

Architecture is Life... ...Life is Architecture

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Institute and State University in Partial fulfillment for the degree of

Master of Architecture

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(ABSTRACT)

When thinking about architecture, I cannot help but think about my life and the things that have affected my life. How does the environment around us effect the daily decisions we make? How do the experiences throughout our life impact who we are and who we become? The people and surroundings we choose will ultimately decide the type of people we become. When we select our surroundings we are in turn selecting our ideal community. Everyone is trying to achieve community in some sense, from individuals to city planners. Council members, politicians, city officials... make decisions everyday based on their idea of what community is to them and their citizens.

In the following pages I will design a community and put in place the elements for it to prosper and grow...

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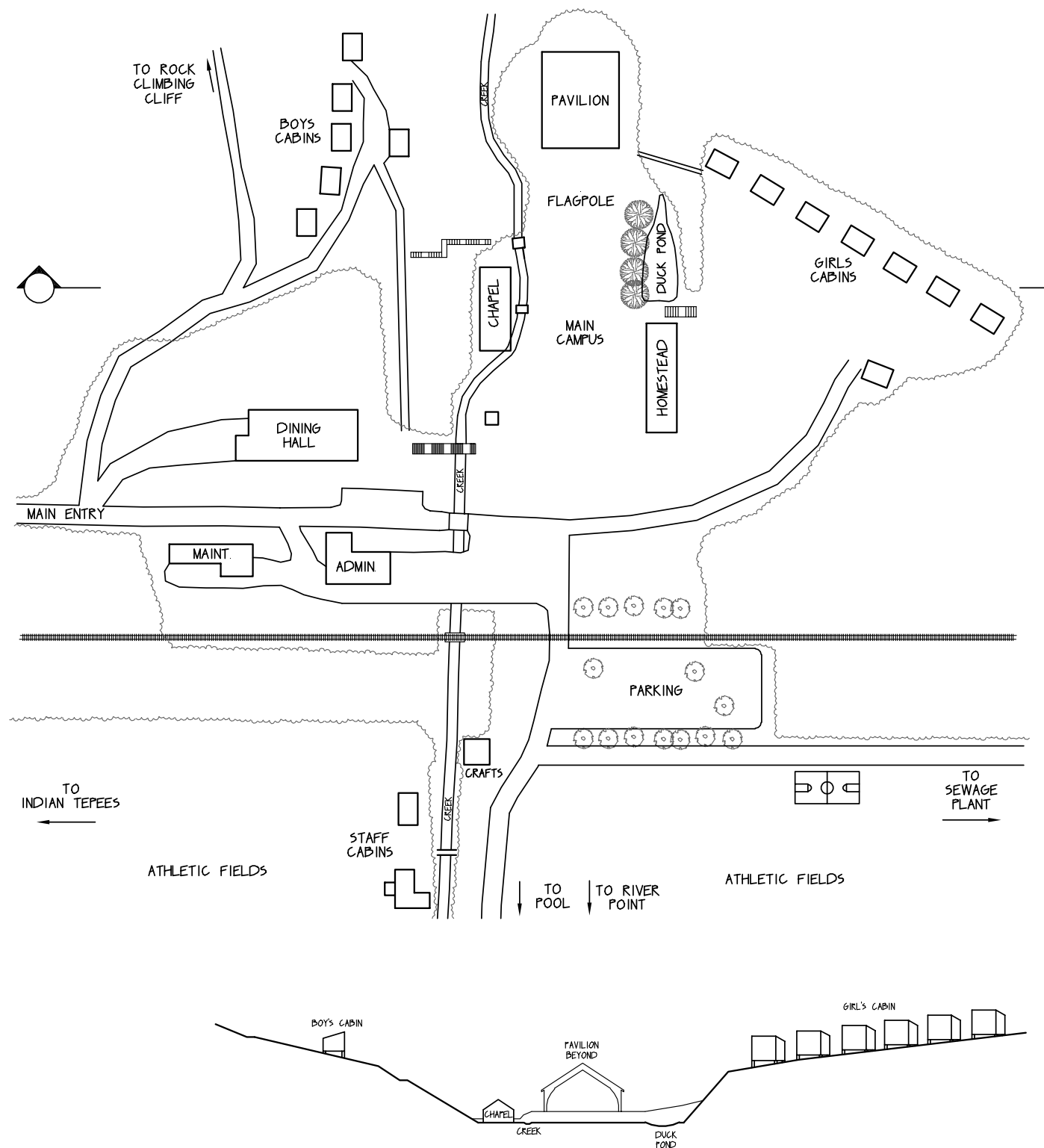
Architecture is Life...

"What is Architecture anyway? Is it the vast collection of the various buildings which have been built to please the varying taste of the various lords of mankind? I think not. No, I know that Architecture is life; or at least it is life itself taking form, and therefore it is the truest record of life as it was lived in the world yesterday, as it is lived today or ever will be lived. So Architecture I know to be a great spirit. It can never be something which consists of the buildings which have been built by man on earth ... mostly now rubbish or soon to be ... Architecture is that great living creative spirit which from generation, from age to age, proceeds, persists, creates, according to the nature of man, and his circumstances as they change. That is really Architecture."

F.L.W. from *Organic Architecture* 1939

...Life is Architecture

"Yet these were the developments of men who were simply responding to their environment, creating simple durable structures with the materials at hand to protect themselves from the weather."
Ted Benson

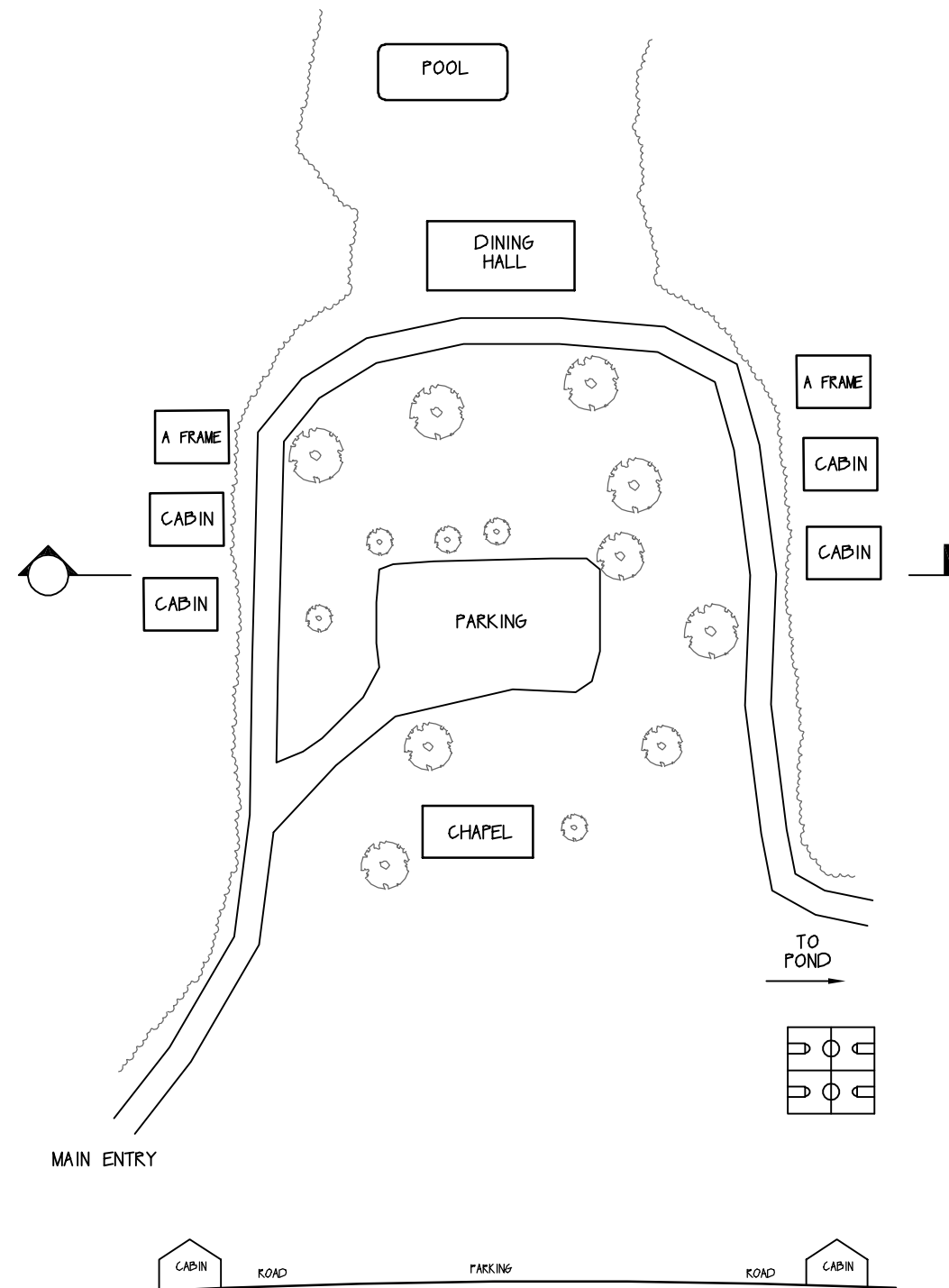


Seneca Hills Bible Conference site plan and section

My first experiences with camp are of Seneca Hills Bible Conference located in the mountains of Northwestern Pennsylvania. I attended camp there in the summer from the age of 8 to 18 as a camper and later as a member of the staff for 4 more years. I always knew I was entering a special place upon arrival. There was the drive off the paved road and onto a dirt road which led through the trees and then opening up into a small valley with beautifully landscaped grounds surrounded by untouched forested mountains. There was a definite division between spaces as if they were preplanned, but they grew around the old homestead on the property. From the sketch one can gain a sense of planning from cabins on opposite hill-sides with the main campus located in the valley between. The homestead, chapel, snackery and pavilion are located in the main campus with the offices and dining hall located just off to the side at the entry point of the camp. Having the Dining hall and Administration building located at the entry allow for the happenings of everyday life, such as deliveries and mail, to occur without disturbing the camp life. I have memories of running to the tracks everytime we heard a train either to see the train or to protect younger campers from getting too close. The tracks seemed to be a nuisance from a safety standpoint but from a planner's eyes they provide a good division from main campus to the extended campus. The cabins are basic 2x stick framing exposed to the interior with bunk beds built at the same time as the cabins. These bunk beds work well for young kids that are used to climbing on things. Going to camp is usually a child's first chance to experience life away from home and to gain their first understanding of how the world operates outside their home. By locating the boys on one hill and the girls on another, you realize there is a difference between the two and

at certain times they need their privacy. The boys cabins are located in the trees on the side of the hill, and the girls are located on the opposite hill in the middle of a pristine meadow. To get to the chapel you have to cross a small bridge over the creek. This bridge helps to signify that you are entering a different place, and with the sound of the water flowing over the rocks you realize it is a place of peace and tranquility, a place of oneness that keeps you coming back. When free time arrives and you are allowed to go to the extended campus where the athletic fields and swimming pool are located, you know its time to let go and go all out due to the openness of the space. The Indian tepees, rock cliff and river point give you the opportunity to experience more of life away from home.

My next significant involvement with camp was Mission Farms located outside of Fairmont, West Virginia. I attended this camp, built by the local Union Mission, as an adult on weekend retreats. The planning lays out very similar to Seneca Hills with cabins on opposite sides and a chapel and dining hall in between. The main campus is located on a flat piece of land and doesn't have the same feeling of space as Seneca. The parking is located in the center of the camp, and the dining hall is at the farthest end of camp away from the entry therefore ruining the division between camp and everyday life. The swimming pool and athletic fields are located outside of the main campus, once again allowing that feeling of openness. The earlier cabins are basic stick framing, but the newer cabins are of "A frame" design. This "A frame" construction begins to give the camp a little character. The bunk beds are steel construction. At the age of an adult when climbing around on things becomes more of a job than fun, these beds begin to lose their appeal.



Mission Farms Camp site plan and section



הִנְנִי

Here (am) I.
I'm Listening. I'm Ready.
I'll Go.



HISTORY

The church that I attend in my hometown of Fairmont, WV, (Christ Community Church), has been involved in a summer missions project entitled "Impact" since 1994. The church runs Impact in conjunction with the Mission to the World's short-term missions program of the Presbyterian Church of America. Mission to the World's office is located in Atlanta, Georgia, and they handle all of the administrative work such as recruiting, finances and so forth. The purpose of the short-term mission program is to provide 1 to 2 week missions experiences for church groups in order to strengthen the church of Jesus Christ, expand the kingdom of God and cultivate the next generation of missionaries. Most of the short-term mission projects are not construction related so there is no specific purpose statement for them. Impact began in the United States in 1986 and eventually worked its way to Bluefield, West Virginia around 1990. Ken Robinson, the pastor of Christ Community church, then brought Impact to Fairmont in 1994. Groups come from all over the eastern United States for a week at a time to work on houses within the community. The work includes plumbing, electrical, painting, roofing, and constructing porches; stairs, ramps and room build-out all depending on the group's individual skills. Plans are in place to acquire a dilapidated home and do a complete remodel. In the future they hope to tackle the construction of a completely new home. The emphasis is on groups, either families or friends, so that along with the work being accomplished a bonding among individuals can occur.

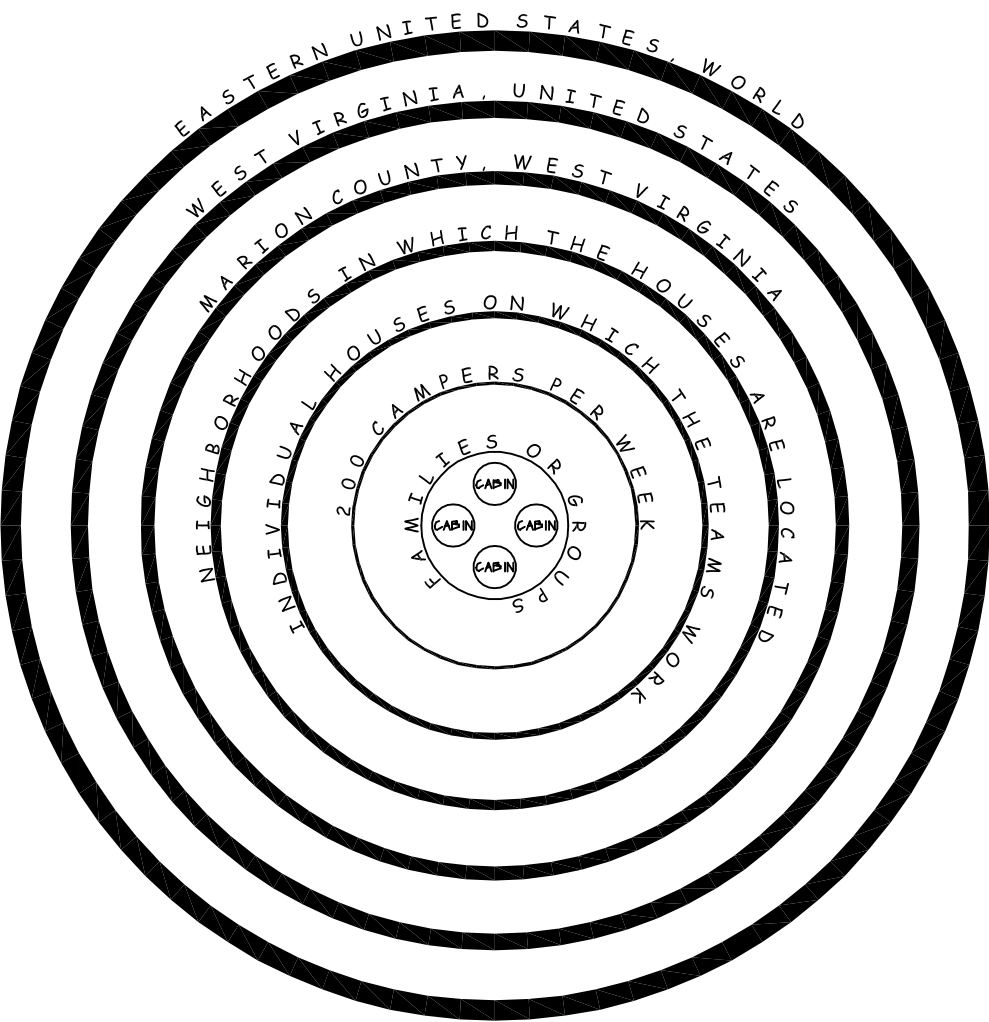
CAMP I MPACT

The church currently leases a 4-H camp as a central place for shelter, recreation and meetings. This camp consists of cabins, dining hall, bathhouses, campfire area, and a meeting room. The future plans for the Impact missions project are to acquire a piece of property, hopefully through donation, for a new camp to be built. This new camp will encompass a wide range of construction from the beginning phase of cabins with no HVAC or water, bathhouses, dining hall, chapel, meeting area, swimming pool and athletic fields to a receiving area with offices and then in the future a conference center with individual overnight rooms.

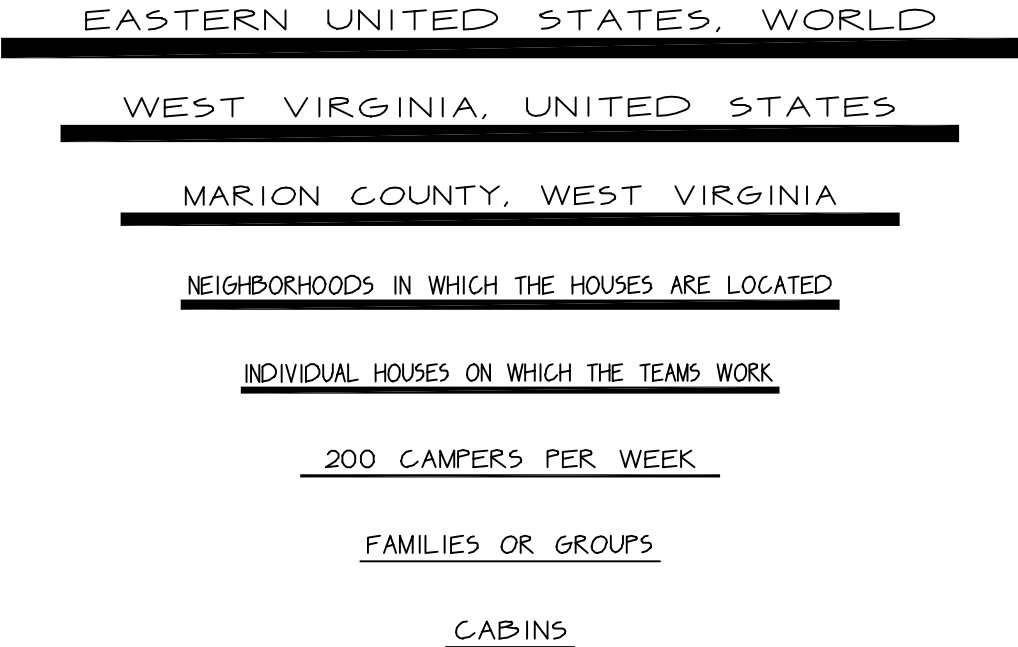
This Thesis Project assumes the following program for spaces and facilities for Camp Impact

Check-in area/offices	1,000-sq. ft.	Bathhouses	400-sq. ft.
Located at entrance to camp		2 – 1 in men's area and 1 in women's area	
The line beyond which cars are not present			
Great room with fireplace		2 – 1 men's and 1 women's located near family cabins	
Counter with open office area			
1 private office		Staff cabins (Future)	
First-aid station	100-sq. ft.	Dining Hall	250 seats max. 4,000-sq. ft.
Exam room		Tables and chairs	
Sick bay with 2 beds		Cafeteria line style serving	
		Milk bottle collection displayed (1300)	
Camp Store	256-sq. ft.		
Selling of camp memorabilia and collectibles		Outdoor meeting area	250 seats max. 1,200-sq. ft.
		Circular with campfire in center	
Parking area	21,000-sq. ft.	Terraced bench style seating	
60 Vehicles		Portable amplification for speaker and musicians	
Located away and not visible from camp			
Located on the other side of line		Volleyball court (4)	29'-6" x 59' 1,740-sq. ft.
RV Park	10,000-sq. ft.	Basketball court (2)	50' x 84' 4,200-sq. ft.
6 Spaces with electric hook-up			
Need water and sewage hook-ups		Tennis court (2)	60' x 120' 7,200-sq. ft.
Located in an isolated area			
		Softball field	44,000-sq. ft.
Cabins			
200 people, 240 beds		Horseshoe pit (2)	300-sq. ft.
18 – 6 beds – 1 family, no bunk beds	450-sq. ft. each		
6 - 8 beds – no bunk beds	750-sq. ft. each	Swimming pool	45', 83' x 75' 1 1/2" 7,000-sq. ft.
6 - 16 beds	750-sq. ft. each		
Large front porch, no HVAC or water			
Future fireplace or wood burning stove			
Men in one area and women in another area			
Family cabins located in separate area			
Family cabins will have a sink			

