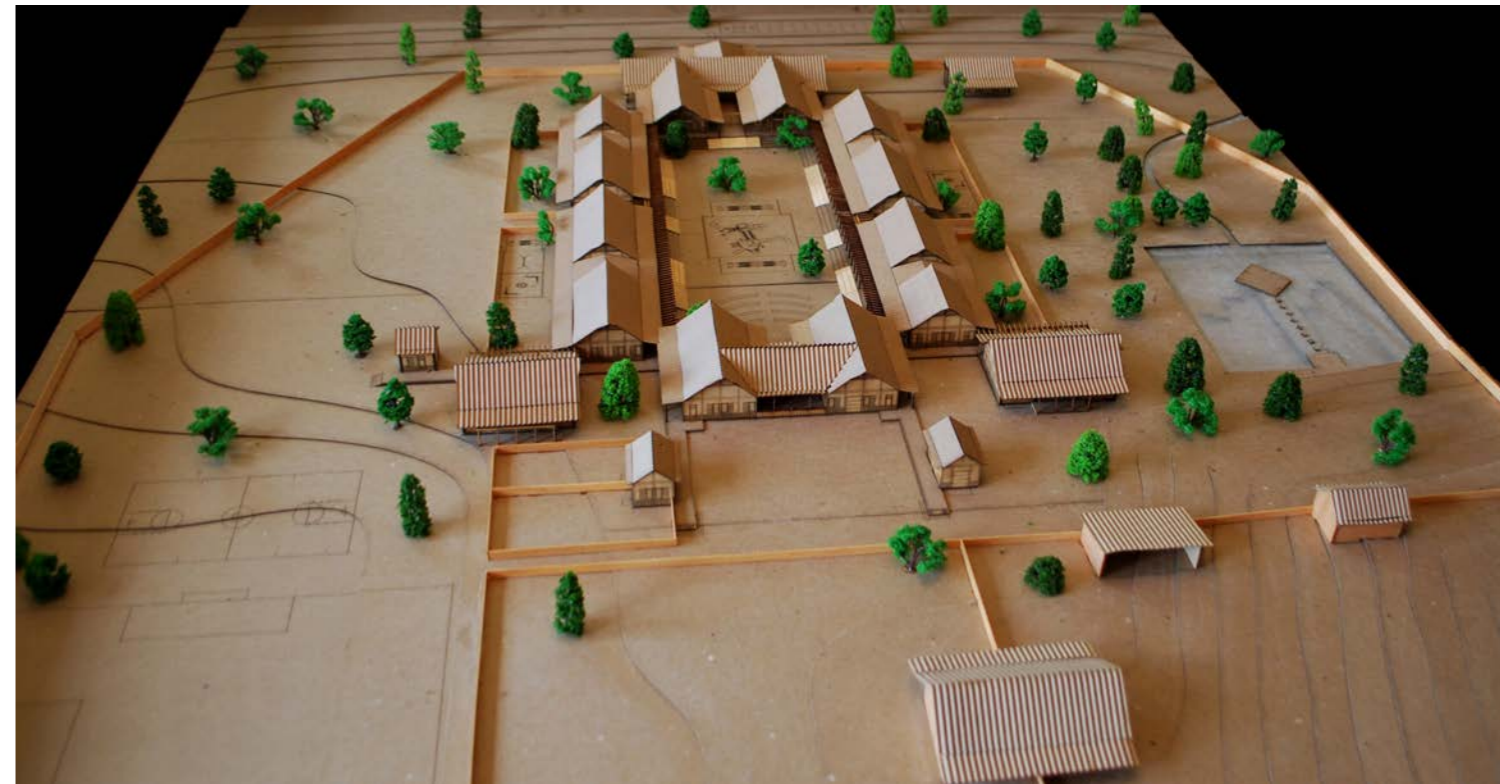
