Log Cabin Playhouse

by James A. Marusek

Disclaimer: This article documents the construction of our log cabin playhouse. Construction contains many inherent risks related to materials, site topography, and safety; to name a few. Safe construction practices must be followed to minimize these risks and dangers. Use of the information in this paper is AT YOUR OWN RISK. It is meant as a public service and represents the author's personal knowledge and approach, not to replace your own experience, common sense or instinct.

I. INTRODUCTION

This year my wife wanted me to build a playhouse for our four grandchildren. Initially I wasn't too keen on the idea. One reason was that I am quickly approaching 70 years of age and didn't want to kill myself with another home building project. But then I thought this might be a good learning experience for the grandkids. Even though they are fairly young (ages 11, 9, 5, and 3), *one is never too young to learn*.

So I decided to go forward with the project predicated on two conditions. The first condition was that the grandkids take part in the construction. Half the difficulty of building something is the fear that you could never do it by yourself. So getting the grandchildren to build something will give them confidence in later life to try new things. The second condition was that the playhouse design be based on log cabin construction. I had never built a log cabin building before, so it would be a new experience for me also. *You're never too old to learn, either*.

We settled on an 8x8 foot log cabin structure with a 4x8 covered porch in the front. The dimensions of the structure were primarily dictated by the length of the 8-foot landscaping timbers used in the construction. The height of the structure (8-foot) was primarily dictated by standardization in pre-hung doors. We could have made the playhouse shorter but that would have significantly added to its cost. A standard steel pre-hung door (with a 32" x 80" doorframe) costs $174. Whereas a 6-foot special order custom door would cost an exorbitant price of $600.

Completed Log Cabin

This was constructed from scratch without the benefit of detailed plans. I quickly realized that the construction would consist of 3 individual elements: the foundation/floor, the outside timber walls, and the attic/roof.

II. CONSTRUCTION

A. General

There are three distinct parts to this construction: foundation, log cabin walls and roof. When I began the project, I could visualize the foundation element and the log cabin element, but the roof element was not clear. I decided to go forward and figure out the last element when the time came.

As a general rule, the cost of the finishing products is higher than the cost of the basic building materials, such as lumber. So as a general rule, I never skimp on basic building materials.

I used treated lumber throughout to ensure its water/insect resistance throughout the structure. This included the framing boards, landscaping timbers and plywood.

I used headlock screws (4 ½ inches, 6 inches) for joints that needed extra support. This was generally at transitions such as setting the first run of landscaping timbers to the plywood floor. I used these to attach the doorframe and window frames at the base. I also used them to strengthen the joints above the windows where I used 2x4's and 1x4's.

I predrilled holes prior to attaching headlock screws and the nails. I used a drill bit that was slightly smaller than the nails or screws. This allowed the nails to be driven in without bending. This was especially important because the grandkids would often miss the strike when pounding in a nail. This approach also minimized the wood from splitting.

Generally I hand picked the lumber and timber when I purchased it. As a result, the wood was fairly straight and not warped or twisted.

When I brought the wood home I moved it to a flat staging area. I took some used landscaping timbers and set them down as runners and stacked the lumber on top. This raised the wood off the ground. I then covered the wood with a tarp until I used it. It is important to minimize exposure of the wood to the elements because this can cause warping.

B. Foundation

The initial step was to pick out a location for the playhouse. We choose a nice spot and then cut down trees that might fall on the new structure. Then we measured and marked off the building site with stakes.

For the foundation or base of the structure, I decided to use a plastic bucket technique. We dug holes in the ground and buried 5-gallon (or larger) plastic bucket so that the top of the bucket was flush with the earth. Wooden 4x4 post beams were then placed in a plastic bucket and then when all the beams were properly aligned, the buckets were then filled with concrete.

I used this type of construction when I built my wooden decking. We installed the wooden decking 26 years ago and it is still very strong and stable. This foundation structure conforms to uneven ground and is fairly simple to make level.

Six 4x4 posts were used to set the base of the structure. I had several used plastic buckets available. Many were 5 gallon buckets but I also had some 6-gallon and 7-gallon used bucket. I used the largest ones in the construction. The main posts need to be slightly inside the 8' x 12' structure. The entire

structure was raised a minimum of one foot off the ground. The only elements touching the earth in this design was the plastic buckets. This approach minimized wood degradation.