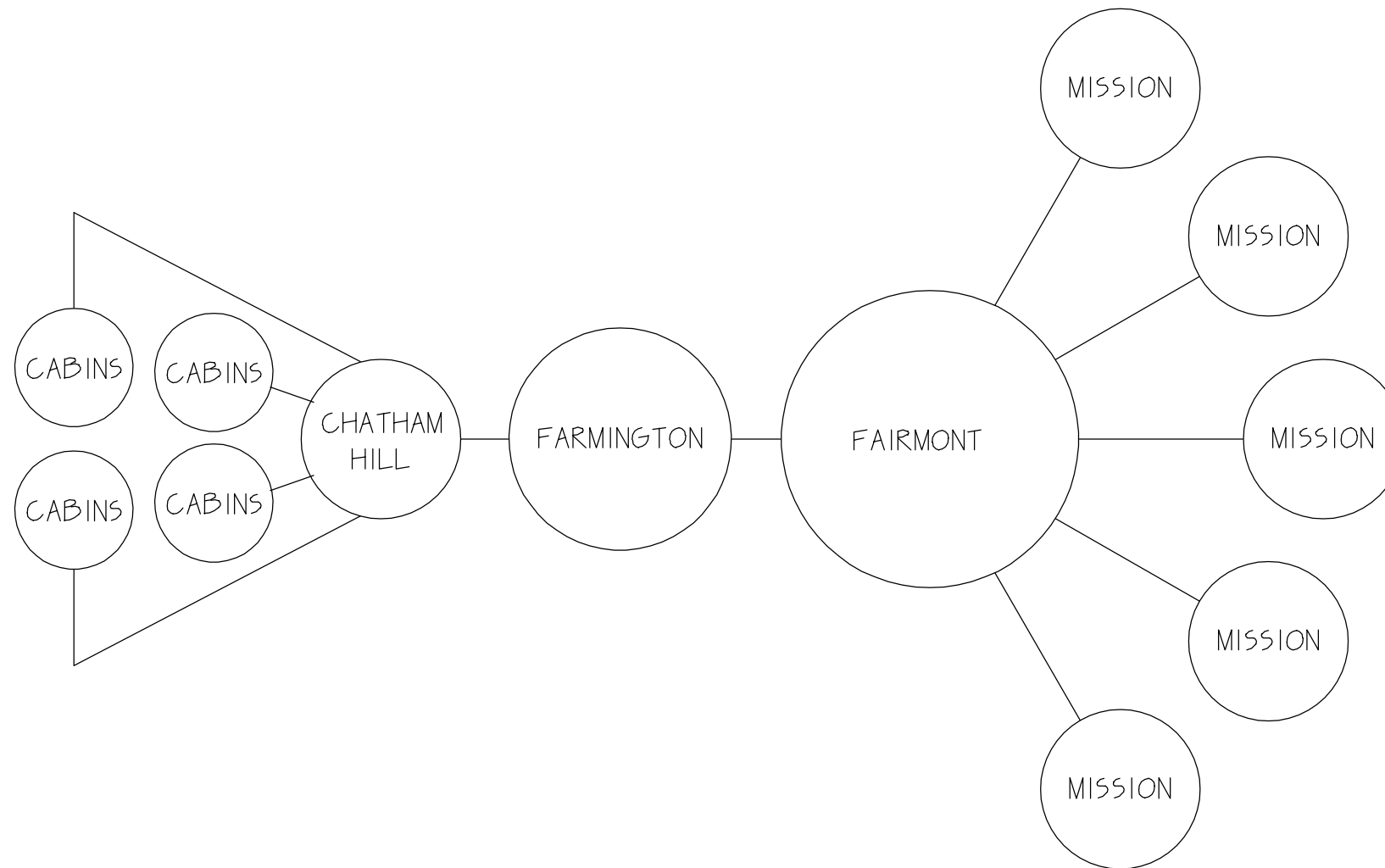
To understand community we think of it in terms of scale or magnitude of size. A larger scale gets its magnitude from the smaller scales joining together. In applying scale we look at different sizes of community, and how, when you leave one community, you really aren't leaving, you're just increasing the magnitude of the community. The point where community starts to break down is when the smaller scales are no longer present within that community, therefore it becomes a small scale of its own and begins a new community.



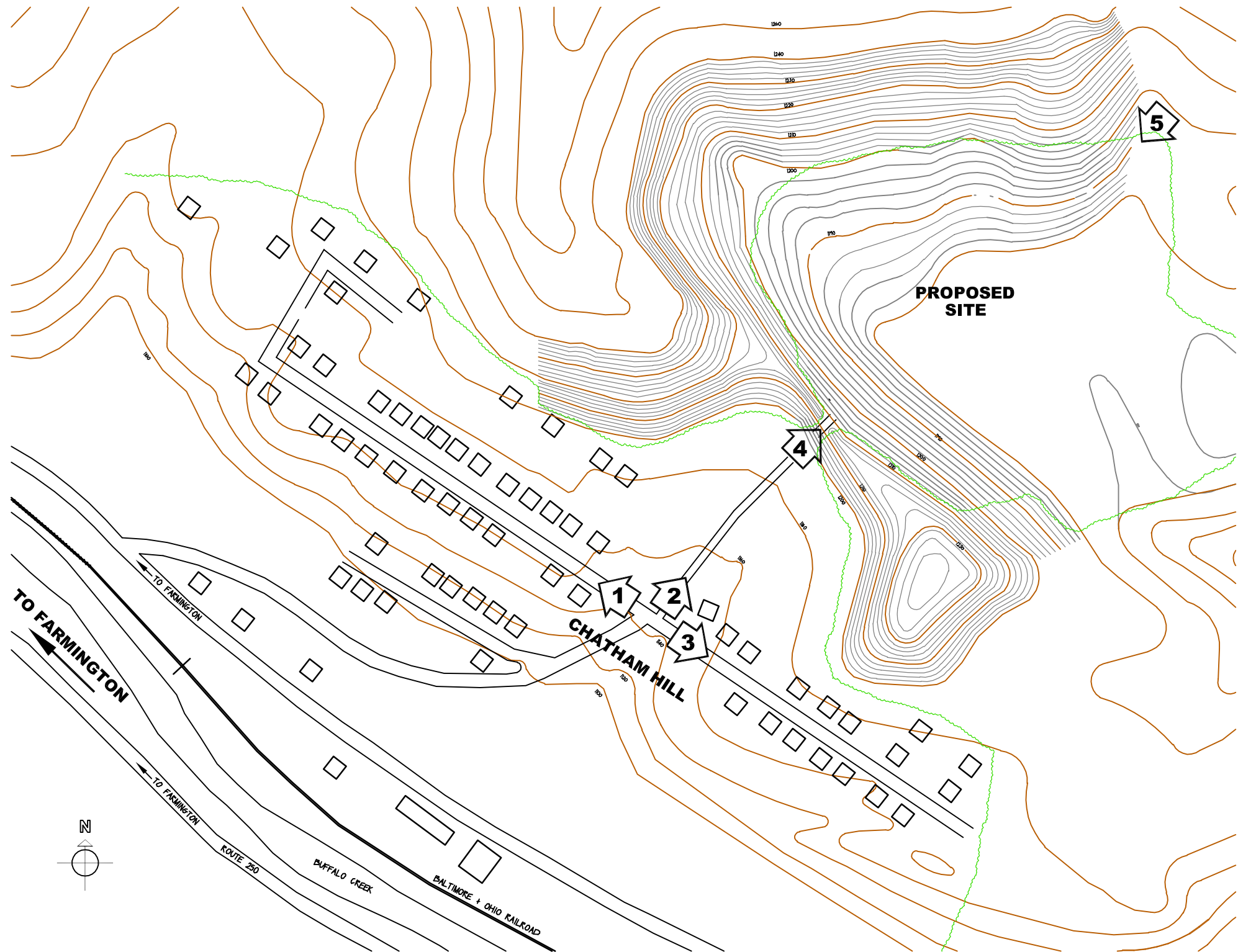
Scale starting at a center nucleus and growing out in all directions



Scale starting from a single point and growing in one direction.



Model of Camp's Scale of Community



Existing site plan showing proposed site and Chatham Hill Community



1. View to left at entry to site showing typical row houses of Chatham Hill Community. The houses which were built by the coal mining company can be seen on both sides of the asphalt street.



2. Entry to site showing gravel road between houses of Chatham Hill Community and through low spot in the ridge.



3. View to right at entry to site showing typical row houses of Chatham Hill Community. The houses which were built by the coal mining company can be seen on both sides of the asphalt street.

Video of the entry to the site can be viewed in the electronic thesis on the Virginia Tech server.

SCALES OF COMMUNITY

Community is a spirit that develops by people coming together first as neighbors, then friends, and when they all come together to help the other for the good of the community. Scales of community are something that the campers will experience everyday when they leave and come back to camp. When the workers awake in the morning and have breakfast that will be their first community interaction. After Breakfast when they leave camp they drive through Chatham Hill Development waving and saying good morning to the homeowners on their porches and in their yards. Once through Chatham Hill they will drive through a city called Farmington having the same experiences only with store owners and shoppers. A few miles down the road they will drive through Fairmont, a much larger city interacting with community members on a much larger scale. From there they will branch out to different parts of the county to their worksites, all the while coming in contact and sharing their lives and work experiences with members of the various communities.



4. View from entry to site looking northeast



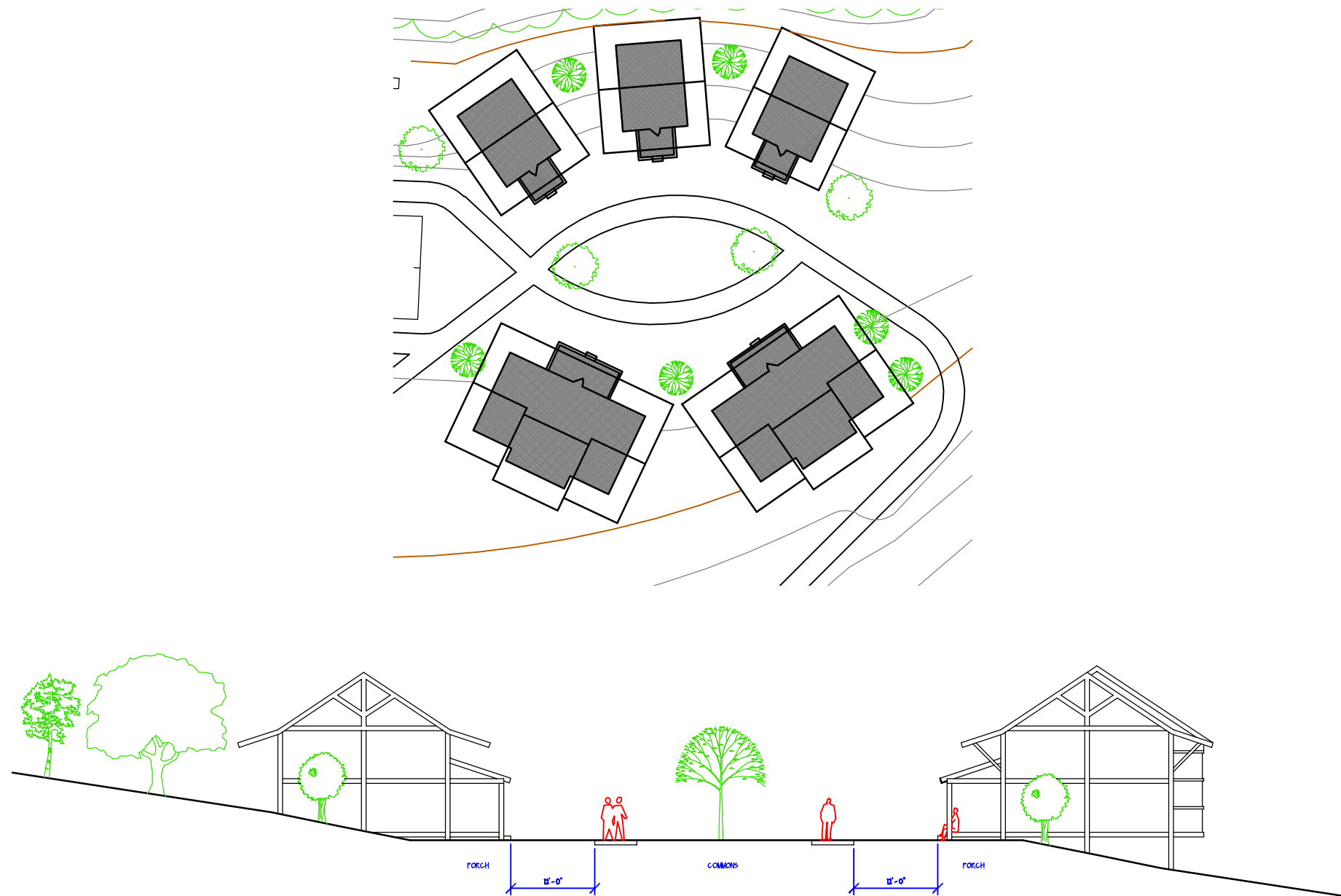
5. View from opposite hillside looking toward entry and southwest



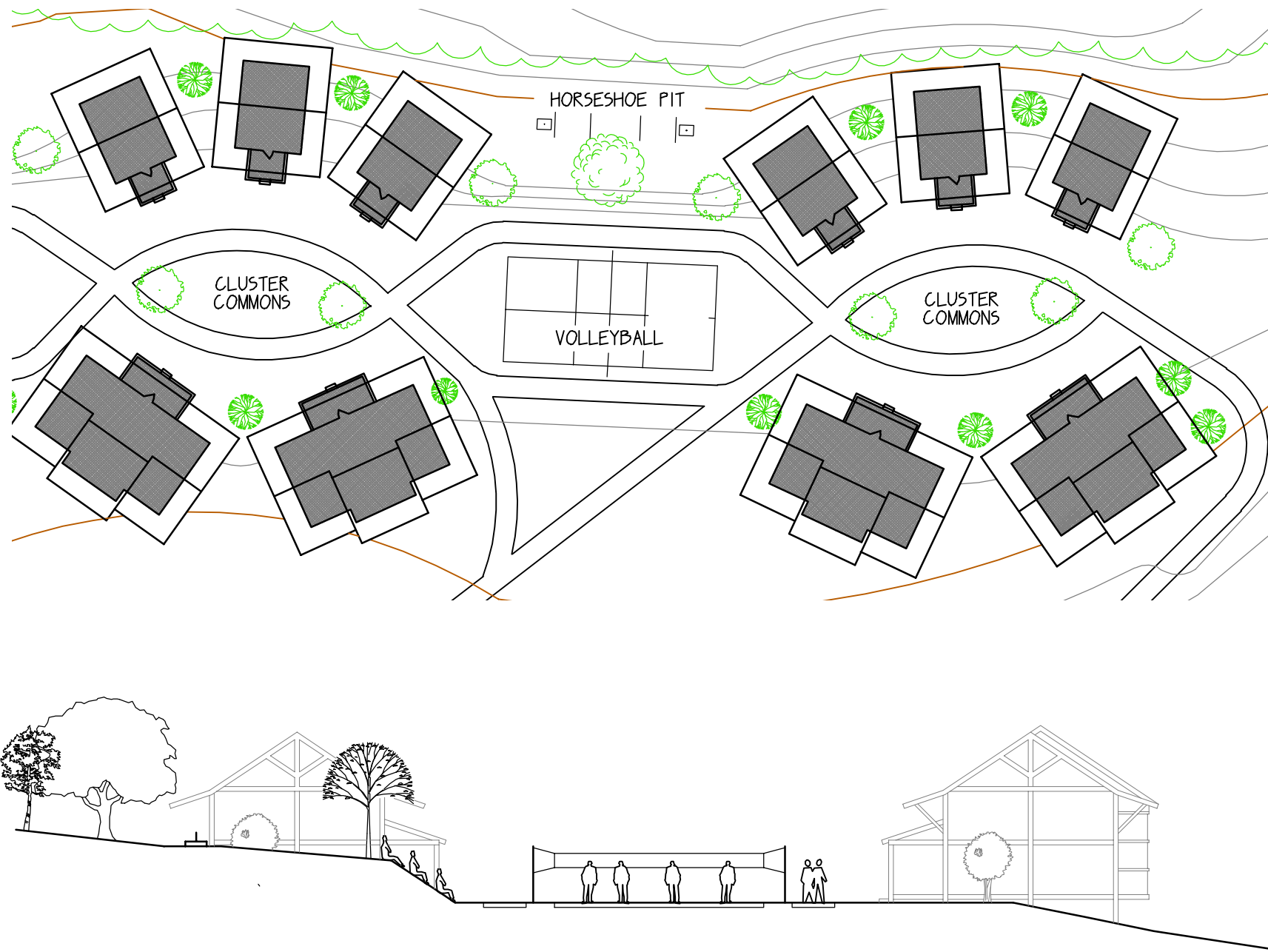
SITE DESCRIPTION

Your first view of the site can be seen from picture No. 4. You can see the grassy valley surrounded by tree-covered hills on all sides, which gives you the sense of seclusion. This property is an old strip mine location. The electric line through the center of the property will be relocated to underground. The topography will be retained except for creating level areas for sporting fields. A bench in the topography, for cabins and paths, will also be created next to the tree line off to the left of the entry and connecting with the existing bench that can be seen in the foreground of picture No. 5. From here you are looking back toward Chatham Hill which cannot be seen because it is nestled below in a valley between the tree-covered hills. To the left of the entry you can see where the topography will be leveled and banked for car parking and the RV area.

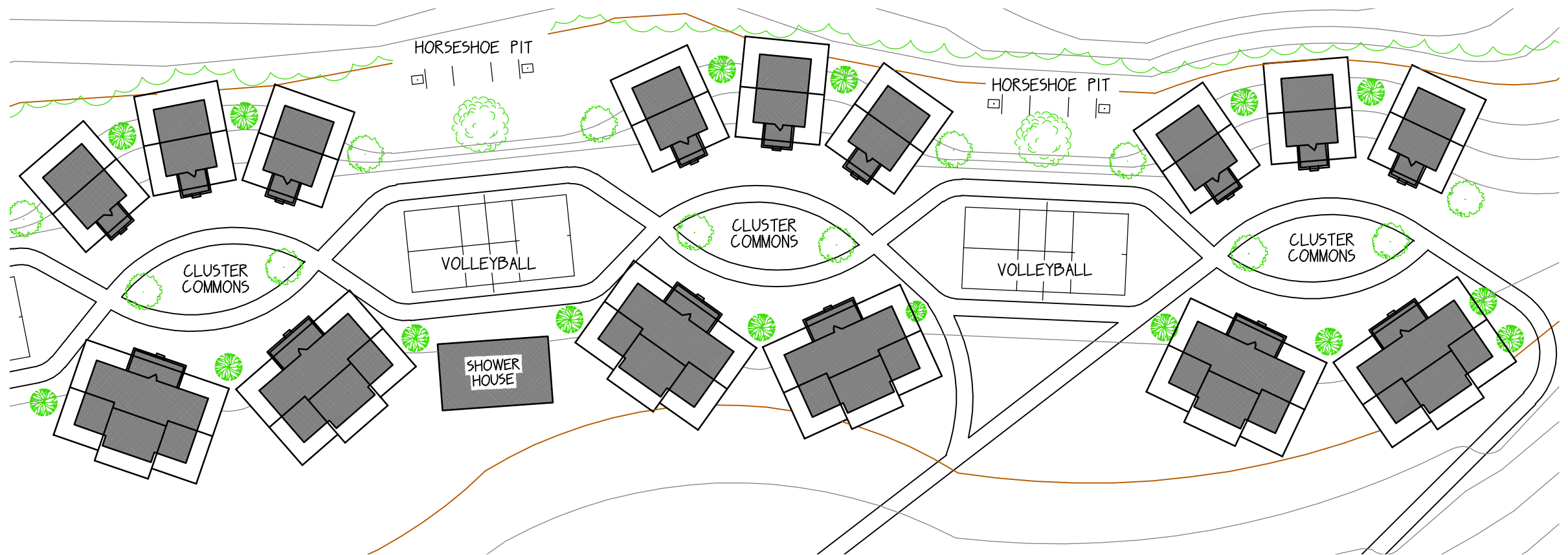




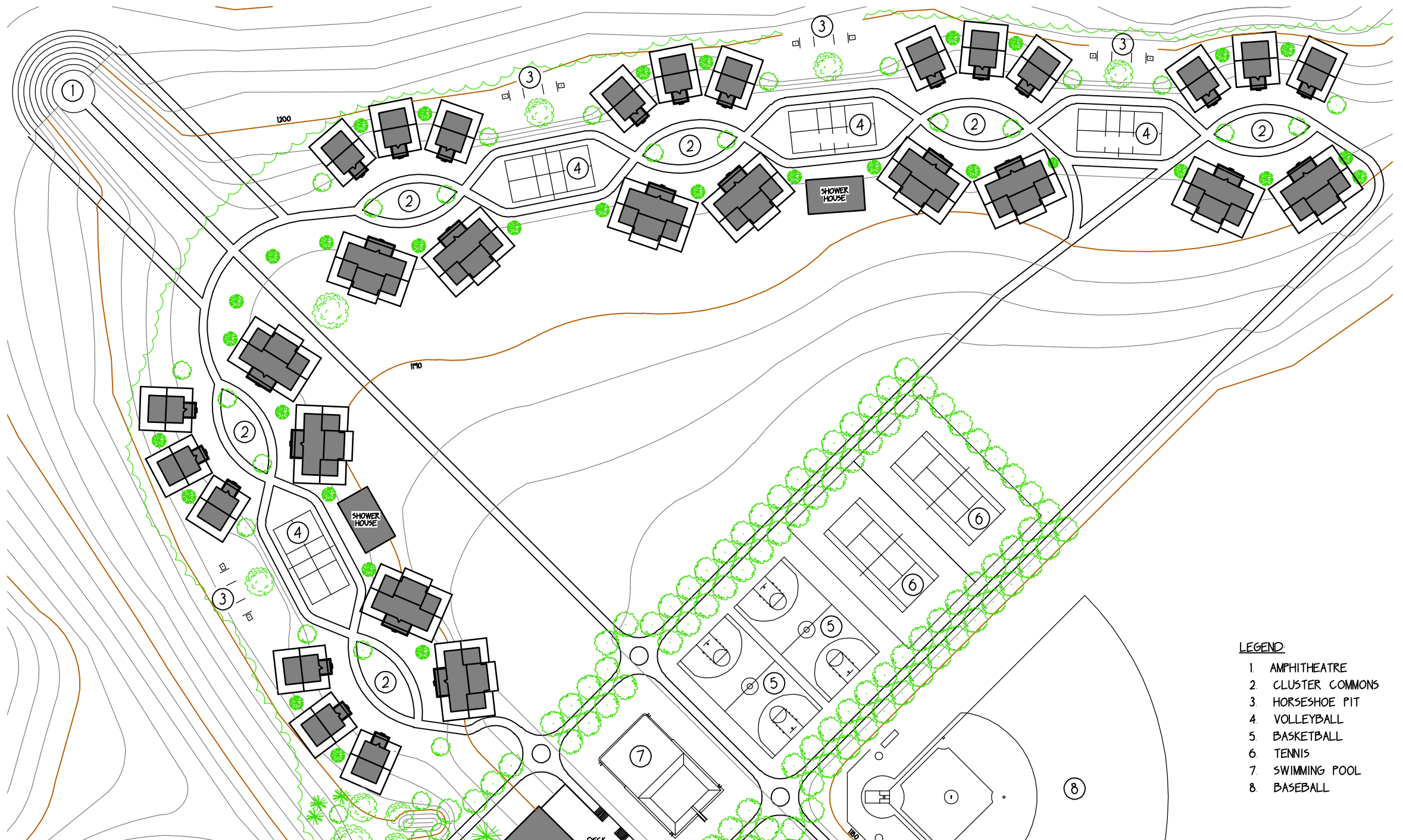
Community starts as a small group of people sharing amenities and common space. As seen in the plan above, the 5 cabins, consisting of 1 large cabin, 1 medium cabin (same footprint as large cabin but with no loft area) and 3 small cabins make up the first community cluster. Grouping these cabins together around a commons area with the front porches facing each other allows the occupants to interact with each other on a daily basis. In viewing the section, one can start to understand the difficulties in designing community. With the front porch and commons area being a popular space for people to gather for both public and private conversations, one has to consider the distances involved. Trying to encourage interaction but yet maintaining a good distance from path to porch, so that one doesn't feel required to say hello or feel as if their conversation is heard by all those who pass by, is the goal. In studying these situations in daily life, it was discovered that around 12 feet was an optimal distance for both public and private to occur.