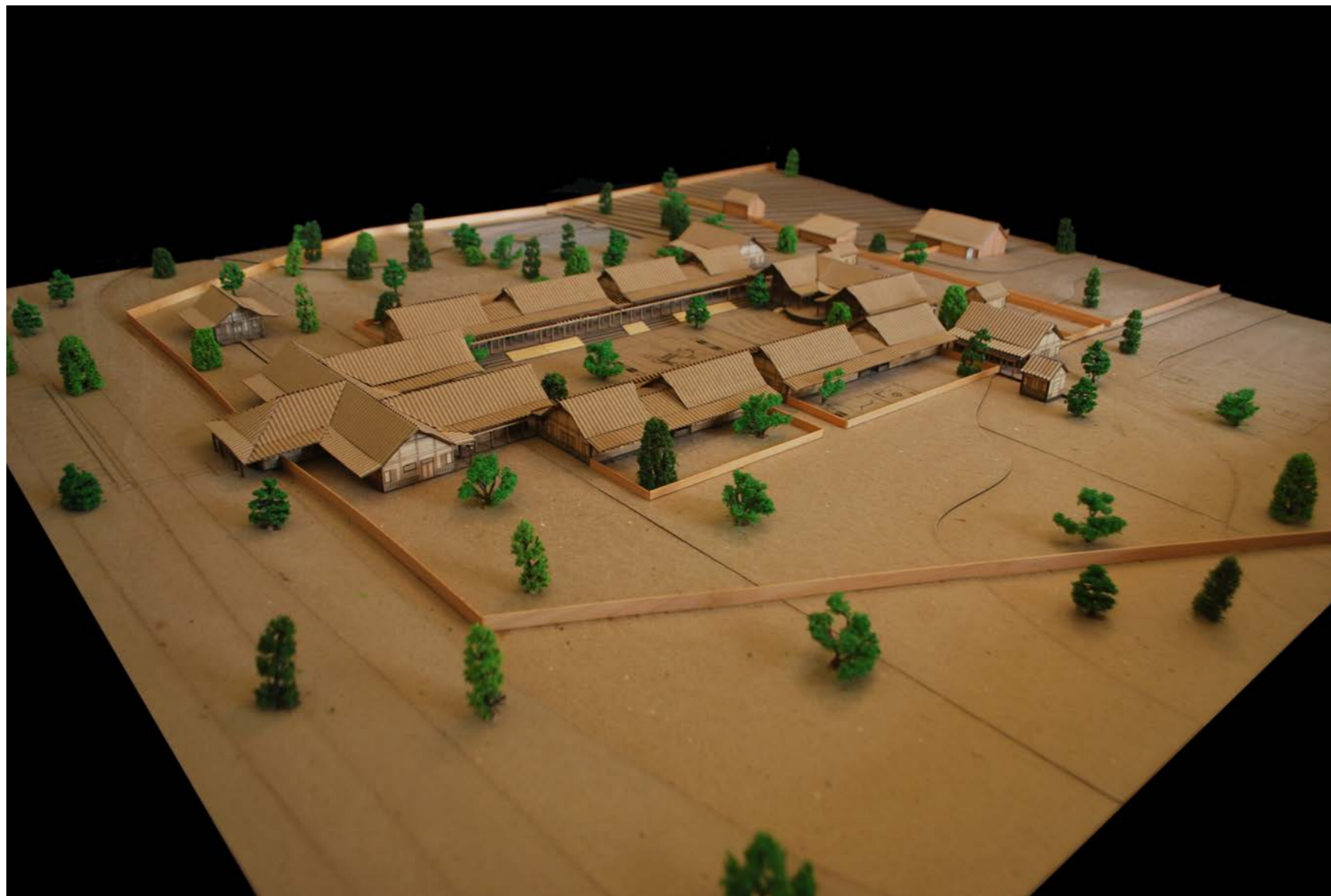