The best way I found to cut the 4x4 wood posts and the landscaping timbers was to cut them using a worm-drive circular saw (Skilsaw Model HD77) with the carbide tip blade fully extended. This would cut the timbers around 95% through. Then I used a small very sharp handsaw (19 inch Sandvik Model 2600XT) to finish the cut. This gave the posts and the timbers a fairly smooth end and the cut was done fairly quickly. I highly recommend using a worm-drive circular saw because it provides a very stable smooth cut. The saw is about twice as heavy as a normal circular saw but the added precision is well worth it.

> Several years ago, I found this Skilsaw on the clearance table at Sears. I purchased the saw and took it home. When I tried to use the saw for the first time, all it did was smoke the wood. It came with no instruction manual because it was a returned item. Eventually I pulled a manual from on-line. I then discovered that the blade had been installed backwards. Also there was a saw-blade bushing insert that was installed that caused the blade to wobble. No wonder it wouldn't cut. I corrected the problem and the saw has been simple wonderful ever since.

After burying the plastic buckets, I cut the 6 posts used to support the entire structure. To begin with I chose the corner with the highest elevation. I wanted the entire structure raised one foot off the ground in order to minimize degradation from moisture contact and insects. I measured the depth of the plastic

bucket and added to this the width of the [8 foot long 2x10] main support beams, the width of the header floor joists [12 foot long 2x6], and then added one foot. Then I cut the first post.

Since I used different size plastic buckets buried with different depths and since the site had a significant slope, it was important to measure and cut each of the posts individually. So I took a fairly straight eight-foot 2x4 and screwed it to the top of the first post. I put the tap measure to the bottom of the second bucket, held the board level (by using a standard level) and then measured the distance to the top of the post at the second bucket. I cut the second post. I used a wood clamp to secure the 2x4 to the second post. Then I moved onto the third outside bucket. This time I used a 12-foot long header floor joist and temporarily screwed it to the top of the top of the second post. I measured from the bottom of the third bucket to the top of the leveled board and cut my third posts. I repeated the process to determine the height of the fourth outside post. In the end, I had all four outer posts cut and placed into position with 2x4s or 2x6s, either loosely screwed or clamps together. I rechecked the levelness of the top boards. I also checked the width of the four sides and adjusted as required. The next step was to cut the remaining two center posts.

With all six posts held in position loosely, we mixed up the ready mix concrete in a wheelbarrow and filled each bucket with concrete. Before the concrete hardened, we used a standard level to verify each post was vertically level, and adjusted each post as required using a rubber hammer. After the concrete hardened, we removed all the clamps and screws and removed the lumber leaving only the standing posts.

We then placed a row of solid concrete CMU blocks (4x8x16) completely around the foundation and filled the area with loose gravel. [The structure is above ground and impossible to cut with a lawnmower, therefore it is important to eliminate as much as possible weeds from under the playhouse. Covering the area with a thick layer of heavy gravel helped to meet this goal.]

After the concrete set, we mounted the posts to the beams. There are 3 rows of beams, 2 outer rows and one inner row. I began with one of the outer rows. It is important for the top of the posts to not extend above the floor joists. Otherwise I would have to recut the vertical posts and that would be difficult at this stage, since they are set in concrete. I used a short piece of 2x6 to represent the height of the floor joists. I then temporarily mounted two main support beams (8 foot long 2x10 lumber) one on each side of the pair of posts. I used the dummy joist to make sure it extended above the height of the posts. I leveled the main beams and then secured them temporarily using wood screws and clamps. I repeated this process for the other two pairs of posts. Then I took real (12 foot long 2x6) joist and placed them on top the beam and checked their levelness. Since every connection was temporary at this point, it was possible to make some minor adjustments to make the structure completely and perfectly level in three-dimensional space. When I was satisfied, I made these connections permanent. I drilled a hole from one beam through the post to the next beam and installed an 8” long hex head bolt with washers on each side between the pair of beams. I then drove in two 6-inch long headlock screws on each side for added strength. I repeated this process for all 6 posts. Refer to Figures 1 & 2.

The 12-foot long 2x6 boards used at the joists are slightly longer than 12 feet. This is not a problem. But all the 9 boards used as joists must be exactly the same length. So I measured each one individually and cut the ends to match the shortest of the 9 boards, so they were all the same length.

Attaching Beams and Floor Joist to Post

The next step was to mount the joist to the beams. We mounted the two outer joists directly to the vertical posts using one 4½ inch long headlock bolts at each set of three posts. I split the overhang on the two outer joists equally. There were approximately 4 inches of overhang on the front and another 4 inches of overhang on the back. I spaced the inner joist, one-foot apart and used two USP structural connectors (rafter ties) to make the connections between the horizontal joist and the horizontal beam. We installed the rafter ties only on the backside of the back beam and on the front side of the front beam. All the other connections in the interior were free standing.