The camper's free time occurs in short intervals before and after dinner, and during that time they often play volleyball. So linking two cabin clusters together with a volleyball court will begin to create the next scale of community. The campers start to enlarge their circle of interaction by sharing their experiences with campers from the other cabin cluster over a game of volleyball. For those who do not wish to engage in volleyball there is a grass bank which has been created where they can sit and discuss their experiences over a game. Also for the less athletic, horseshoe pits are available next to the tree line.

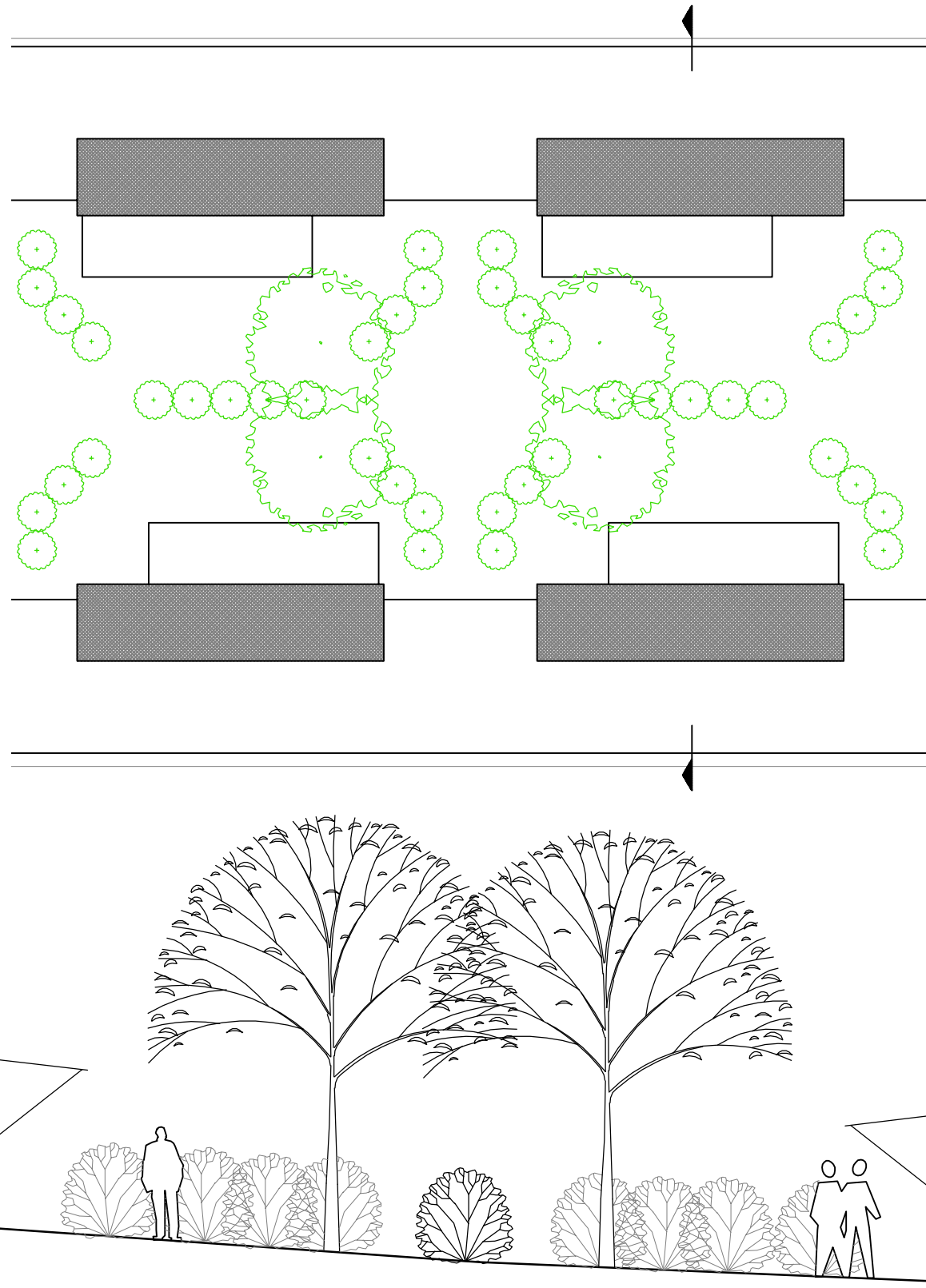


Three cabin clusters are joined together by the shower house which will have a men's area on one side and a women's area on the other side. Along with a shower room they will have sinks and toilets. This is where all daily hygiene will take place and therefore will enable campers to interact during their trip back and forth.

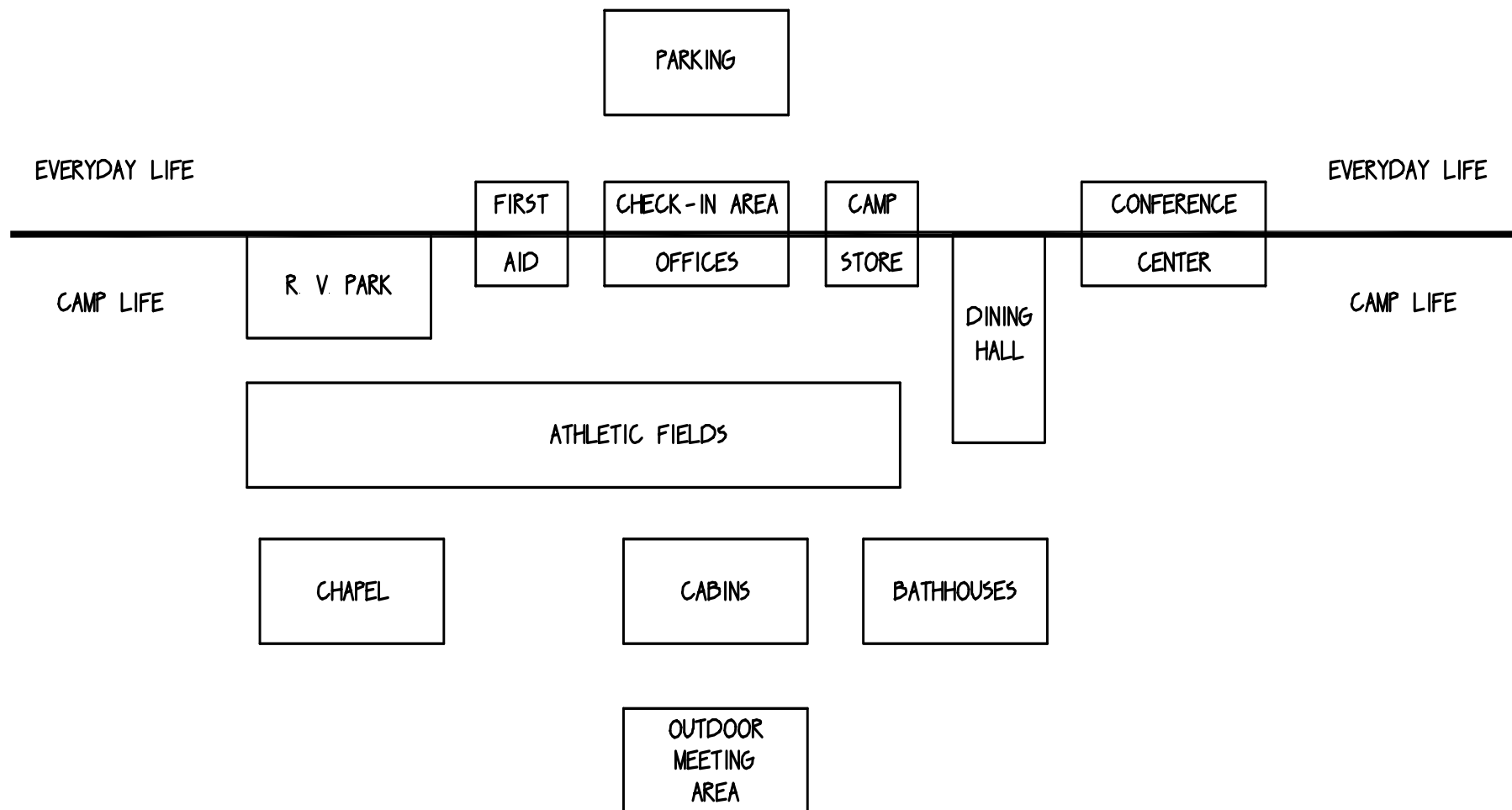


Weather permitting the morning and evening meetings are held at the outdoor amphitheatre which is located in the natural cove of the hillside along with the cabins. This amphitheatre helps to tie all six of the cabins together into one community. This is where the entire camp will interact sharing experiences that last a lifetime, which will help them grow and strengthen as a community.

With the popularity of Recreational vehicles growing everyday there needs to be a place at this camp that accommodates and even goes one step further to make this an outdoor camp that somebody wants to come to more than another. An R. V. owner is looking for something a little different than the average person that comes to a camp located in the mountains of West Virginia. While these people prefer the outdoors more than the climate control of four walls, they still want the creature comforts such as couches, beds, electrical appliances and private bathrooms.

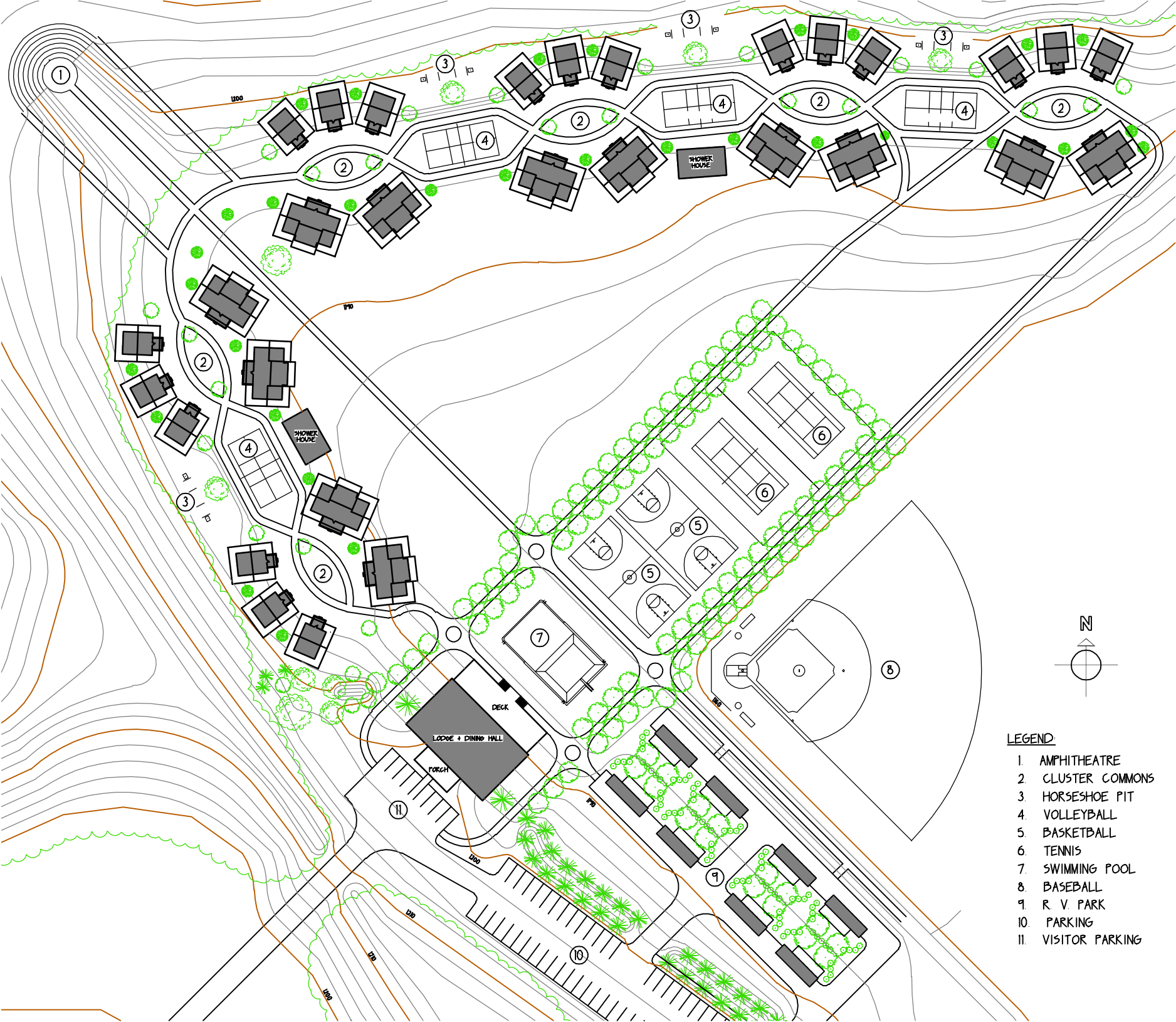


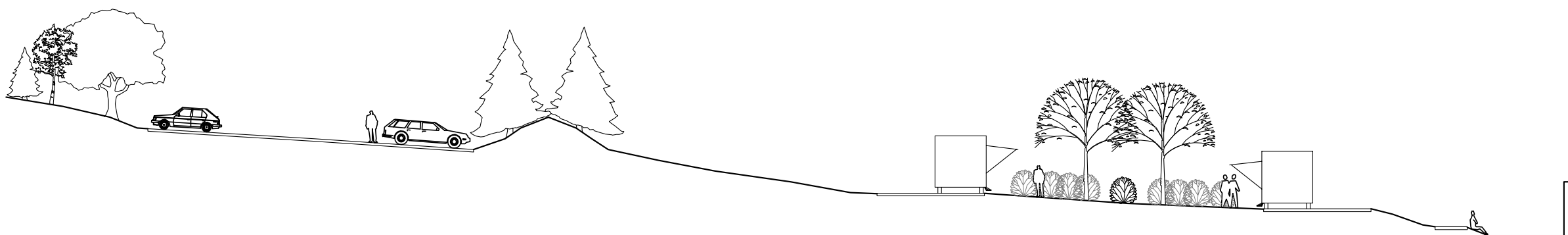
While the R. V. provides the creature comforts of daily life, it does it in a very cramped manner. So the occupants personal space is expanded to the area just outside the R. V. door. This space becomes part of their private area, and some of the same issues are apparent here as in the cabin clusters. From the plan and section it can be seen that the private area is defined by small 5 to 6 feet tall shrubery. Passageways are created between the shrubs at the end of the R.V.'s to allow for interaction and sharing that a community atmosphere needs to prosper. In the section it can be seen how the dogwood trees create a canopy above the campers which further defines a room or private area. These dogwood trees are not a very dense tree which will still allow the sunlight to filter through and let nature in.



In order to take full advantage of a week away from the everyday tasks of life, you need a different atmosphere. Simply coming to the mountains of West Virginia will accomplish that for some people. But in order to make the most of what a camp in West Virginia has to offer, a line needs to be established. This Line that differentiates everyday life from camp life develops in the planning stages by working out the items in the program that do and do not need to be connected to everyday life.

The selection of the site helps to establish this line by locating the entry at the ridge line. The ridge line is where the line first starts to become apparent to the campers. At this point the campers start to realize they are leaving their everyday life behind and entering into camp. From there, the line is extended by creating a tree covered 6 foot berm on both sides of the lodge. The line then extends beyond the lodge by using formal geometry to lay out the pool and athletic fields. When one leaves the athletic fields the landscape becomes informal and slowly develops into its natural setting. The line also extends around the lodge with dogwood trees to enclose the athletic fields which helps to invite the Chatham Hill community into the fields for after school activities while still keeping their experience separate from the rest of the camp.





In the section view the line can be seen taking the form of a landscape berm and creates a place for the cars to become hidden from the natural landscape of the camp.



FIG. 1 French grooved post and fill construction method
Fort Chimo, Ungava Bay, Labrador, 1896



FIG. 2 Cottage on Red River Road near Winnipeg,



FIG. 3 Manitoba, McDermot's store, near Fort Garry



FIG. 4 old Anglican church at Fort Simpson

When designing a camp that is supposed to belong to nature, one needs to build something that will survive the natural elements. A strong structure with the feeling of permanence, longevity and sustainability is needed to inspire the campers to build houses and lives in a manner that will endure for many generations. Along with permanence a strong tie to the surrounding nature is needed. Therefore timber frame construction was chosen because of its ability to blend with nature and survive the elements which is documented in the photos above. Timber frame construction is very beautiful from the inside where the frame is exposed but in most cases the frame is covered on the exterior with some sort of sheathing. To allow the structure to have a more profound impact from the exterior the sheathing is considered as infill between the structure. This idea is a variation of the grooved post construction method which is illustrated in the images on these two pages. These cabins will only be used in the summer when the weather is mild, so therefore a thin board and batten system will be ample for sheathing.



FIG. 5 Plank Construction

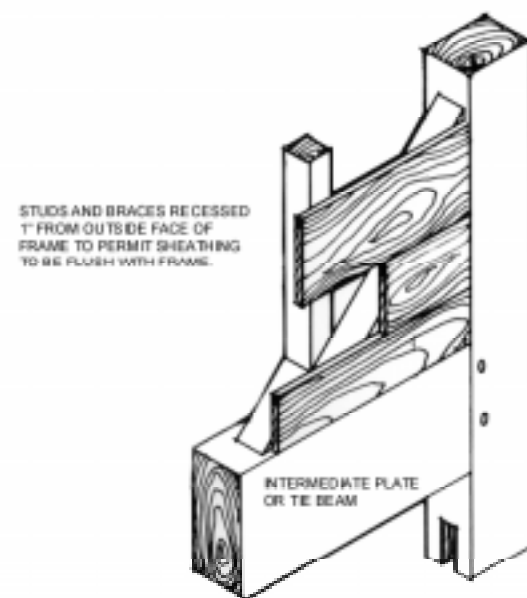


FIG. 6 Plank Construction

"Behind the lines etched into this timber are decisions: about a position in a living framework, about joints that will be strong, and about wood that will be seen in a house that was built to last." - Ted Benson

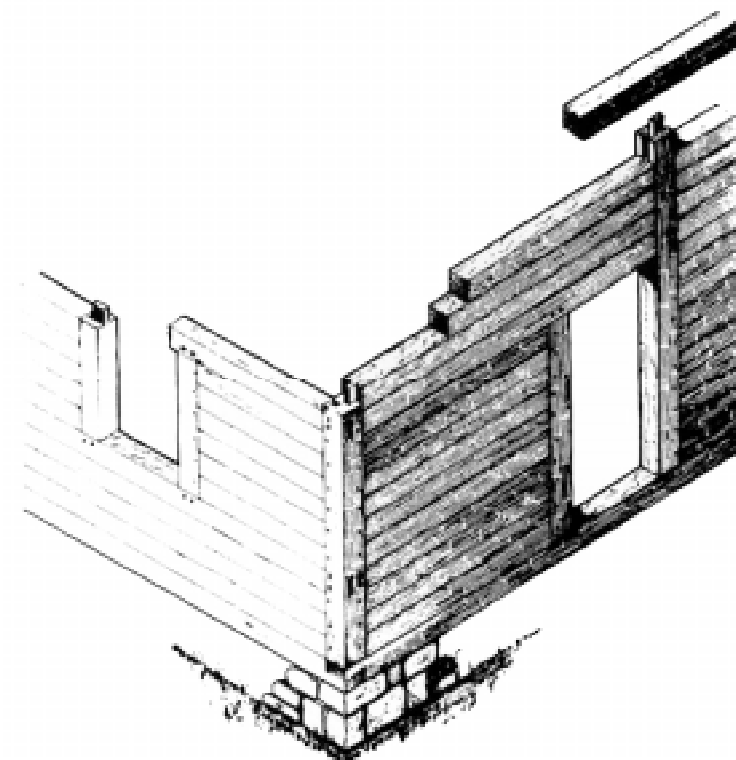


FIG. 7 Typical Quebec grooved post construction



Timber frame structure model large cabin front view

"...Architecture which is really architecture proceeds from the ground and somehow the terrain, the native industrial conditions, the nature of materials and the purpose of the building, must inevitably determine the form and character of any good building" - F.L.W.