1" to 40'-0" Contextual Site Model





1/16" to 1'-0" Site Model





Safe Haven Orphanage and School
Savanette, Haiti

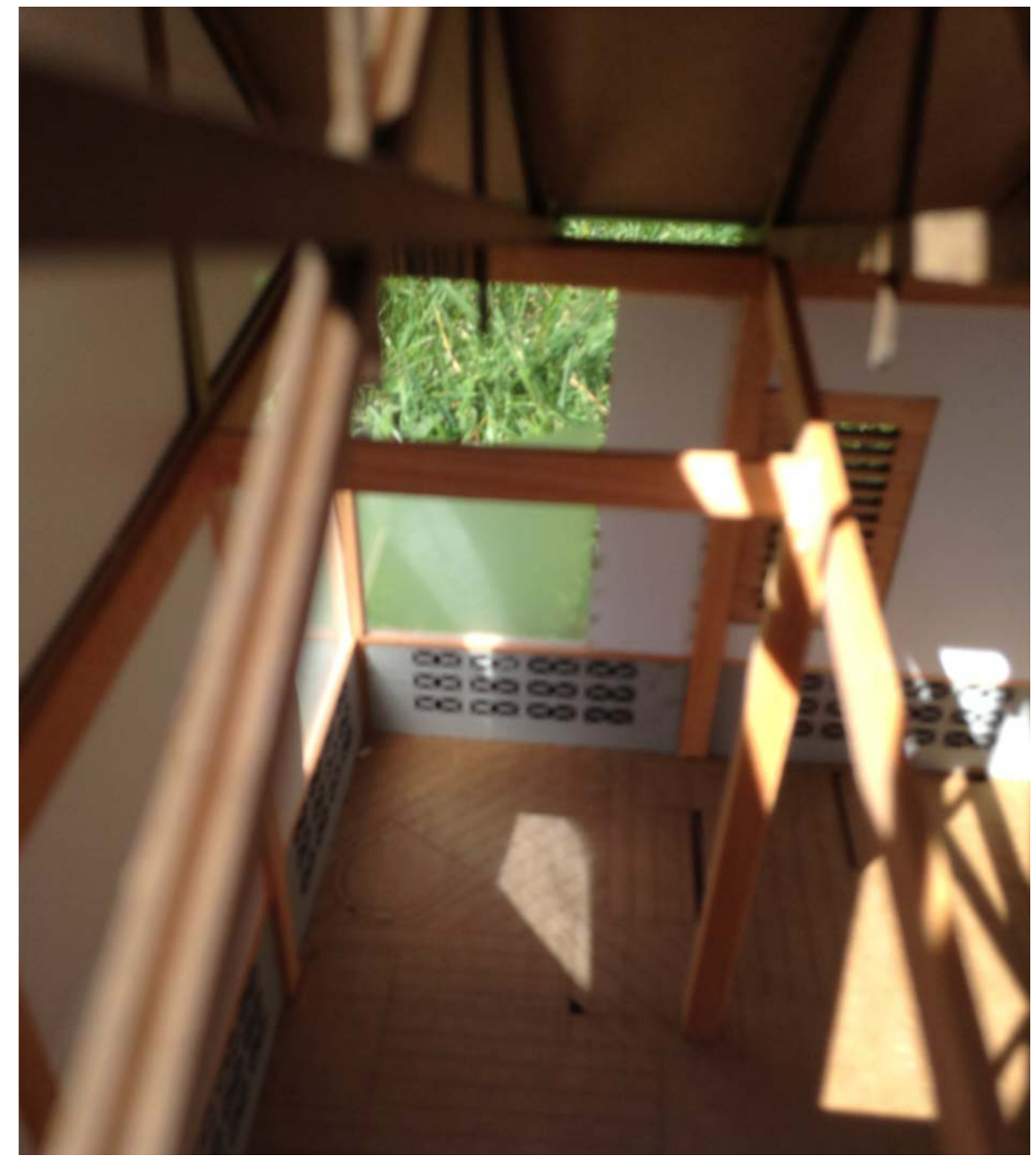




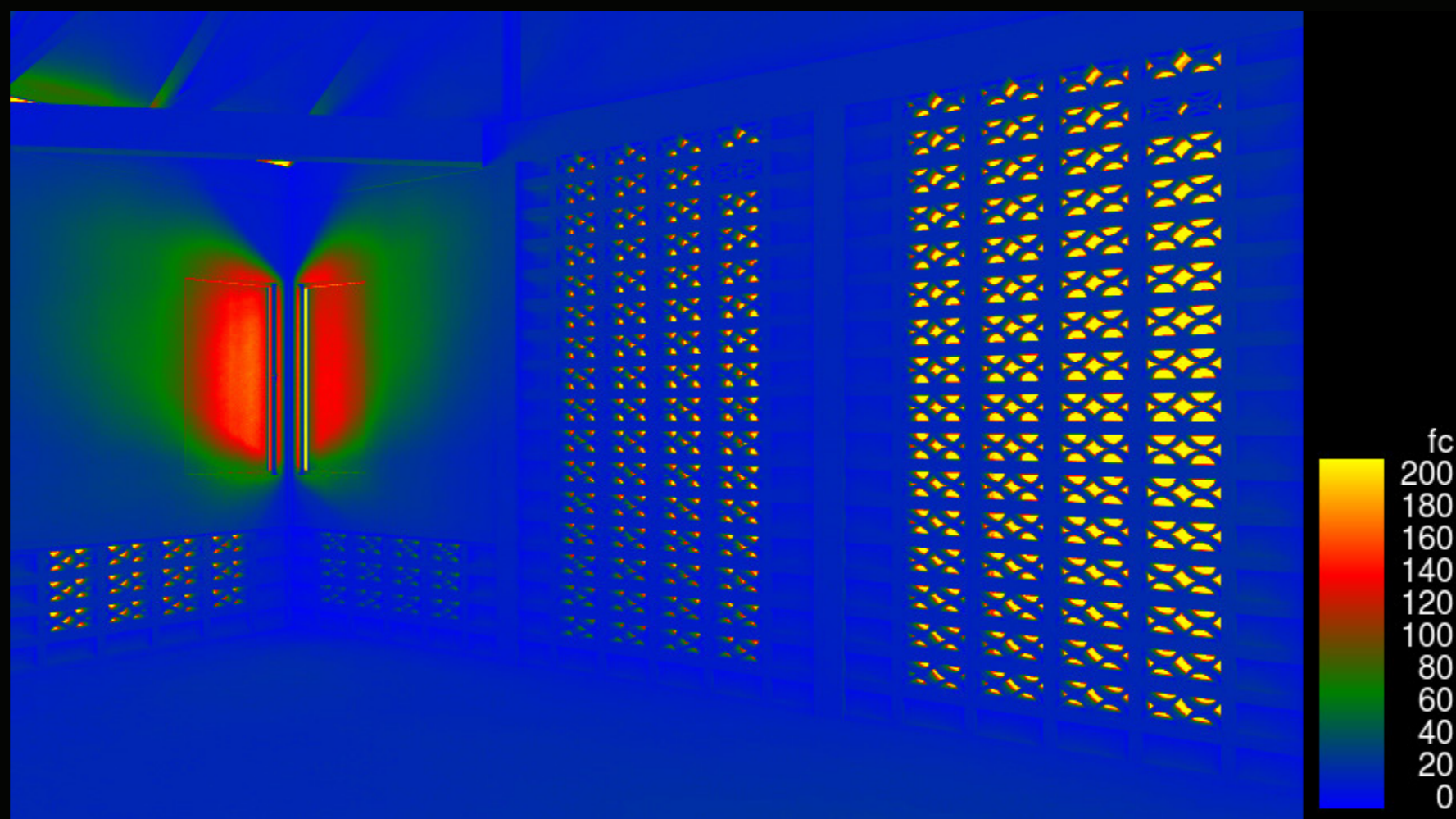




1/2" to 1'-0" Building Model



Tools



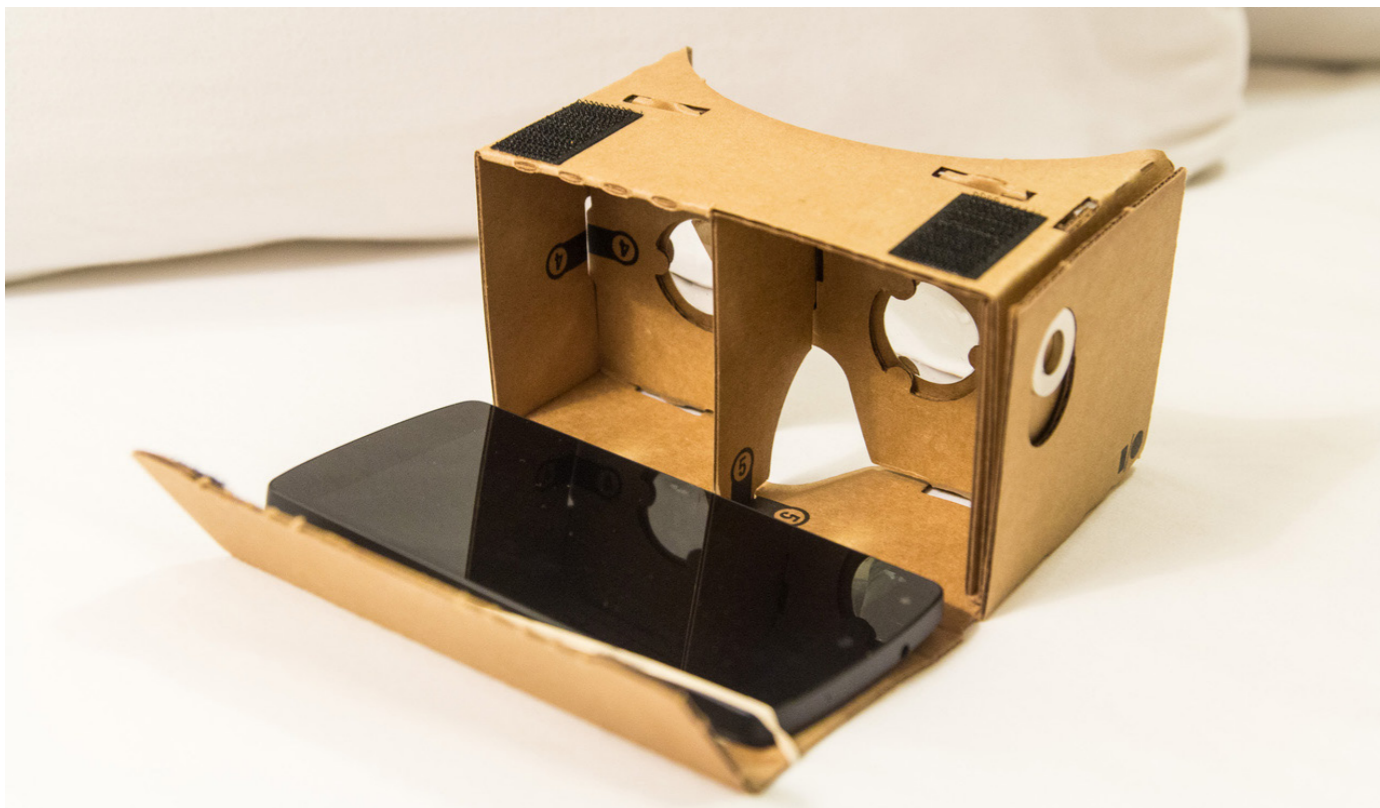
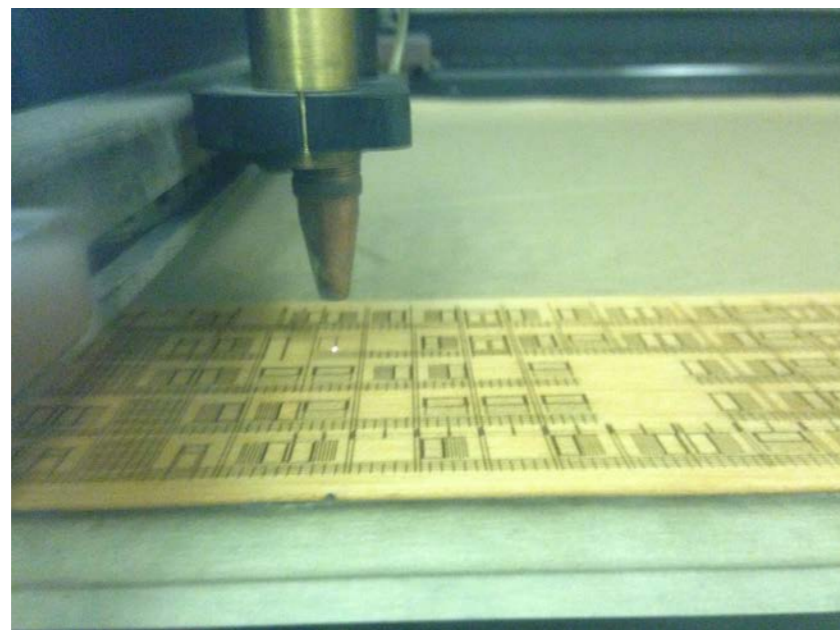


Fig. 21



An important part of graduate school was exploring emerging tools of the trade. For this thesis, I utilized the more common tools that I used in undergrad, like hand sketching, massing and study models, 2D-cad, and reference books for inspiration and information. However, I also took these two years to expand my own knowledge of and proficiency with modeling using Revit, SketchUp, and large-scale physical materials. For this project, I have analyzed in-depth 3D design, rendering, and studies; the information available from a BIM model; and how to use all this to create an augmented reality for clients. For my final defense, Google cardboard glasses and cell phones allowed people to immerse themselves in different spaces of the project. Showing somewhat what they would experience through this emerging technology was a particularly exciting exploration.



Modeling in two and three dimensions also allowed me to explore emerging tools, such as laser cutters, CNC routers, and 3D printers, for creating large-scale physical models. These tools aided in precise and relatively fast models of this project, including terrain and details. My 1" to 40'-0" contextual full site model was created with a large-format CNC router that accurately scaled and depicted the 1'-0" topographic contours received from a GIS model. With such a physical model, the interaction between the terrain and layout of the campus becomes more readily apparent. The 1/2" to 1'-0" and 1/16" to 1'-0" models were laser cut, giving added detail to even small-scale models.