Attaching Joist to Beam

It was important to have all the joists installed with the same setback. So I used a straight 8-foot 2x4 to align the placement of each joists. After all the joists were in place and secured with screws and structural components, we installed a 2x6 face board to the back and then one to the front with screws. Therefore the top of the deck was completely boxed in giving it a finished look.

Then we installed the 8-foot long composite deck planks to make up the porch floor. Since construction took several weeks I wanted to protect the plywood from exposure to the elements until the playhouse roof was constructed. We applied a coat of Thompson WaterSeal to the plywood floor.

After the framework was constructed, we mounted two 4x8 foot sheets of ¾ inch thick treated plywood to the framework to make the floor of the log cabin. Refer to Figure 3. After we installed the plywood floor but before we screwed down the composite deck planks, we marked on the edge of the plywood the location of each rafter board beneath. We marked both edges of the rafter location. We also marked the plywood on the back end of the playhouse. As a result, when we screwed down the first set of landscaping timbers, we knew exactly where to drive the first set of screws.

The last step was to construct the stairs to the porch. We took one of the 6-step pine deck stair stinger and placed it up against the side of the outer joist. This gave us the location for the stair footing. We dug this area out and placed two solid concrete CMU blocks as stair foundation blocks. We cut up the two 8-foot long 2 x 12 treated boards of lumber into the 6 stair steps, each being 32 inches long. The top of the runners was screwed onto the floor joist and the bottom rested freely on the CMU blocks. We used the cut stair steps to

determine the location for installing the second stair stringer. The steps were screwed into the runners. It was important for the stairs steps to be level and not touch the earth. Once the steps were in place, we dug out a small drainage trench from the buried stair base and filled it with some gravel. This drainage step was to keep the base of the stair stringers as dry as possible to prevent wood rot.

We also dug out some natural drainage trenches around the playhouse so that during a heavy rain the water coming down the hill would be diverted away from the playhouse and the foundation.

C. Log Walls

Placing the first layer of landscaping timbers down was critical because all the rest of the timbers were built upon these. The first layer needed to be slightly recessed because the ends at each timber need to overhang. This approach gave the structure added support.

So we began by installing a full landscaping timber in the back of the log cabin using strong headlock screws. Since we had already marked the location of the rafter beams on the plywood, we knew exactly where to drill and drive these 6-inch long screws. The first layer of landscaping timbers was secured to the joists to make the foundation/wall juncture very strong. Next, we measured and cut two pieces of landscaping timbers for the base of the front wall (minus the doorway) and then installed these into place. We then measured and cut two landscaping timbers for the sides and screwed these down using shorter 4 ½ inch headlock screws. These screws were driven only into the plywood adjacent to the rafters and not into the rafters themselves. This was done to obtain the proper setback on the landscaping timbers. This completed the base layer.

We began by creating an outer doorframe out of 2x6 lumber that would surround the prehung doorframe. Once constructed, we took the entrance door with the prehung doorframe and verified it would easily slide into this outer doorframe. We then took some scrape lumber and mounted it temporarily horizontally on the middle of constructed doorframe to prevent this frame from warping during installation. We moved the outer doorframe to the foundation and installed it vertically to the plywood floor using headlock screws. We installed this outer doorframe to align to the outside edge of the plywood sheet. We also took some scrap lumber and braced the doorframe so it was level vertically (front to back and side to side). Refer to Figure 4.

At the same time, we fabricated three window frames out of 2x4 lumber and verified the plastic prehung window frames would easily slide in and out of the wooden frames. The log playhouse has 3 windows – one in the front next to the door and one on each of two sides.

In the next layer up, we used full landscaping timbers for each side and shorter timbers for the front and back. This was an alternating pattern with each layer. To join each layer we used a combination of heavy nails and 3 ½ inch long deck screws. It is important for the log walls to be level vertically. These logs were heavy and we did not want the playhouse to lean in one direction or the other. We used a level to verify the vertical orientation of the timbers before we nailed them down.

In general, we anchored the window and doorframe to every third timber by driving in deck screws. This was needed for support and wall integrity. In this photograph headlock screws were used to join the window frame to the landscaping timbers at the base and star drive deck screws were used along the sides.