Timber frame structure model large cabin right-front view



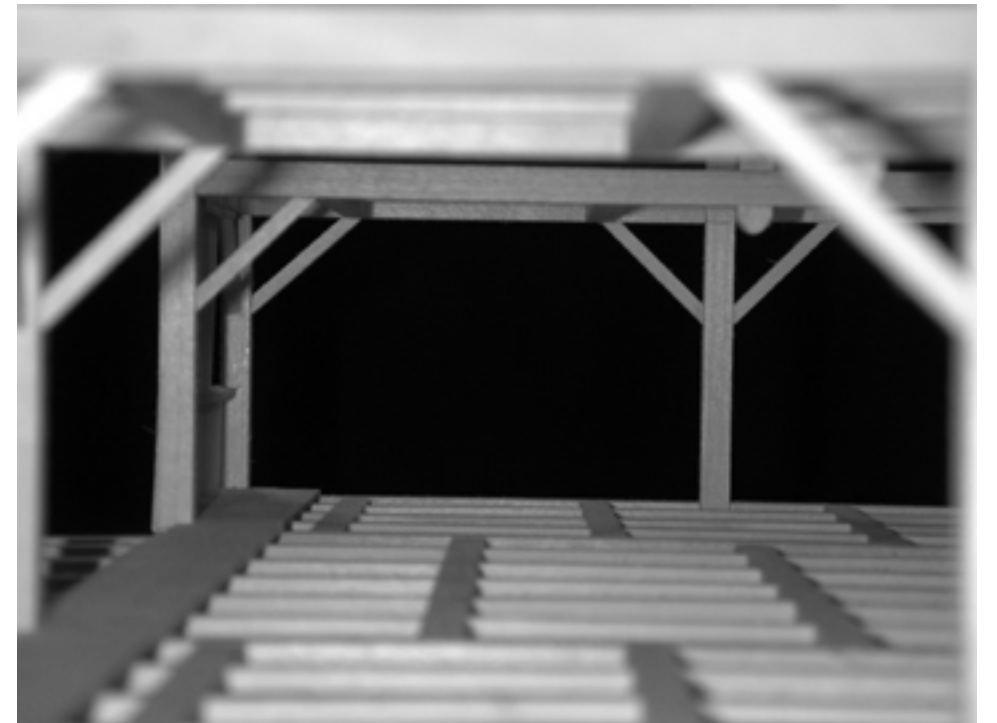
Timber frame structure model large cabin left-rear view



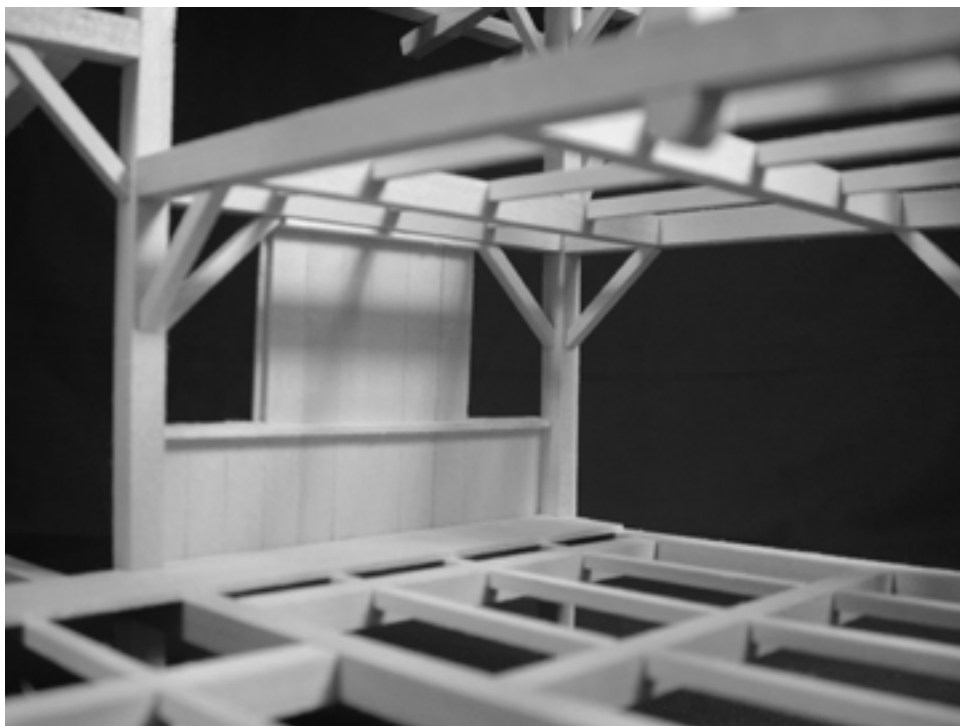
Timber frame structure model large cabin left view



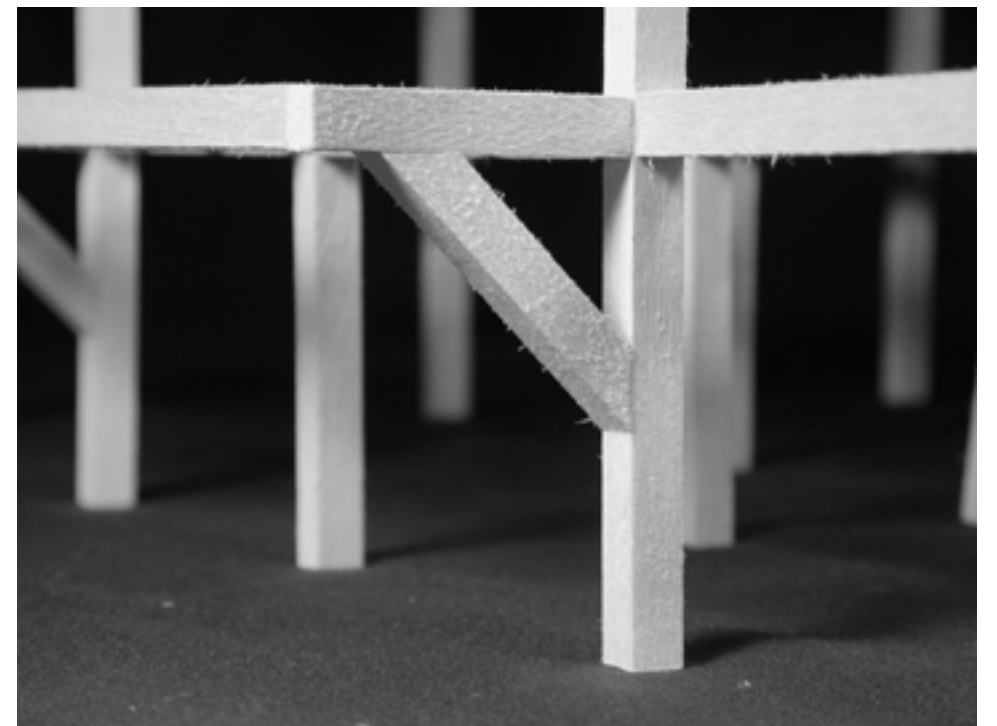
Floor structure consisting of bents with connecting girts



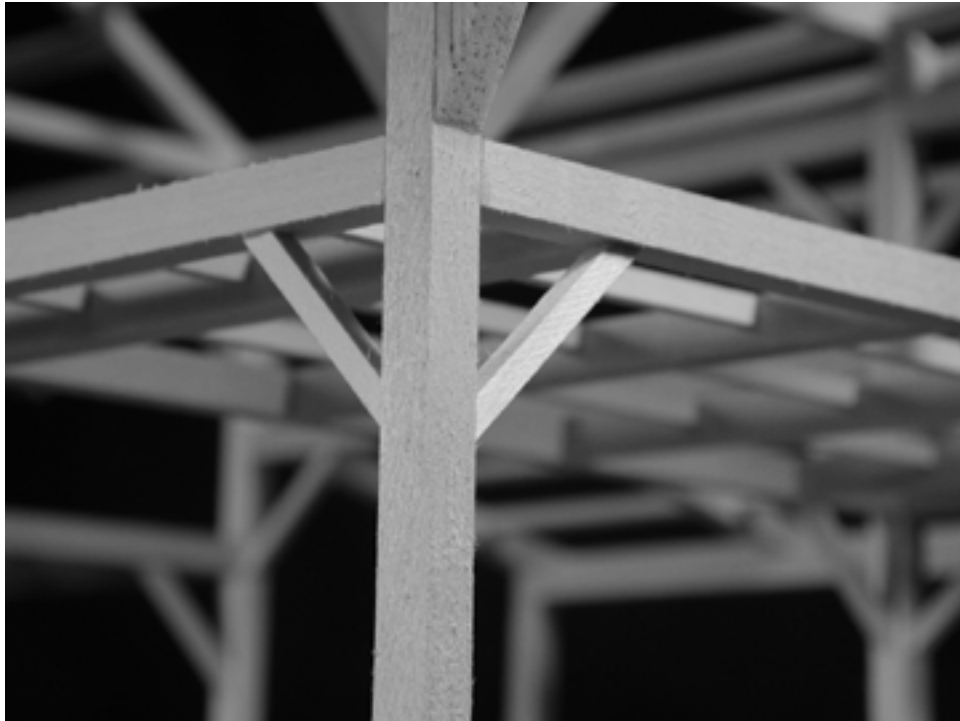
Summer beam and floor joist construction



Bent girts, summer beams, floor joists and knee brace construction



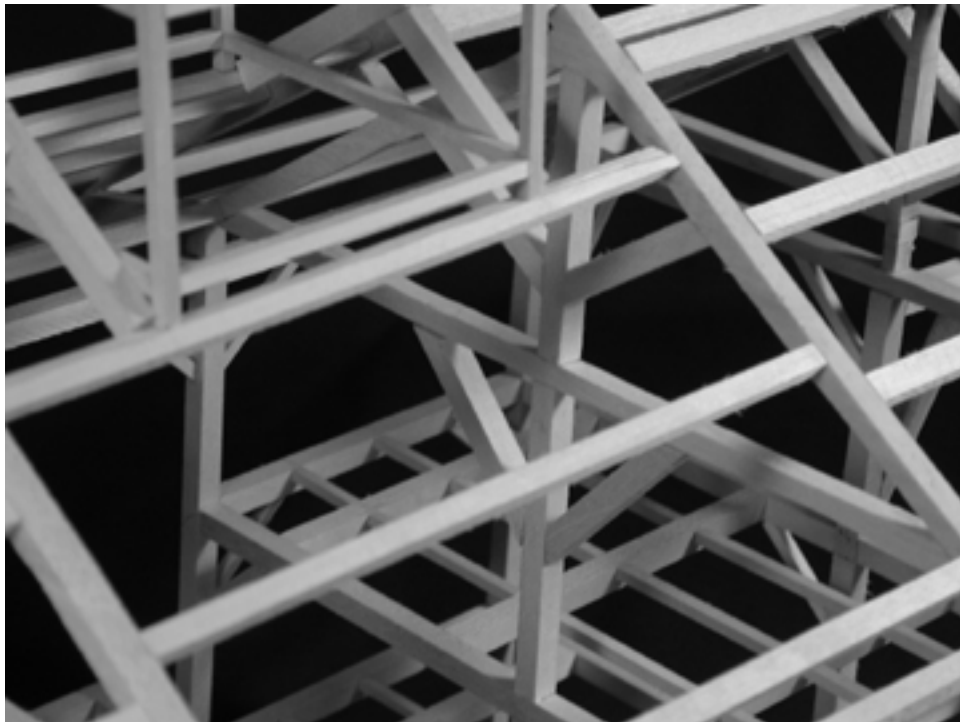
Knee strut for cantilevered viewing window



Knee brace at bent and connecting girder



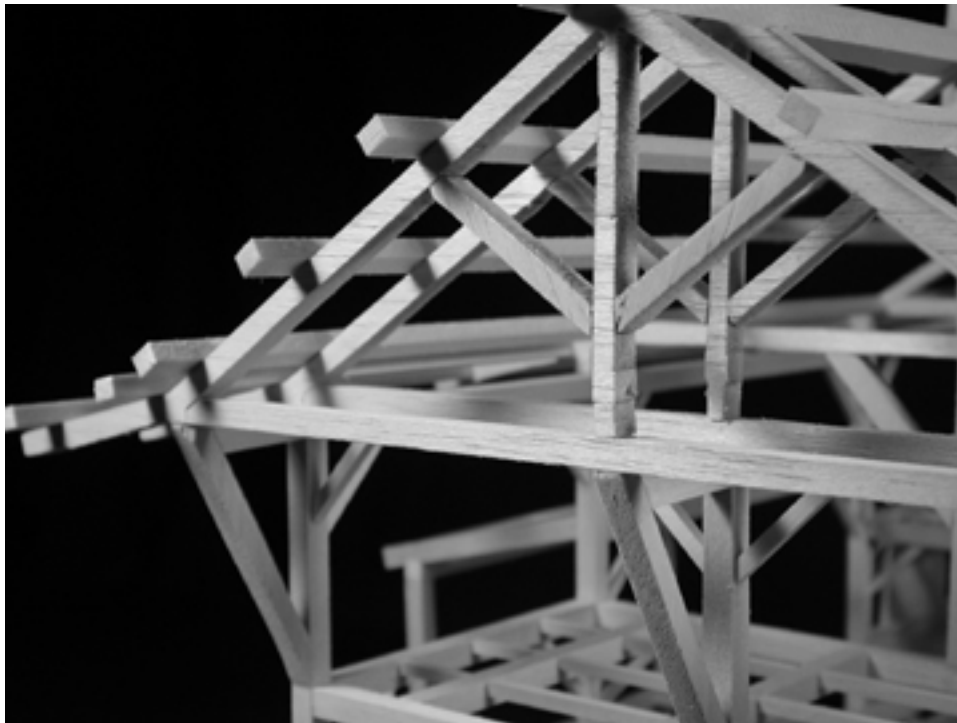
Exterior sheathing/siding



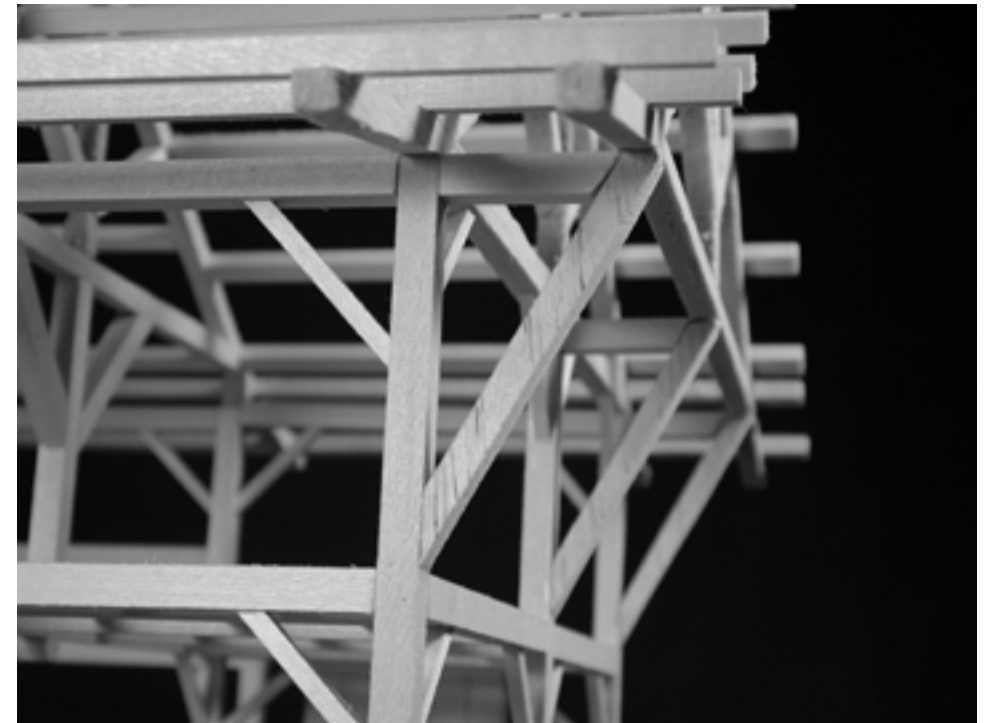
King post on top of a crown post to suspend loft