List of Figures

Unless otherwise noted, all drawings, sketches, renderings, models, and photographs in this thesis are by the author.

Figure 1: Dormino, Marco. "Haiti Earthquake building damage." Digital Image. United Nations Development Programme Flickr. 14 January 2010. <https://www.flickr.com/photos/37913760@N03/4275395512>

Figure 2: Digital Image. Haiti Mission Trip Blog. http://haiticmc.blogspot.com/2011_03_01_archive.html

Figure 3: Digital Image. American Friendship Foundation. <http://affhope.org/wp-content/uploads/Haiti3-072.jpg>

Figure 4: "Political and Administrative Map of Haiti." Digital Image. Nations Online Project. Based on United Nations map. http://www.nationsonline.org/oneworld/map/haiti_map.htm

Figure 5: "Haiti" Map. Google Maps. Google, Web. <https://goo.gl/i7gs6y>

Figure 6: "Haiti" Map. Google Maps. Google, Web. <https://goo.gl/i7gs6y>

Figure 7: Jlanghurst. "Mountainous Farming Plots Haiti." Digital Image. 5 June 2003. https://commons.wikimedia.org/wiki/File:Mountainous_Farming_Plots_Haiti.jpg

Figure 8: "One Plus logo." Digital Image. One Plus. <https://theoneplus.org/>

Figure 9: Hursley, Timothy. "Rural Studio - Glass Chapel." Digital Image. ArchDaily. http://images.adsttc.com/media/images/5371/a0f9/c07a/80c6/9200/0089/large_jpg/2000_Glass-Chapel_73837p.jpg?1399955696

Figure 10: Digital Image. Land8. <http://land8.com/profiles/blogs/6-ways-landscape-architects-benefit-from-pro-bono-work>

Figure 11: CCA Mellon Lectures. "AD Classics: AD Classics: Amsterdam Orphanage / Aldo van Eyck." Digital Image. ArchDaily. <http://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck>

Figure 12: HOK Architects. "William Jefferson Clinton Children's Center." Digital Image. HOK Architects. <http://www.hok.com/design/service/architecture/william-jefferson-clinton-childrens-center/>

Figure 13: Ravi, Joe. "Crown Hall." Digital Image. 10 May 2011. https://commons.wikimedia.org/wiki/File:Crown_Hall_1.jpg

Figure 14: MASS Design Group. "GHESKIO Cholera Treatment Center." Digital Image. MASS Design Group. <https://www.massdesigngroup.org/portfolio/ctc/>

Figure 15: Anello, Michael. "BFG Women's Clinic in progress." Photo by Michael Anello of Building Goodness Foundation while working at FHM Women's Clinic in Haiti. 7 October 2015.

Figure 16: Helmer, Kendra. "Amid rows of cabbage, Haiti." Digital Image. USAID. 6 October 2010. https://commons.wikimedia.org/wiki/File:Amid_rows_of_cabbage,_Haiti.jpg

Figure 17: Digital Image. TeknoMega. <http://www.teknomega.it/node/751>

Figure 18: Digital Image. There's some beauty next door blog. <http://ontheedgeofanartbreakdown.blogspot.com/2013/06/theres-some-beauty-next-door.html>

Figure 19: Digital Image. "Sun Path Diagram of Savanette Haiti." Picture taken from Ecotect Analysis 2011. Haiti - Passive Cooling blog. <http://haitipassivecooling.tumblr.com/>.

Figure 20: Digital Image. "Wind Speeds of Savanette Haiti." Picture taken from Climate Consultant 5. Haiti - Passive Cooling blog. <http://haitipassivecooling.tumblr.com/>.

Figure 21: Digital Image. Emerging Technologies Blog. <http://www.wearobo.com/2015/05/where-can-i-buy-google-cardboard-vr.html>

Figure 22: Gneiser, Drew. "Beautiful Haiti." Digital Image. Feed My Starving Children. Published August 27, 2013. http://fmscblog.com/from-the-field/whos-coming/attachment/5427941927_946638ab9a_o/

Figure 23: Torres, Gibran, SPC. "Citadelle Laferrière Aerial View." Digital Image. United States Army. 28 April 2010. https://commons.wikimedia.org/wiki/File:Citadelle_Laferri%C3%A8re_Aerial_View.jpg

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