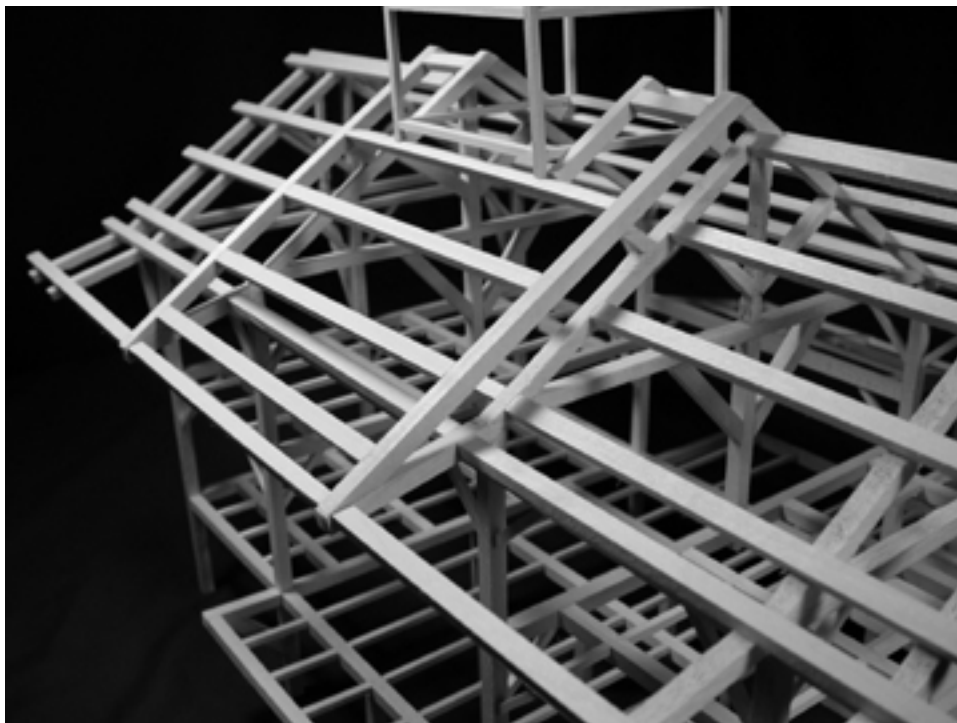
Crown post to suspend loft framing



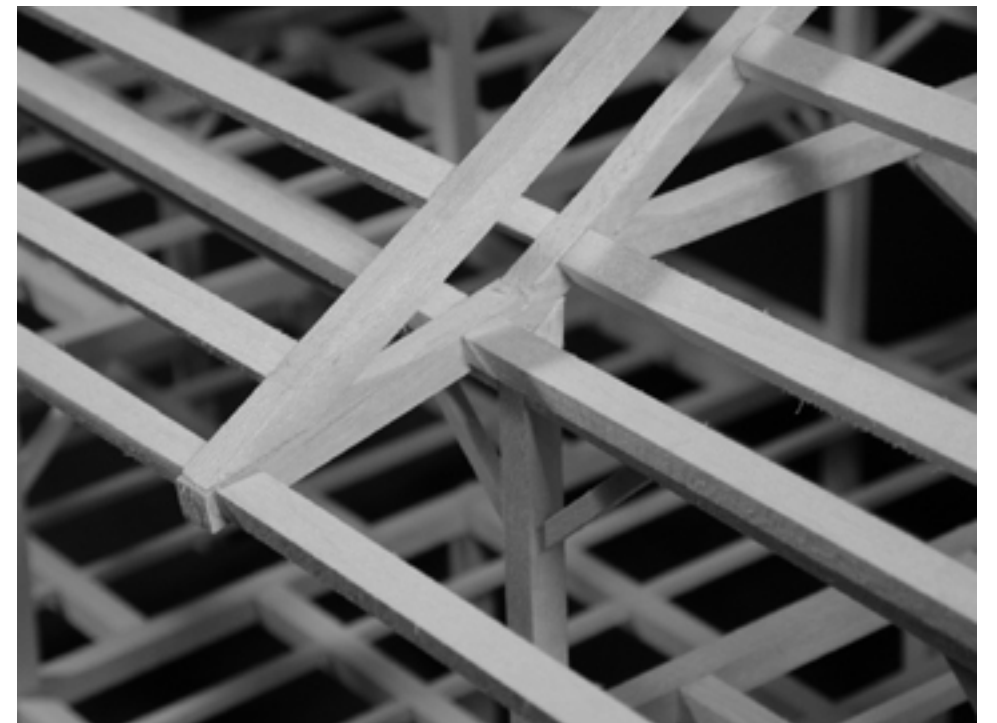
King post roof truss at end



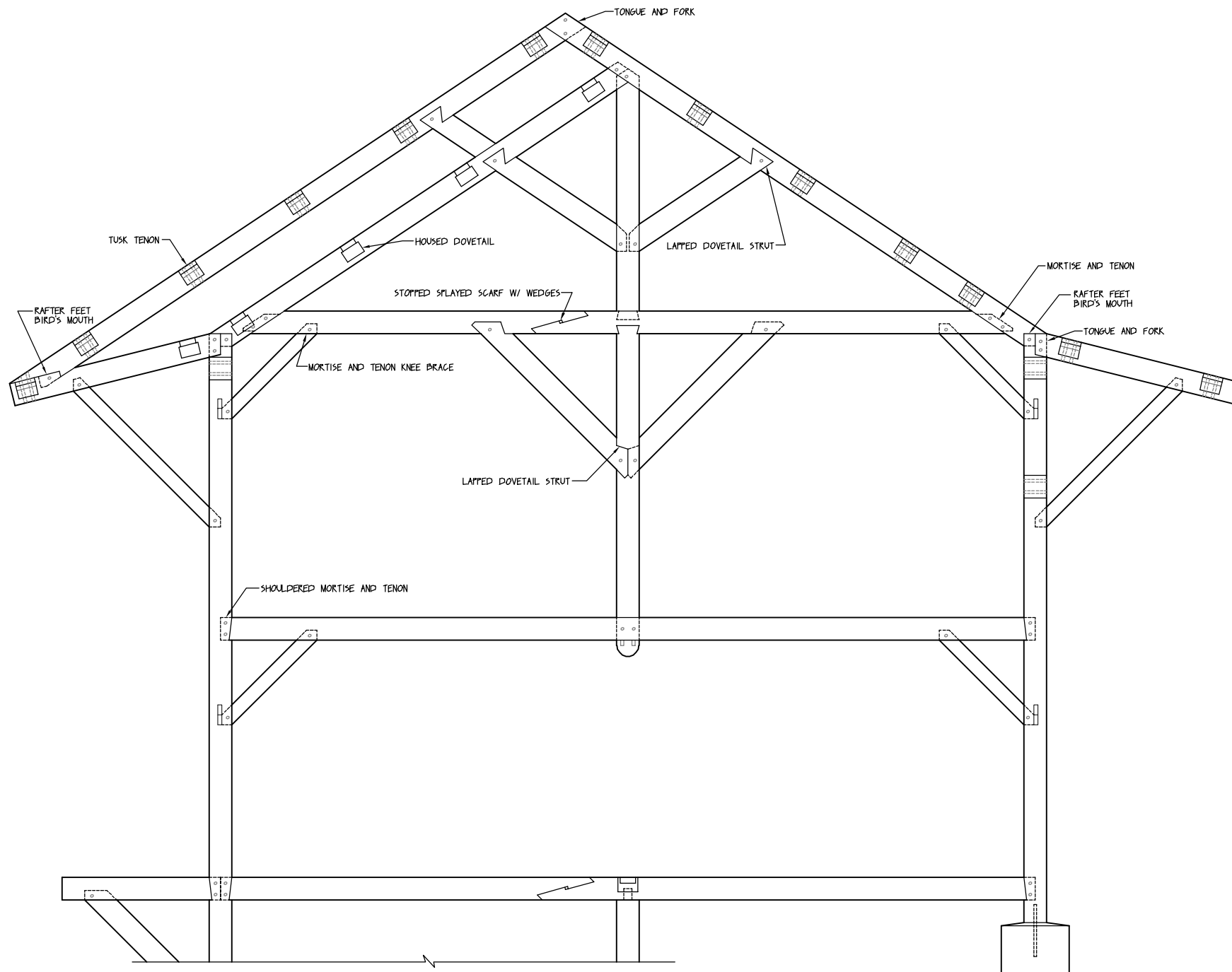
Strut to support end truss



Compound truss to create raised roof area for P.V. arrays

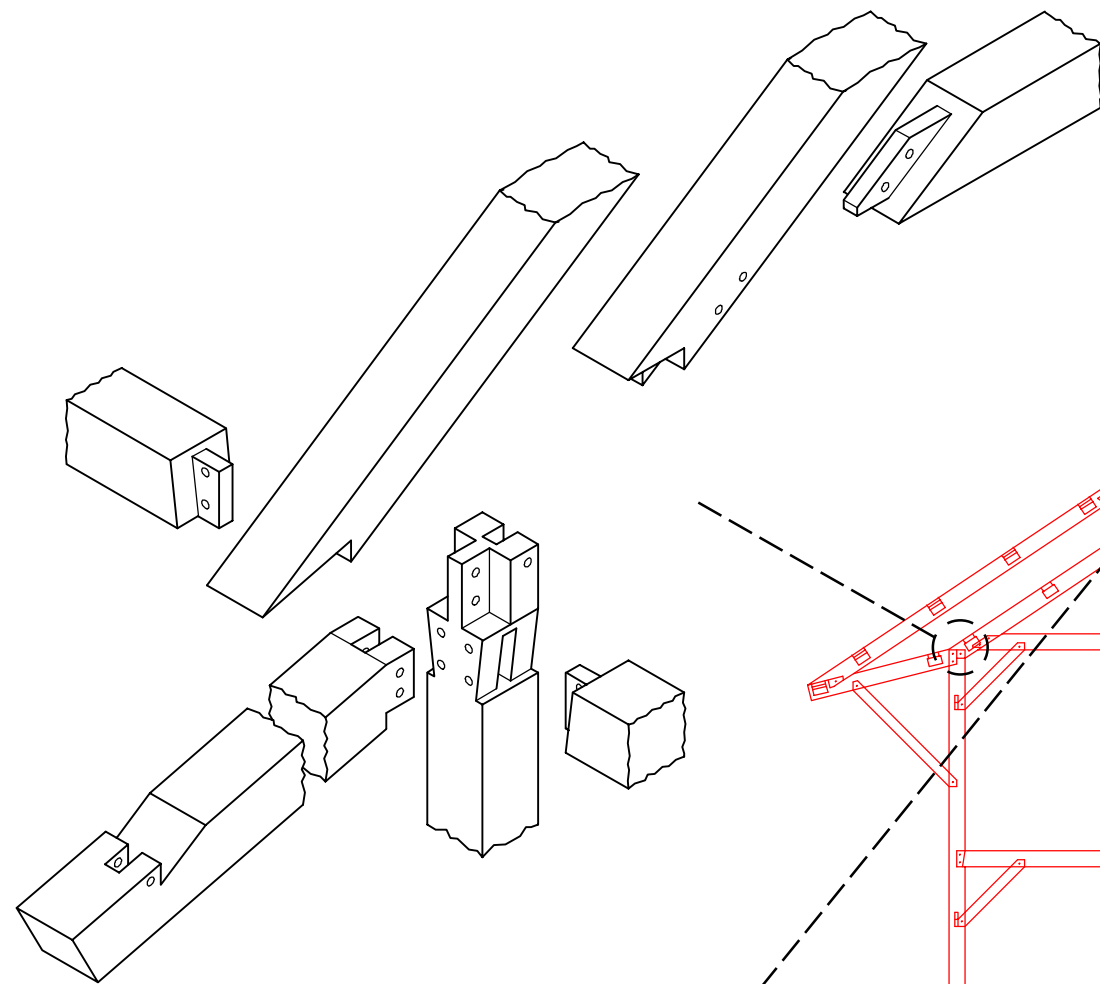


Compound truss to post connection

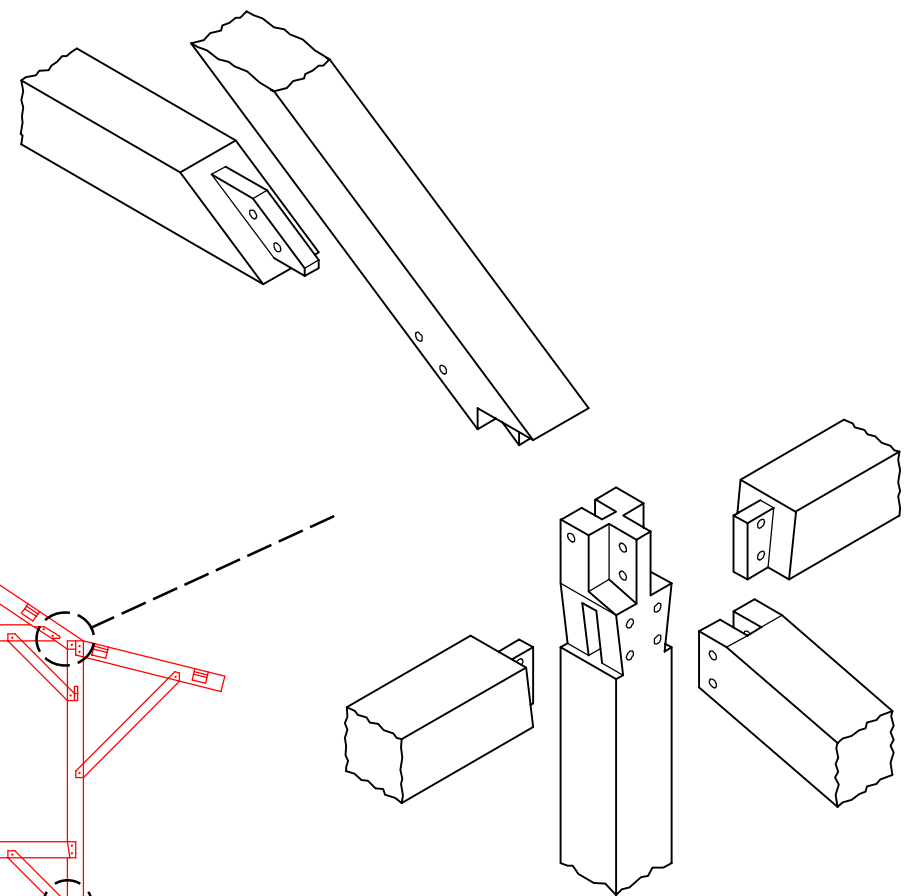


Section of Joints
 Scale: 1/4" = 1'-0"

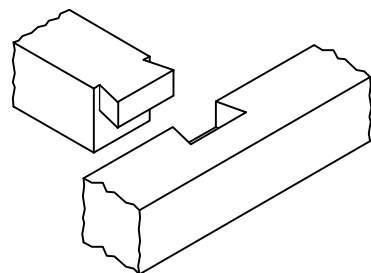
Rafter Joint Connections
Scale: 1/2" = 1'-0"



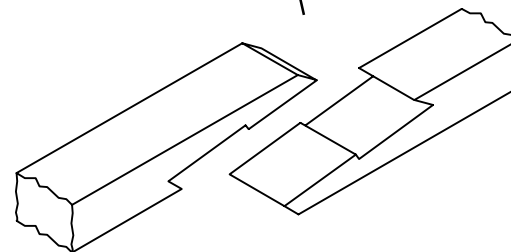
Rafter Joint Connections
Scale: 1/2" = 1'-0"



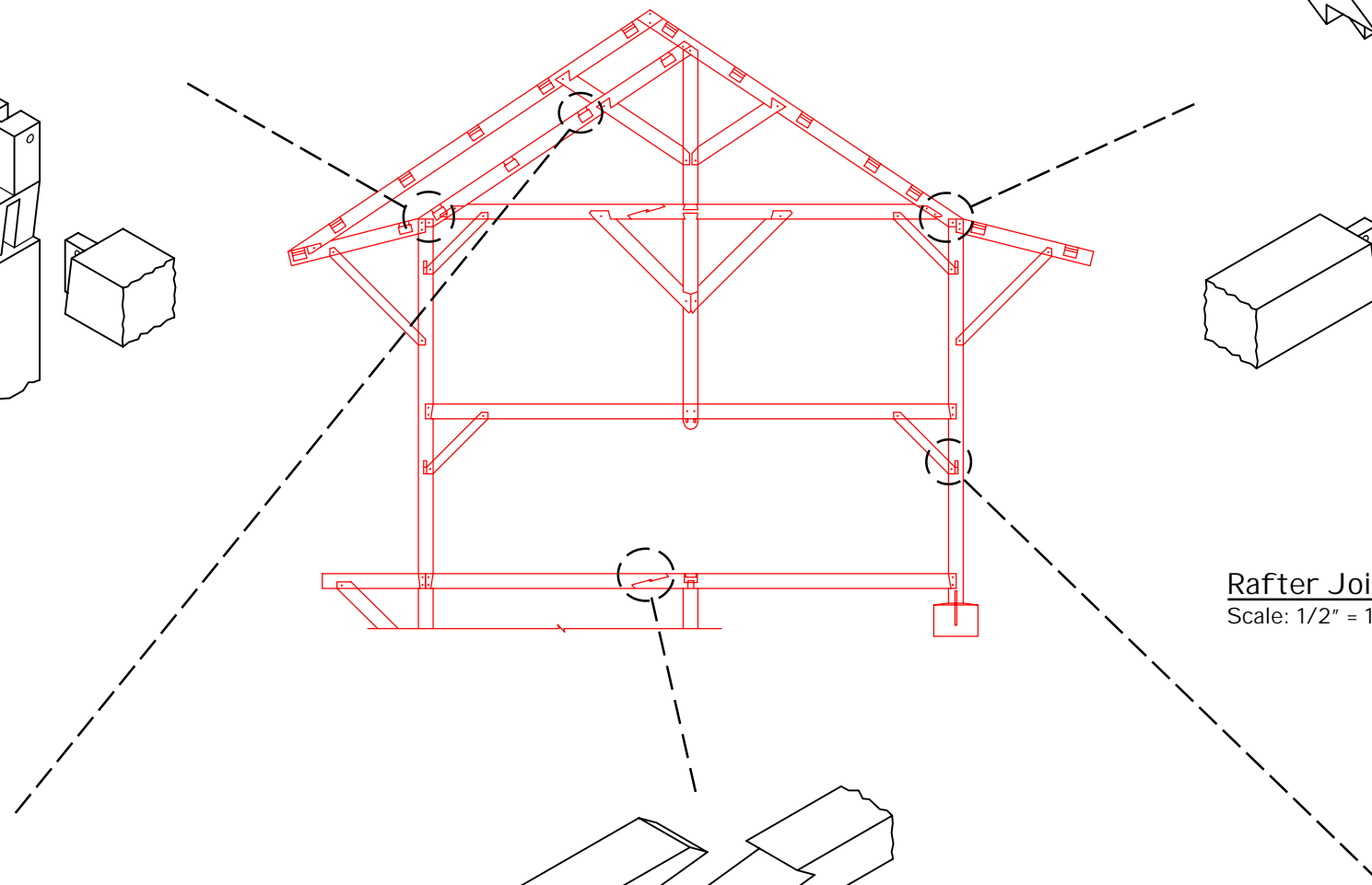
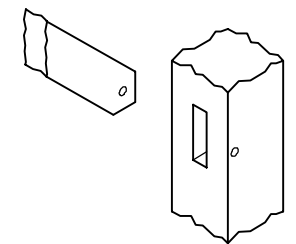
Dovetail Joint
Scale: 1/2" = 1'-0"



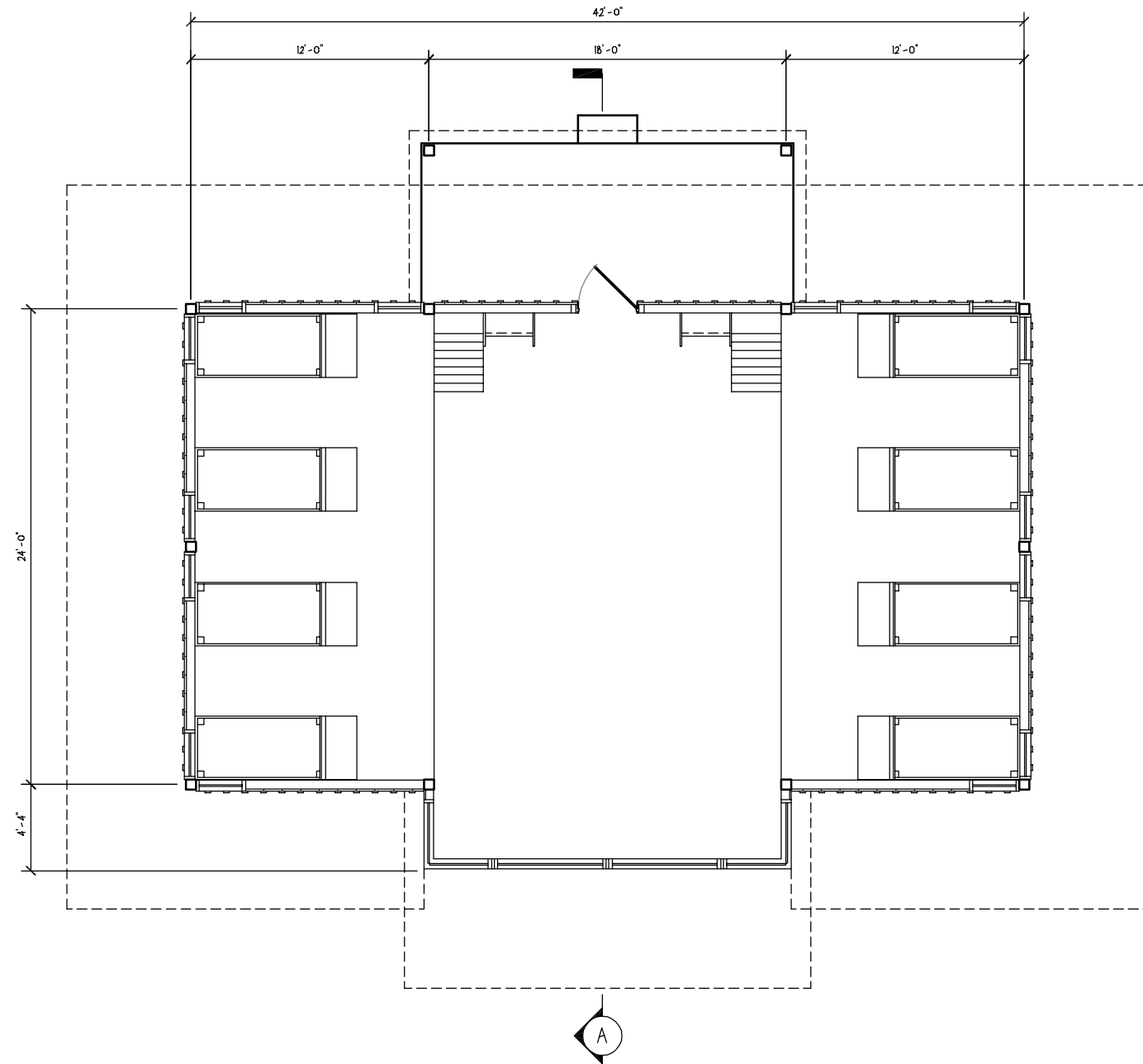
Stopped Splayed Scarf W/ Wedges
Scale: 1/2" = 1'-0"



Knee Brace Joint
Scale: 1/2" = 1'-0"

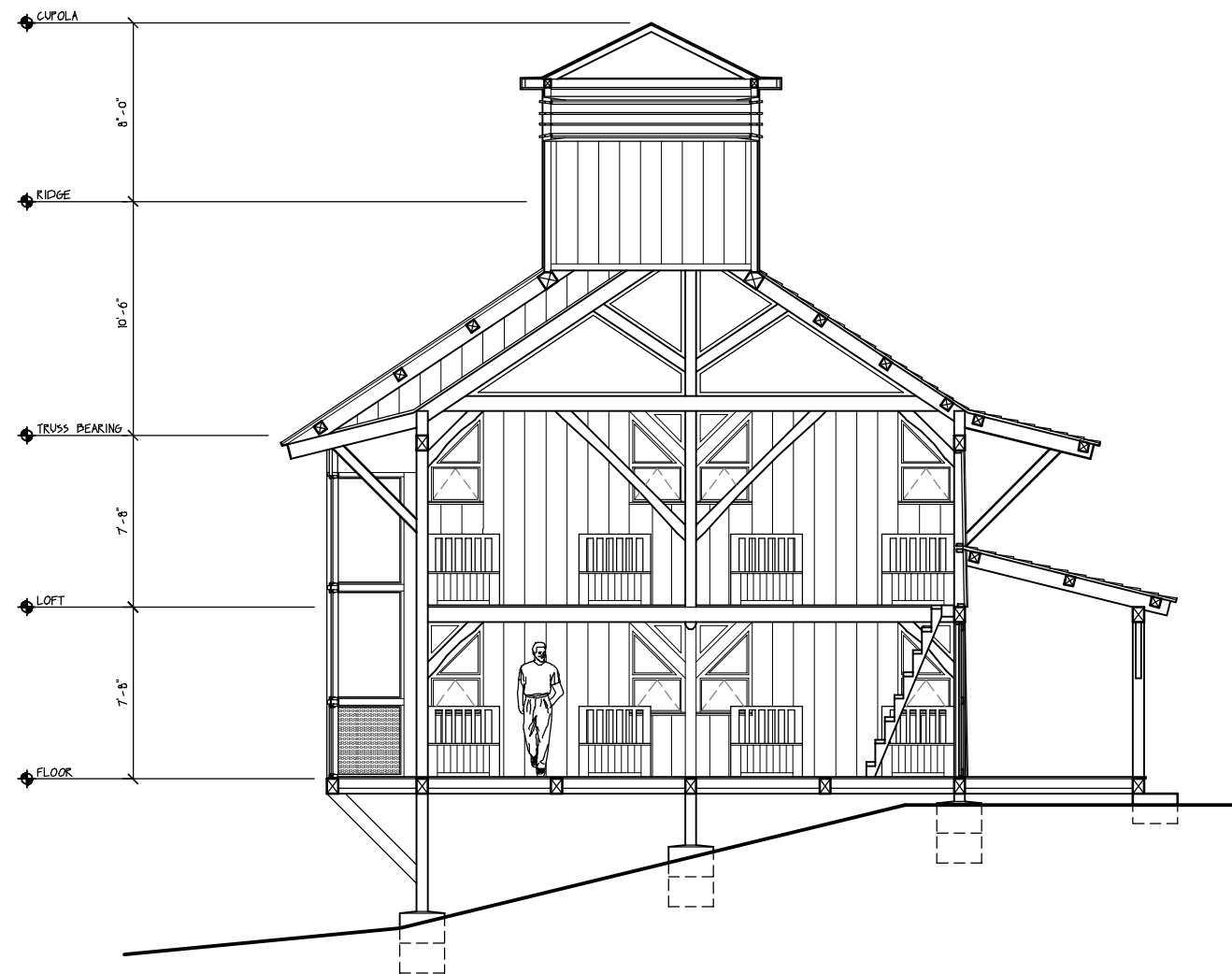


The large cabins will function as sleeping quarters only. Entry is from a porch into the commons area in the center of the cabin. They will have 16 beds total with 8 beds on each side of the commons area. The bed areas on either side will have a loft area with four beds and a ship's ladder for access. The medium cabins will have the same footprint but without the lofts that could be added in the future for expansion. The small windows at each bed will allow for individual lighting and ventilation while the large windows in the commons area will be for the major air inlet and views across the camp.



Floor Plan - Large Cabin

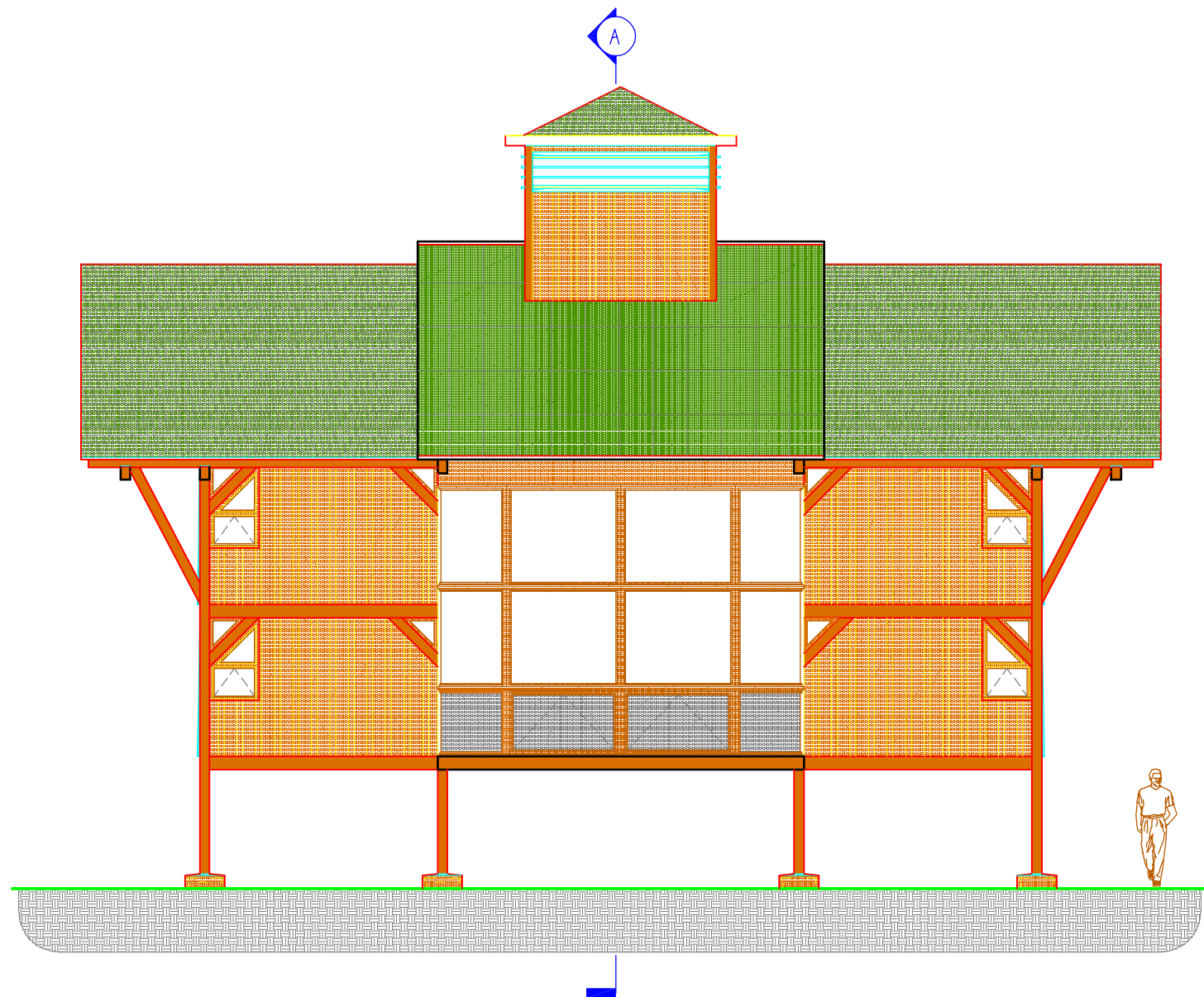
Scale: 1/8" = 1'-0"



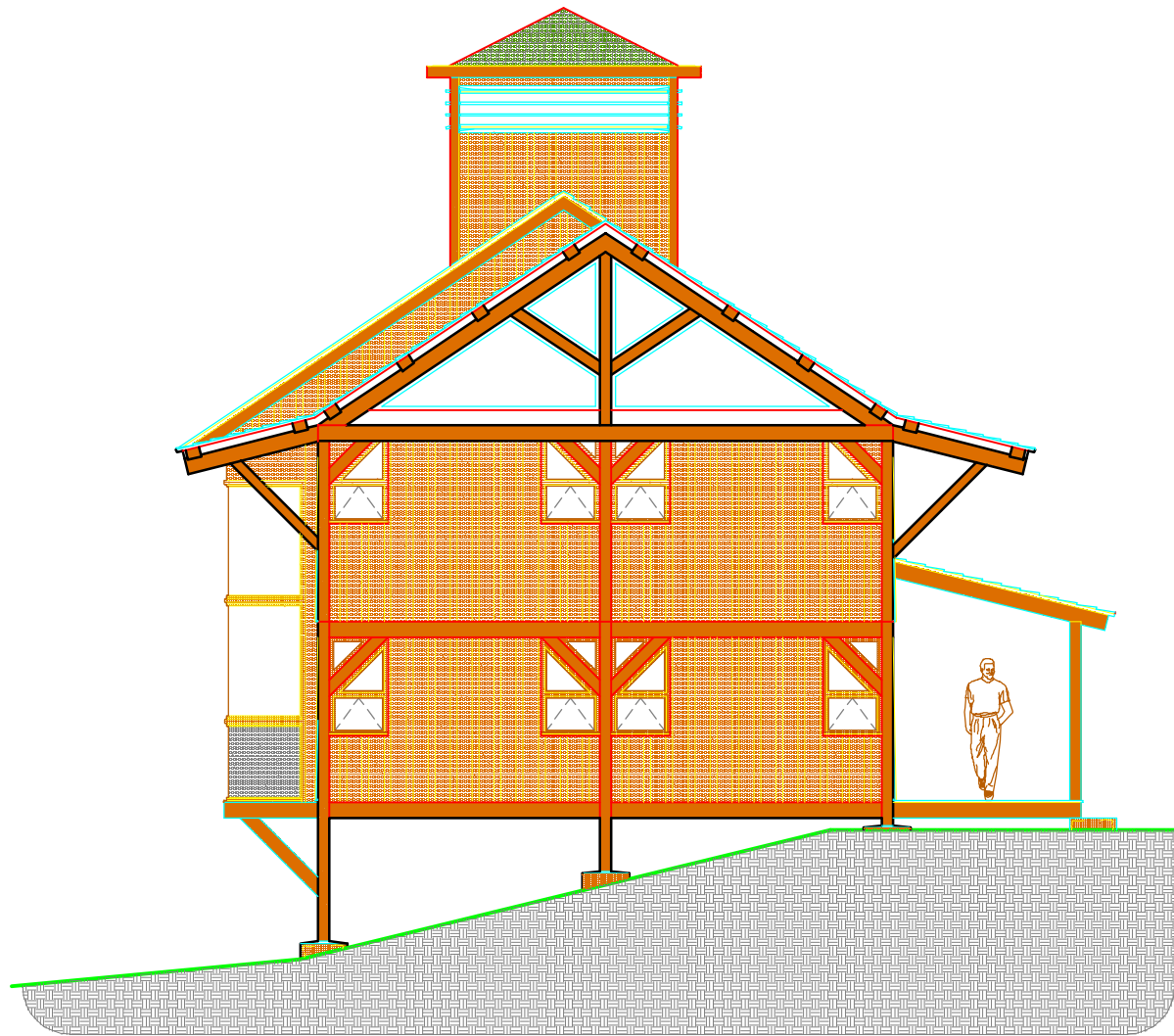
Transversal Section - Large Cabin
 Scale: 1/8" = 1'-0"

From the building section the relationship between the loft sleeping area and the commons area reveals itself. This height difference helps distinguish between the private sleeping areas and the public commons area. The ship's ladder up to the loft can be seen on the right. The small windows can be seen in the background above each bed. The structure is cantilevered on the left to provide a viewing area with large windows. This also allows for the roof to protrude out further at this area to make a place for the P.V arrays. Also in this open commons area is the cupola which is the major air outlet. By being located here, it is able to draw the air out of the loft areas.

The south elevation shown is the rear of the cabin that looks over the camp. The large area of windows can be seen in the center that allow for air entry and viewing. The P.V. arrays can be seen on the protruding roof area above these windows. The relationship between the ground and the floor of the cabin is greater on this downhill side to allow for more air movement underneath, thus providing better ventilation. The operable louvers can be seen in the cupola that allow for the adjustment of air movement out of the cabin.

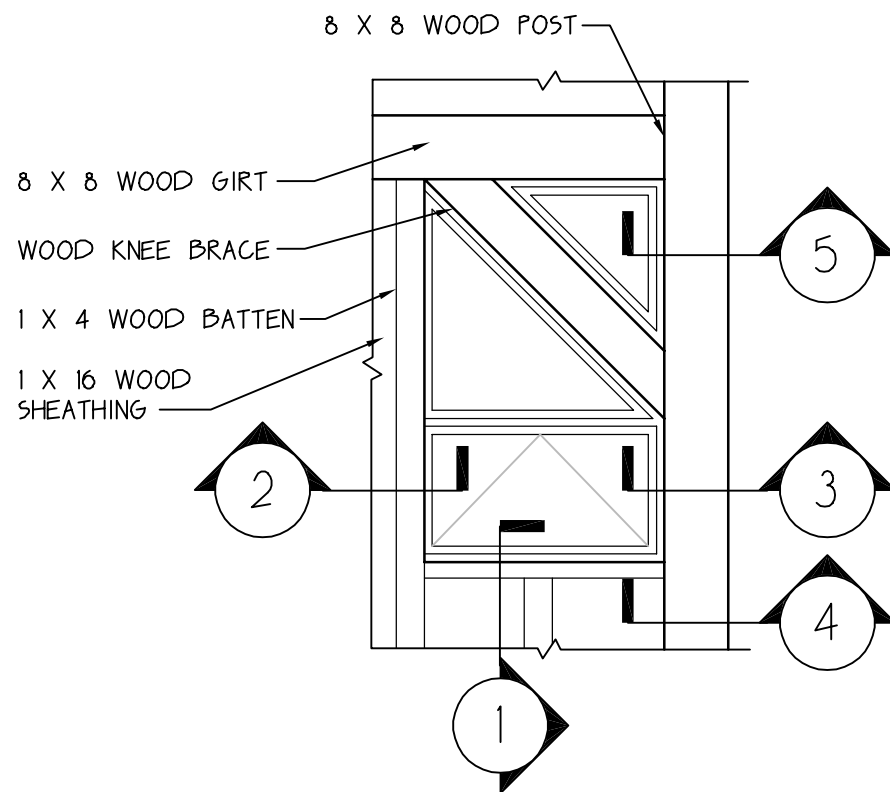


South Elevation - Large Cabin
Scale: 1/8" = 1'-0"



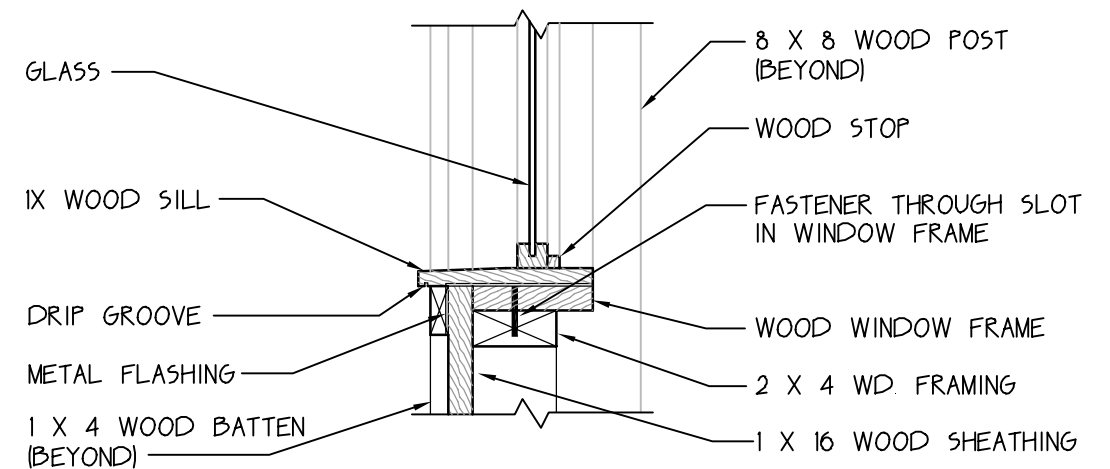
East Elevation - Large Cabin
 Scale: 1/8" = 1'-0"

In the east elevation, the use of the sheathing material helps to reveal the structure on the exterior. Since the board and batten sheathing is used as infill, the timber frame structure is allowed to reveal itself. More emphasis is placed on the structure by placing the small windows around the knee braces. The truss area is infilled with windows to allow light to filter through and across the interior structure, creating shadows on the floor.



Window Elevation

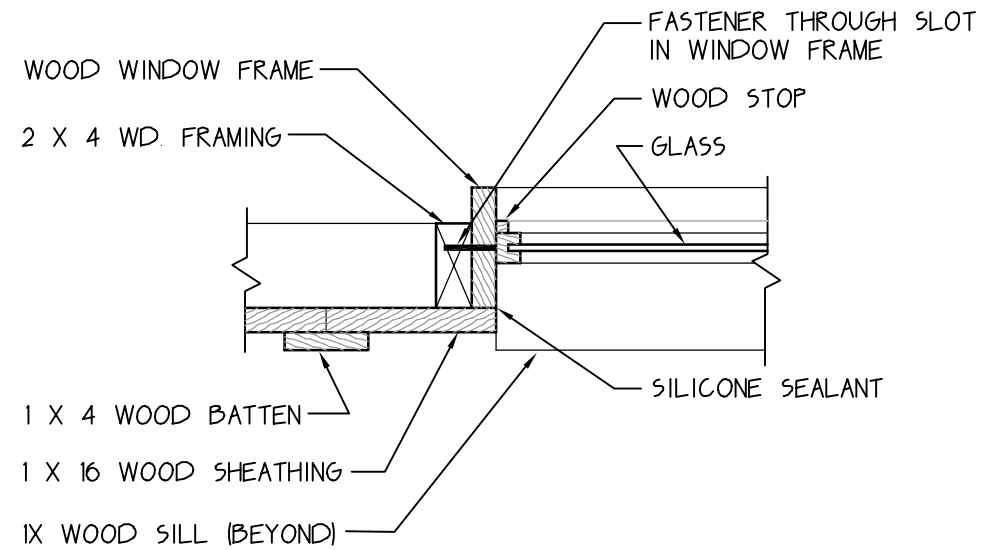
Scale: 1/2" = 1'-0"



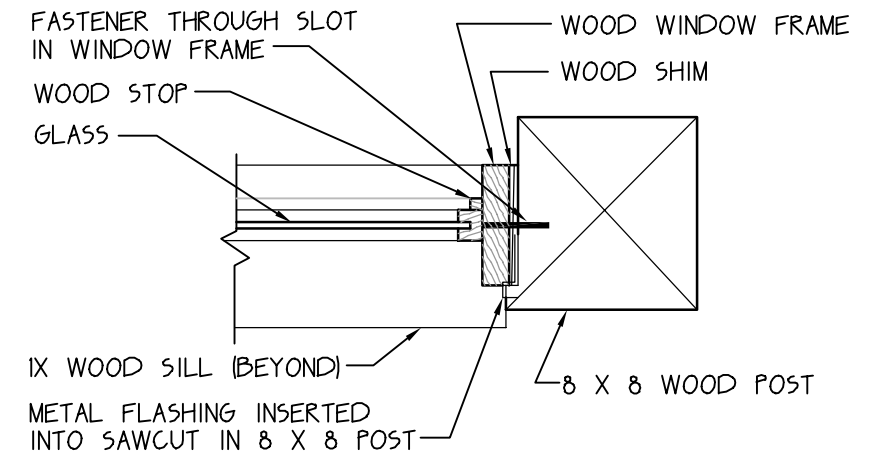
1 Window Sill Detail

Scale: 1 1/2" = 1'-0"

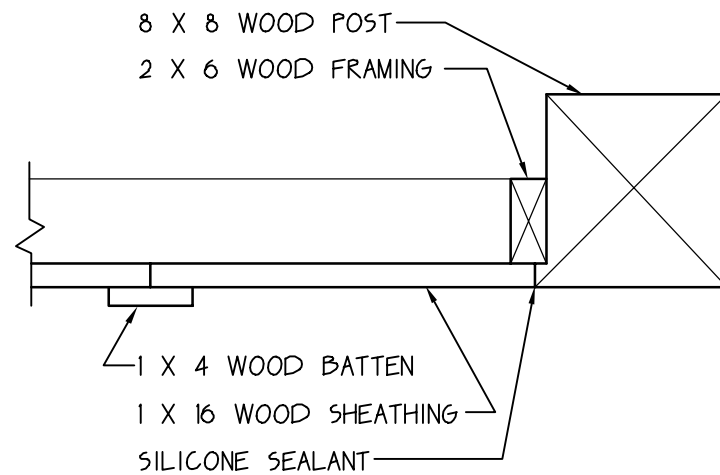
The cabins are made up of three elements: Structure, Roof and Infill. The sheathing and windows are considered as infill to give the structure primary hierarchy. In developing the details to enclose this cabin, this hierarchy has to be maintained. Layers are normally used to compensate for the movement that occurs when wood dries and shrinks. Since the joint between the infill and the structure is critical to maintain hierarchy, a combination of fixed connections and layers will be used. The board and batten sheathing is placed between the posts and beams and fastened to a 2 x 4 wood frame. This 2 x 4 wood frame provides the second layer to allow for movement. The operable window will be permanently attached to the structure on the top and side and will move with the structure. At the window and sheathing joint, the window will be attached with a loose connection allowing movement parallel to the sheathing. The connection between the fixed window and the structure will be permanent and the frame and glass will provide the two layers needed. With the help of an expansion material, the glass will be allowed to move within the frame.



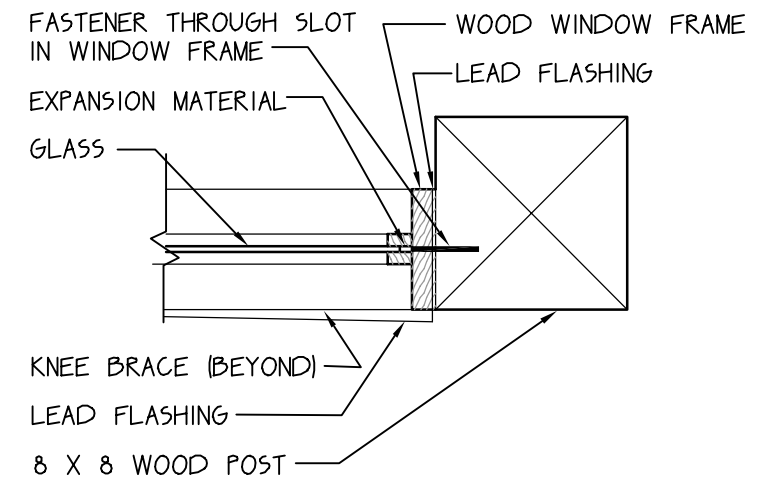
2 Window Jamb Detail
Scale: 1 1/2" = 1'-0"



3 Window Jamb Detail
Scale: 1 1/2" = 1'-0"

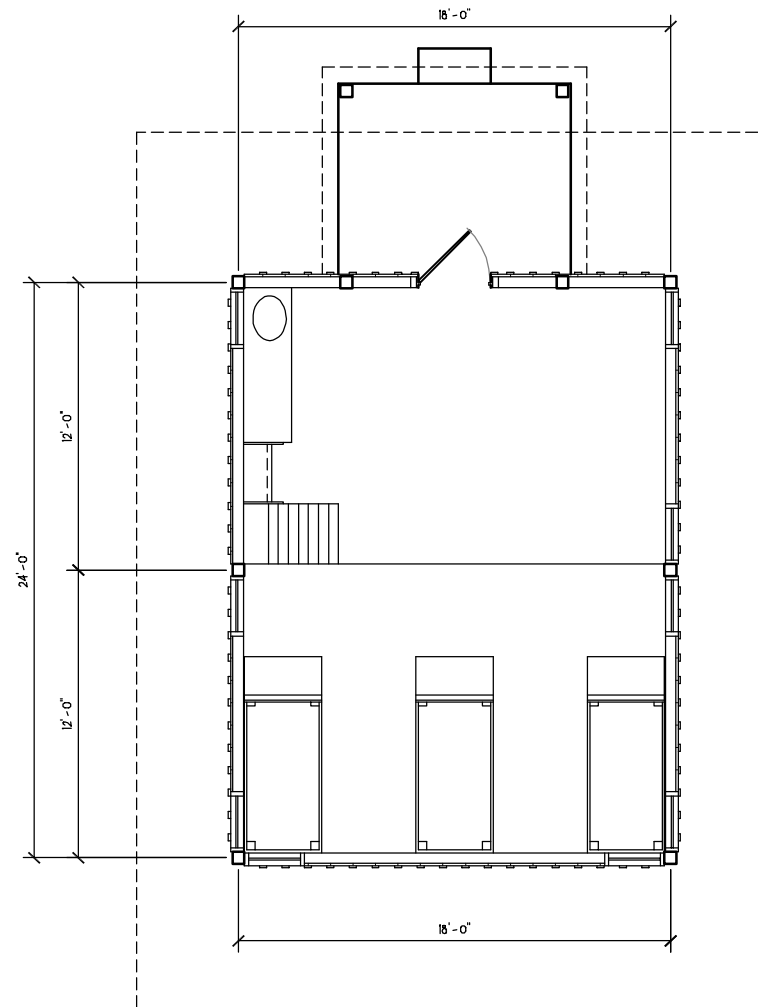


4 Sheathing / Structure Detail
Scale: 1 1/2" = 1'-0"



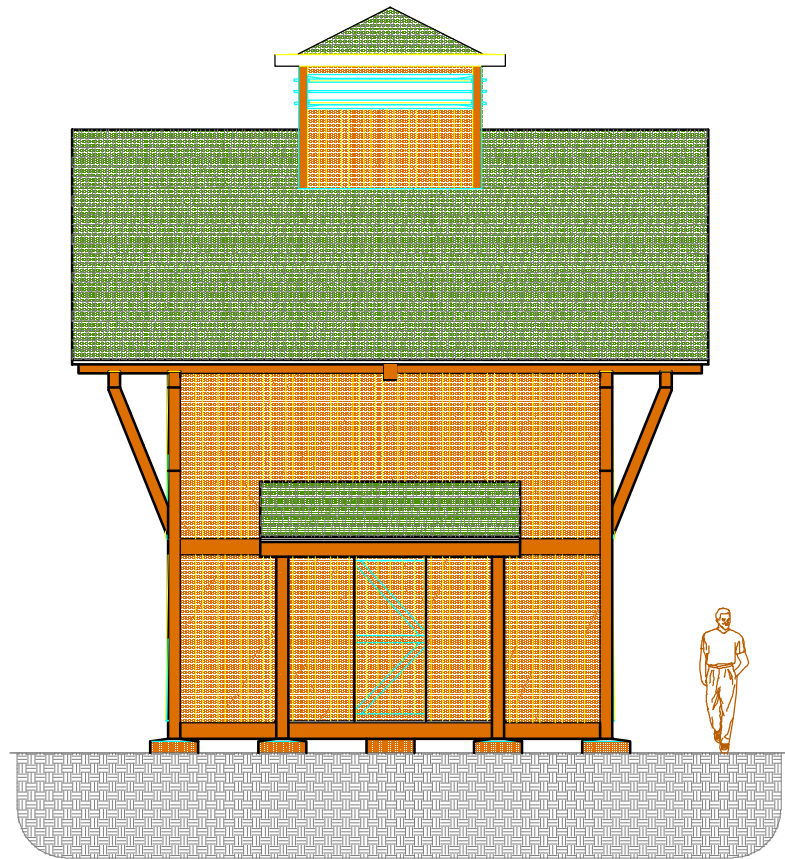
5 Window Jamb Detail
Scale: 1 1/2" = 1'-0"

The small cabins will function as living quarters for families. Entry is from a porch into the commons area at one end of the cabin. They will have 6 beds total with 3 beds on the loft and 3 below. The sleeping area is located at the other end of the cabin and will have a ship's ladder for access. They will have small windows similar to the large cabins at each bed that will allow for individual lighting and ventilation. Since these cabins will be living quarters for a family that could possibly have small children, some of them will have a counter area with a sink. These cabins are also more private and will not have the large windows, thus relying on the small windows for air inlets.



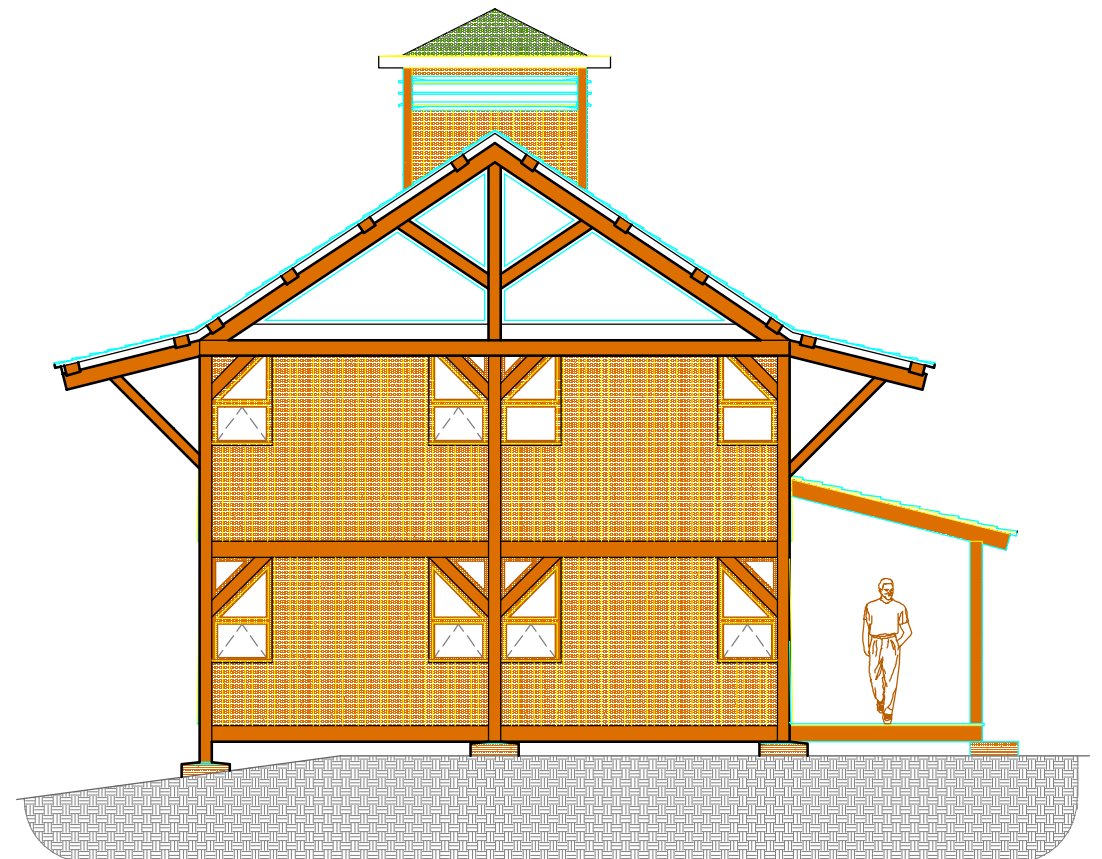
Floor Plan - Small Cabin

Scale: 1/8" = 1'-0"



South Elevation - Small Cabin
 Scale: 1/8" = 1'-0"

The elevations of the small cabins show the same use of materials as the large cabin elevations except for the fact that there is no protruding roof area for P.V. arrays since the large and medium cabins will provide enough area for this function.



West Elevation - Small Cabin
 Scale: 1/8" = 1'-0"

When designing a building that is going to have strong ties to nature a decision has to be made as to whether the building will sit alongside nature and enjoy the view or actually be in or become a part of nature. The best drawing point of a camp in West Virginia is the mountains and the back-to-nature atmosphere, so becoming part of nature was the design idea chosen. In becoming part of something you have to use it appropriately and not abuse it. Nature has provided us with plenty of solar energy to power just about anything as can be seen in the accompanying images. Photovoltaic panels for energy have been chosen so to avoid the need for power poles and wires that would abuse the landscape. The energy will be stored for night time use in batteries that will be housed in a small structure between the large and medium cabins.

This single family residence built in 1984 was constructed using the latest technology at that time in photovoltaics. The 45 degree roof faces south and is comprised of photovoltaic panels on either end with solar collectors in the middle.



Location	Brookline, Massachusetts, USA
Architect, Engineering	Solar Design Associates Inc., Harvard, 01451-0242 USA
Installed capacity	4300 Watt
Year of construction	1984



FIG. 8 Single family residence

This vacation cottage was built in 1992 using a photovoltaic panel roof system with enough storage capacity for 3 to 4 days. The cottage cannot be distinguished from the surrounding buildings.



Property owner	Tarmo Suntola Contact: Microchemistry Ltd, SF-02151 Espoo
Location	Laukaa, Finland
Architect	Solihki Suntola
Photovoltaic system	MAPS International, SF-01510 Vantaa
Installed capacity	1800 Watt
Year of construction	1992



FIG. 9 Vacation Cottage

This hotel was renovated using curved and straight photovoltaic panels on the roof to blend with the buildings architecture.



Property owner	Beat Scheu, CH-6354 Witznau
Location	Hotel Gnätsbalm, CH-6354 Witznau
Architect	Beat Scheu, CH-6354 Witznau Alois Bachmann, CH-6282 Urswil
Engineering	Adams Energie AG, CH-3005 Bern
Photovoltaic system	Solution AG, CH-4642 Harkningen
Installed capacity	8400 Watt
Year of construction	1993



FIG. 10 Renovated Hotel

Photovoltaic array size calculations

Fluourescent lights	12
2 way lights	16+
Total lights	28
watts	32x
watts	896
watts/ballast	1.06x
watts	945
miscellaneous watts	455+
watts	1,400
hours daily usage	3x
watt hours	4,200

4200/10 hours = 420 watts
21" x 48" panel size = 75 watts
420 watts/75 watts per cell = 5.6 cells

width of cell	21"
length of cell	48"x
Cell s.f.	7
number of cells	5.6x
s.f. of P.V. cells/cabin	39.2
Miscellaneous s.f.	10.8+
total s.f. of P.V. cells/cabin	50
number of cabins	5x
total s.f. of P.V. cells/cabin cluster	250

When designing a solar energy system, the first two things that need to be considered are electrical load and climate. The cabins will only need electricity for lights and one electrical outlet. The campers will only be occupying the cabins for about three hours in the evening before they go to bed. The P.V. arrays are located on the south side of an eight to twelve pitched roof that will orient them toward the sun. A total of four thousand two hundred watt hours will be required for the cabins. The bath houses will require P.V. arrays with solar thermal collectors for hot water. The water consumption is based on two hundred and fifty people showering at ten minutes apiece using a low flow showerhead. Seven hundred square feet of cells will be required for both bath houses and eighty cubic feet of water storage will be needed.

Hot water Photovoltaic size calculations

minutes/shower	10	hot water temp. deg.	110
number of people	250x	well water temp. deg.	55-
minutes of shower	2,500	water temp. rise deg.	55
gallons/minute	1.5x	annual collector production	200
gallons/day	4,000		
miscellaneous gallons/day	1,000+		
total gallons/day	5,000		
days/year	28x	S. F. cells from chart	700
total gallons/year	140,000	C. F. storage tank from chart	80

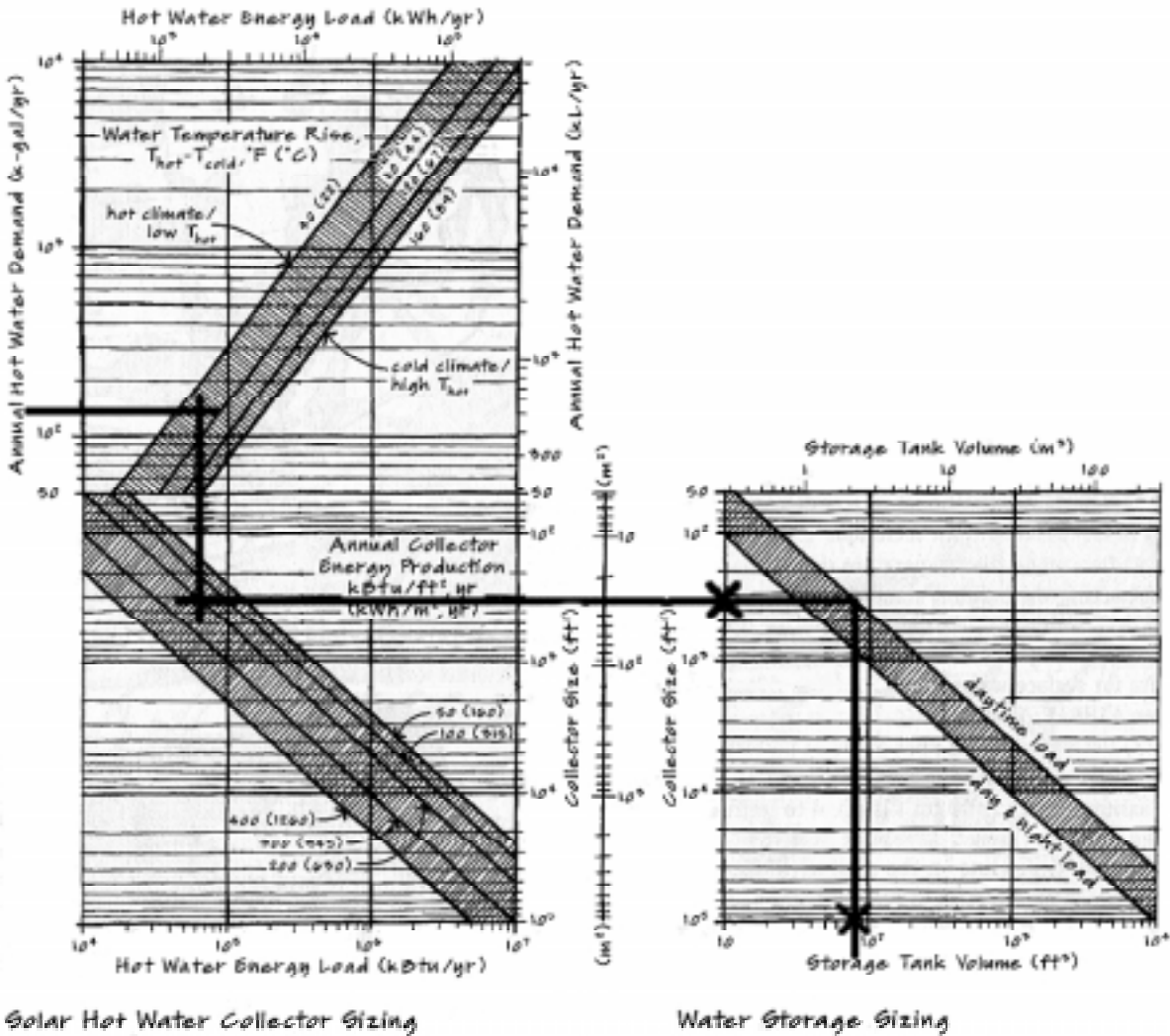
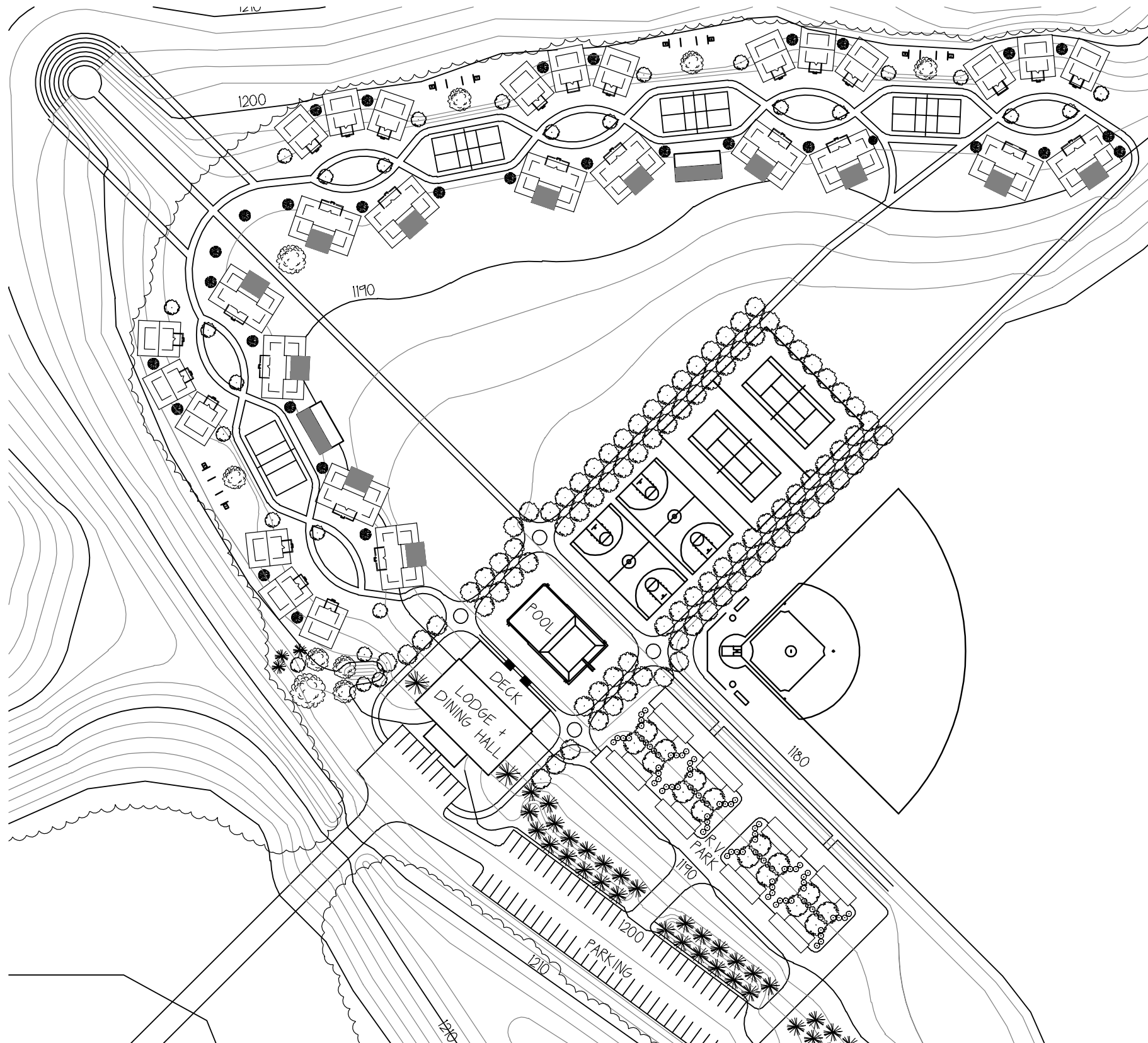


FIG. 11 Solar hot water sizing



Site Plan - P. V. Array Locations

The P.V. array locations are denoted on this map as gray shaded areas in the center of each large cabin. These will also generate enough power for the small cabins. The bath houses also have P.V. arrays on the roof that will provide power and solar thermal collectors for hot water.

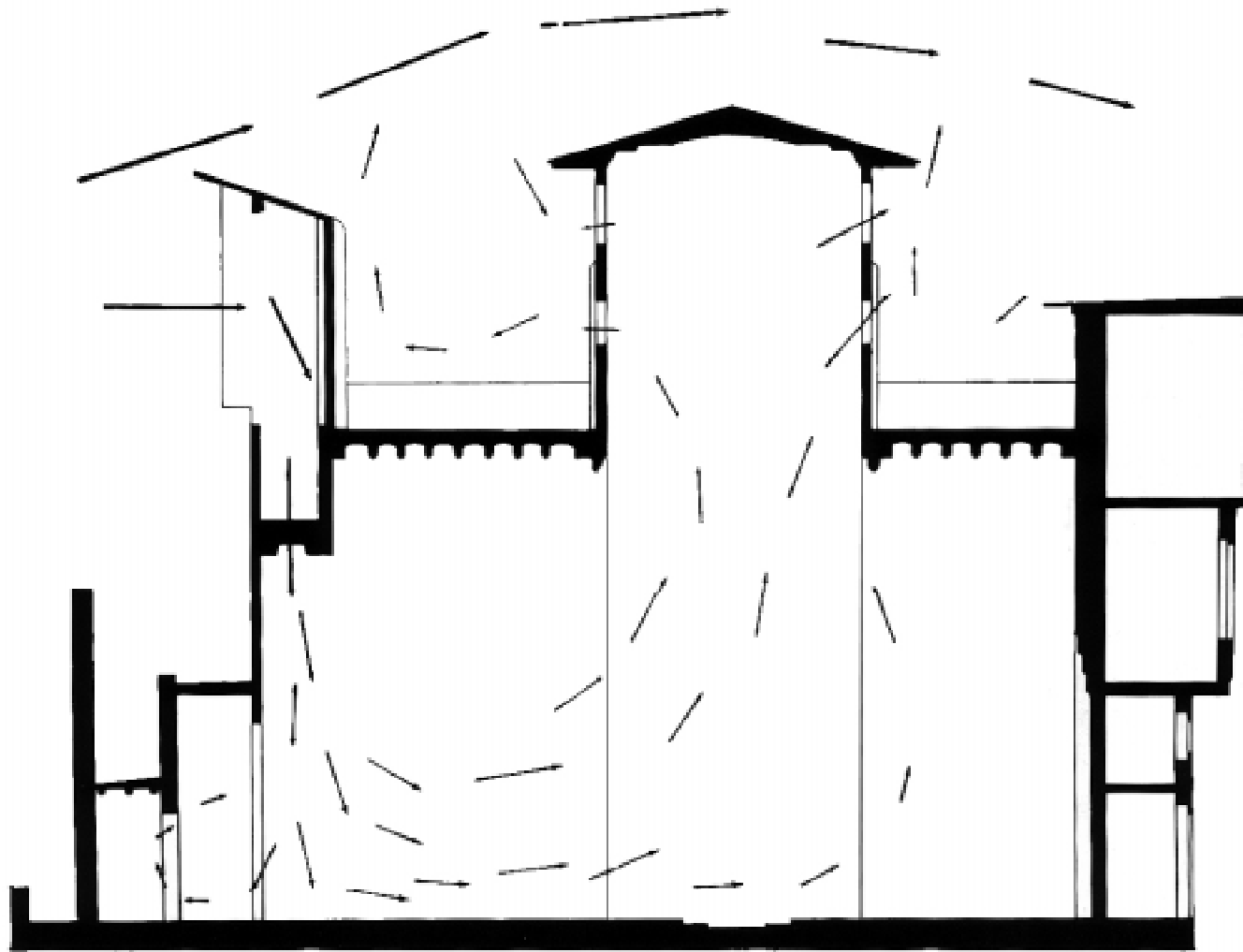


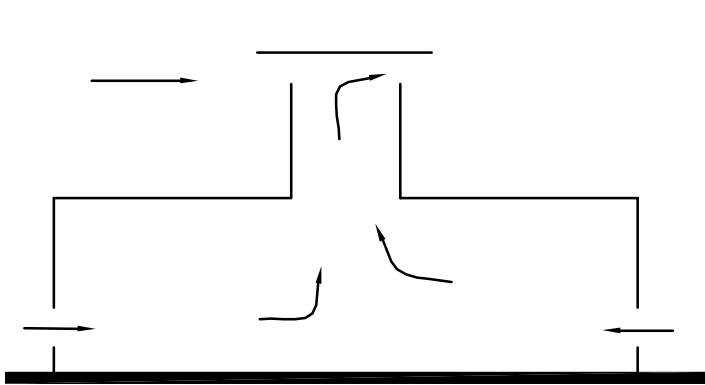
FIG. 12 House of Muhibb Al-Din Muwaggi, showing air movements through the building



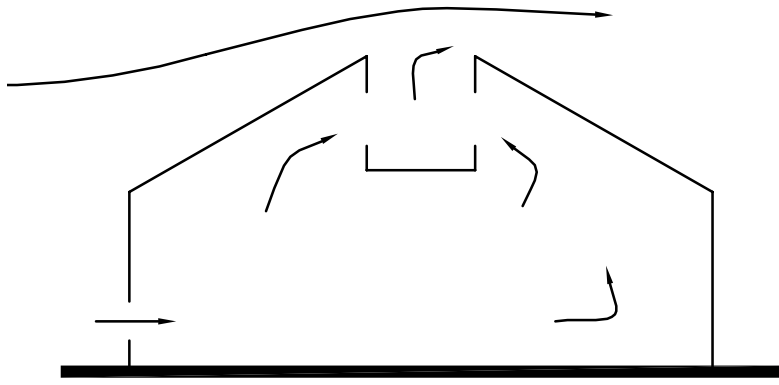
FIG. 13 House of Muhibb Al-Din Muwaggi, Cairo, c. 1350, windcatch and qa'a tower

When studying Al-Din Muwaggi built by Muallim Mustafa Aladin around 1350 A.D. in Cairo, most of the tools for natural ventilation can be discovered. As seen in the photos above a north facing malkaf or windcatch was used to capture and direct the air down into the interior space. Once the air was directed into the interior by the different sized openings of the malkaf, it was cooled by a water fountain and then drawn off by a natural convection process through a high tower. The cupola at the top of the tower was built of light wood construction which allowed it to heat up quicker so that, along with the water fountain cooled air below, a natural stack affect created a low pressure area around the top of the tower and helped to pull the air through the building.

The summer climate in northern West Virginia can be very hot and humid especially in the days of July and August. On these days the temperature will be in the high 90's and humidity around 100%. After working hard all day in the sweltering heat, workers do not want to come back to their place of rest and retreat, take a shower and start the perspiring process all over again. A worker should be able to come back to camp and enjoy all of the comforts that nature has to offer. With these cabins only being used for 5 weeks out of the year, a HVAC system is not feasible so therefore a good natural ventilation scheme is required.



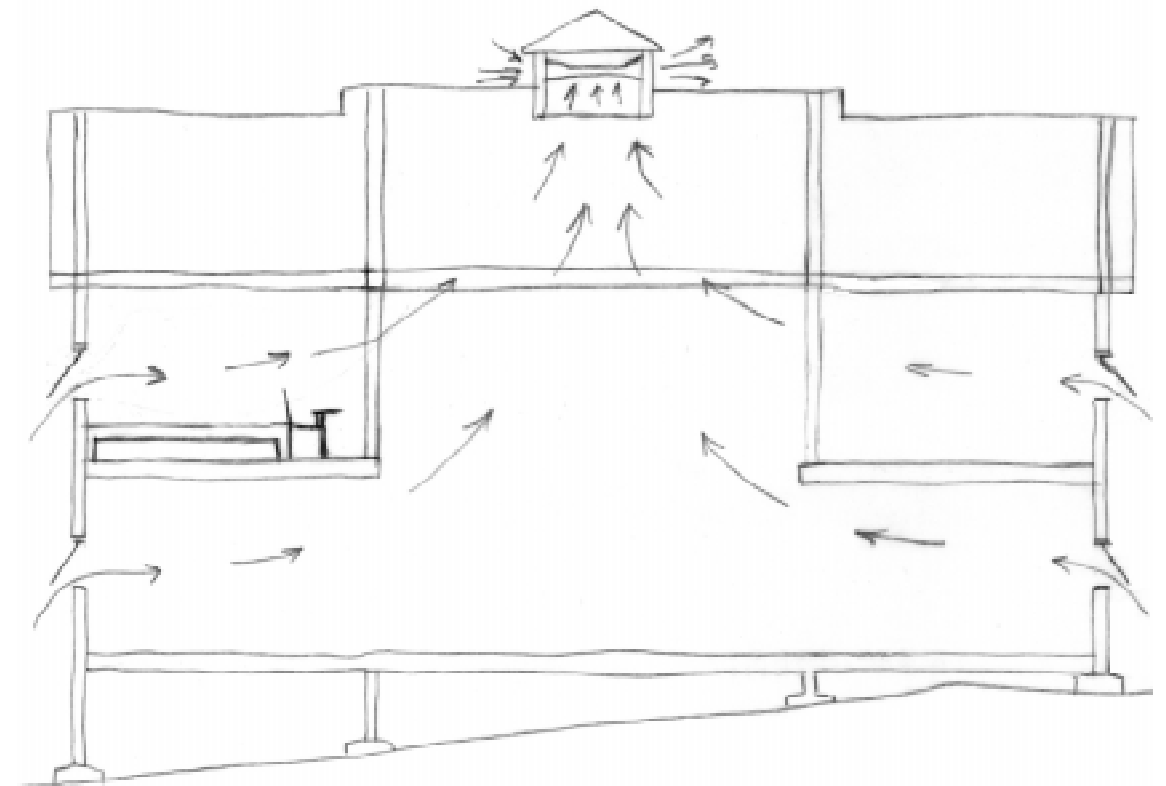
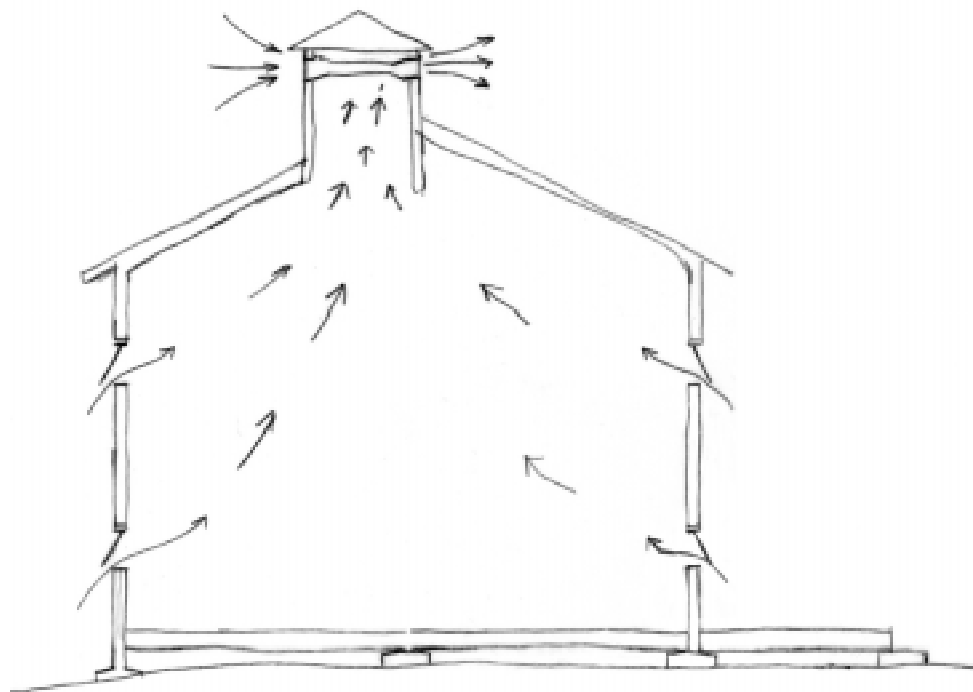
Wind Tower Schematic



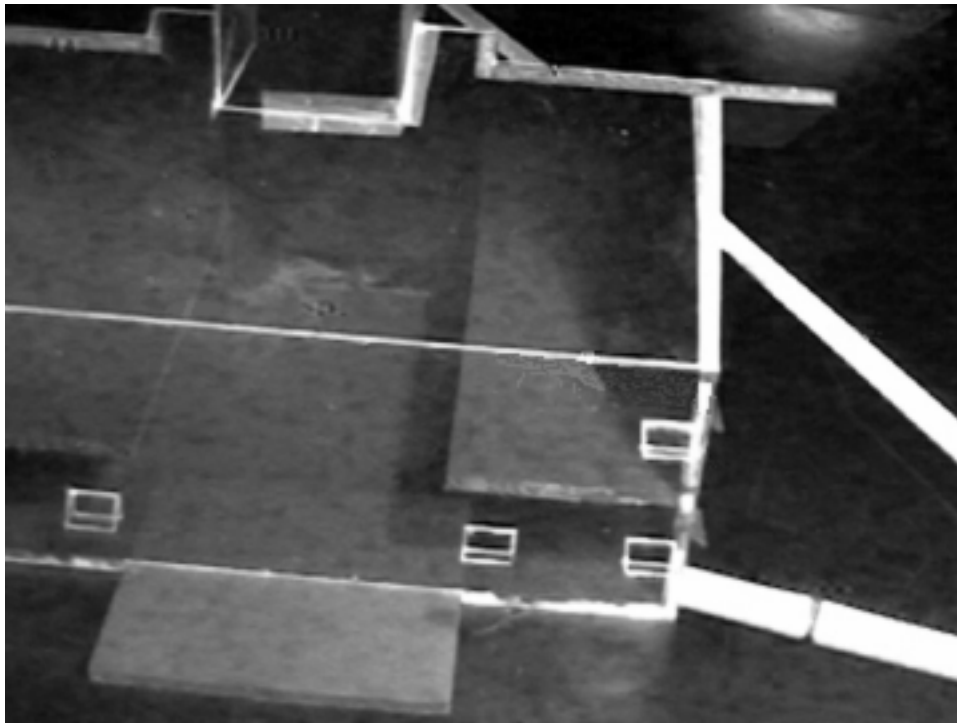
Reverse Wind Tower Schematic

Natural ventilation inlet and outlet calculations

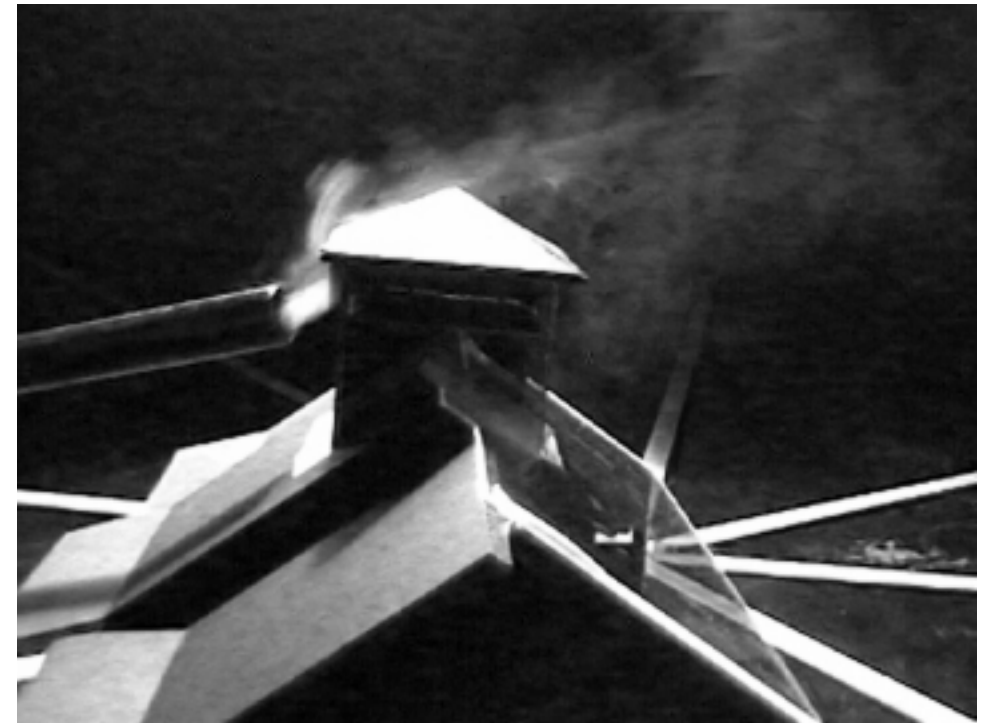
inlet to outlet ratio	1 to 1
percentage of floor area for openings	5
total square feet of building	1080
percentage of floor area for inlet	.05 x
inlet opening square feet	54
total square feet of building	1080
percentage of floor area for outlet	.05 x
outlet opening square feet	54
width of window 1	2'-2"
height of window 1	2'-0" x
window s.f.	2.1667
awning window allowance	.50 x
total s.f. of window inlet	1.08
number of windows	28 x
total s.f. of window 1 inlets	30.24
width of window 2	5'-0"
height of window 2	3'-5" x
window s.f.	17.05
awning window allowance	.50 x
total s.f. of window inlet	8.53
number of windows	2 x
total s.f. of window 2 inlets	17.05
total s.f. of window 1 inlets	30.24
total s.f. of window 2 inlets	17.05+
total s.f. of window inlets	47.29
width 1 side of cupola opening	9'
height 1 side of cupola opening	2'x
s.f. of opening	18
numbers of sides of cupola	4x
total s.f. of cupola outlet	72



As seen in these early sketches the original ventilation design was to have many small windows, one for each bed, so that they could control the amount of air in their area. The original thought was that air would come in thru the small windows but after testing the theory in the wind tunnel the opposite occurred. Air entered thru the large windows on the south face and exited thru the small windows and the cupola. These small windows still allow individual climate control but also help to circulate the air throughout the building. A wind tower and natural stack effect pull the air up and out of the space. With the towers, natural ventilation occurs with little or no wind.



Air drawn in through large south facing windows

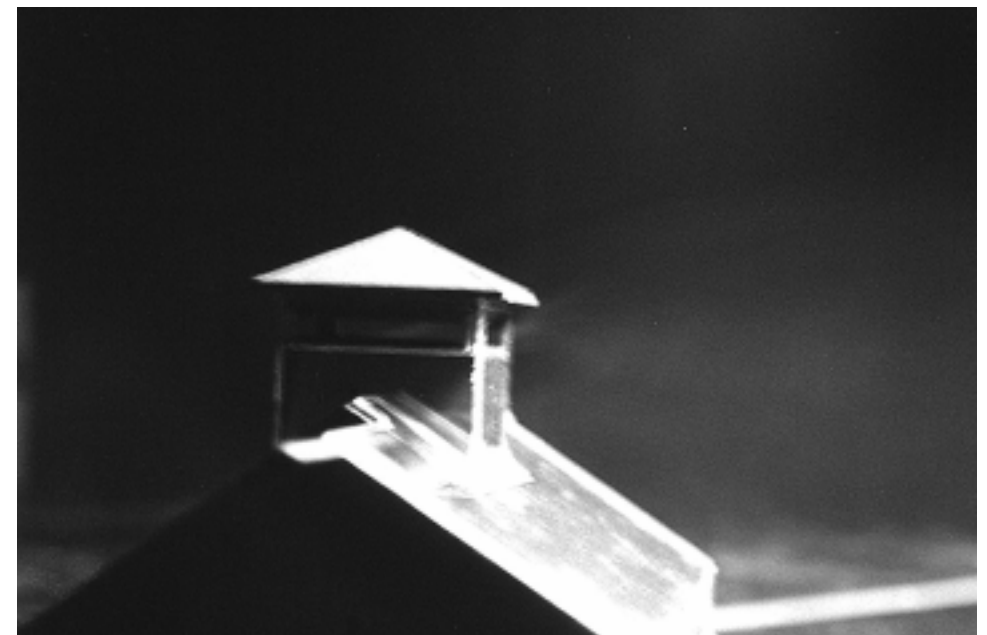


Negative pressure area created by wind tower

These images were captured from video that can be viewed in electronic thesis on the Virginia Tech server



Spreads out through entire cabin



Helps to pull air out of cabin



Air is drawn out through small windows on leeward side

These images were captured from video that can be viewed in electronic thesis on the Virginia Tech server



Air is drawn out through small windows and cupola

Conclusion

"Architecture is Life Life is Architecture?" In the preceding pages I have attempted to bind these statements together to make one. Where this is accomplished, there you will find architecture. The goal has been to create life so that life can create itself. By using a growing scale to measure communities, I have come up with scales of community that can be used to plan a community anywhere. Enhancing the experience of the thresholds between the different scales of community helps to define the smaller scales that make up the whole. The built environment of these communities needs to have a harmony with their surroundings. These surroundings or core characteristics need to be present in the smallest scale of community in order for them to grow in the larger communities.

In developing a growing community of permanence and longevity that uses its surroundings appropriately, I have essentially added to the built environment an object that promotes that spirit in all walks of life.

One unique thing about this project is the "realness" and closeness I have to it. Project Impact really exists and this work goes on every summer. As I finish my thesis, an organization called Dayspring Camp and Conference Center has been established, of which I am a member of the Board of Directors. We have recently closed on 256 acres of land and are in the fundraising and planning process for building a camp. The unique quality is the fact that I was able to talk to the different people involved and develop a program and limits for my thesis. As I began to use this project as a tool for investigating my architectural ideas, I had to establish limits as to where the "realness" would stop and my theory proceed. Now that I am coming to completion of my thesis and begin to use the knowledge gained, the life-long questions appear...

How do I get my architecture built?

How does my architecture remain cost effective?

Is my architecture right for this project?

How do I show the client that my architecture is the realization of their dreams?



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I mages

Unless noted otherwise, photos and work are by the author

- Fig. 1 French grooved post and fill construction method: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 15
- Fig 2 Cottage on Red River Road near Winnepeg: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 19
- Fig 3 Manitoba, McDermot's store, near Fort Garry: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 15
- Fig 4 Old Anglican church at Fort Simpson: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 22
- Fig 5 Plank Construction: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 177
- Fig 6 Plank Construction: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 169
- Fig 7 Typical Quebec grooved post construction: John I. Rempel, "Building with Wood and Other Aspects of Ninetenth Century Building in Central Canada", p. 140
- Fig 8 Single family residence: Othmar Humm and Peter Toggweiler, "Photovoltaics in Architecture", p. 58
- Fig 9 Vacation cottage: Othmar Humm and Peter Toggweiler, "Photovoltaics in Architecture", p. 70
- Fig 10 Renovated Hotel: Othmar Humm and Peter Toggweiler, "Photovoltaics in Architecture", p. 88
- Fig 11 Solar hot water sizing: G.Z. Brown and Mark Dekay, "Sun, Wind & Light Architectural Design Strategies Second Edition", p. 236
- Fig 12 House of Muhibb Al-Din Muwaggi, showing air movements through the building: James Steele, "Hassan Fathy", p. 37
- Fig 13 House of Muhibb Al-Din Muwaggi, Cairo, c. 1350, windcatch and qa'a tower: James Steele, "Hassan Fathy", p. 36

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I would like to thank my mother and father for teaching me the difference between right and wrong. Throughout my life whether I was doing the right thing or the wrong thing I always did and always will know the difference. And that will continue to guide my decisions...

I would also like to thank my extended family and friends who have been with me throughout my life. For it is these people whom I have chosen to be my community whether it be for a short period of time or as lifetime community.

I would also like to thank my committee members for their guidance and understanding of my architecture and helping me to realize it to its extent.

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