It was very important to use a heavy steel nail. We used a 5” #40 Common nails. This was a very strong nail. We would predrill a nail-hole before we set the nail and drove it into the landscaping timbers. We used a long drill bit, which was slightly smaller in diameter than the nail. This made it easier to drive the nail into the wood without bending the nail and also prevented the landscaping timbers from splitting.

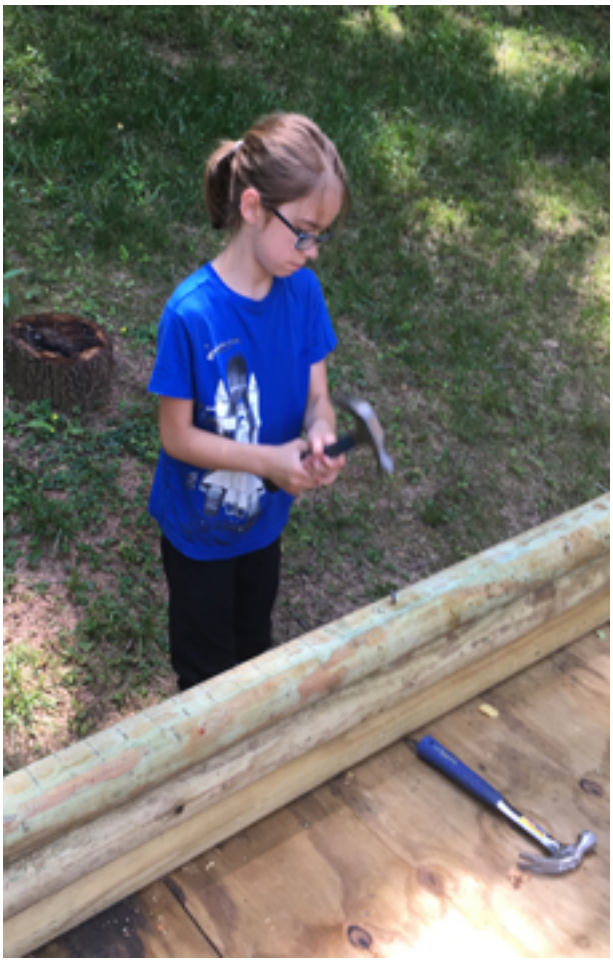
Nails used in the Construction

We kept all the scrap pieces of landscaping timber. We was able to use many of these on the front side because they nearly matched the gaps between the doorway, the window and the ends. So there was very little waste.

We checked the levelness of the walls as we installed each layer of timbers. At 41 inches above the plywood floor, we installed the three window frames onto the layer of landscaping timbers (one on the front and one each on the sides). Every three layer of timbers, we would set a screw from the doorframe and window frames horizontally into the landscaping timbers to strengthen the entire structure. When we did this we would always check the frame for levelness.

[I had to exercise a lot of patience during construction because I wanted the grandkids to learn the building process. It would take them 30 strikes with the hammer to get one nail in, whereas; an adult could easily set the nail in 3 strikes. But one

of the primary goals of this project was a learning experience for the young ones.]



In charge of refreshments

As we constructed the outer walls and built our way up to the top of the window frames, we noticed that there was an alignment problem. This was due to the difference in thickness of the landscaping timbers and also due to the timbers twisting as the wood dried out. We used 2x4's, 1x4's and 3/8-inch plywood to level all four sides just above the top of the 3 window frames.

We used scaffolding inside the playhouse once we started to work above 6 feet.

Leveling above window frame

Once we reached an 8-foot height on the log walls, we screwed down 2x6 top plates on all four sides of the log wall. This top plate became the base of the attic. We used long headlock screws to firmly anchor this top plate to the landscaping timbers beneath.

D. Attic/Roof

The attic of the playhouse is a very important feature. It is like a hidden space. We constructed the roof with a steep angle for a couple reasons. First it would prevent the metal roof from caving in should we have a deep, deep snowfall. Second, it would provide extra space to the playhouse. The roof was designed so that the kids could stand up in the middle of the structure and not bang their heads against the roof.

I could conceptualize the foundation and the log walls fairly easily but the construction of the roof was rather baffling. After I got my head wrapped around it, I set a design and worked out each idiosyncrasy as I encountered them. So please forgive me if this section appears a little winded, but the devil is in the details.

[At this stage, my wife had a dream or more like a nightmare. She approached me the next morning; her face was ashen white, like she had just seen a ghost. She dreamed that I would fall off the roof and break my back, or my neck, or my legs, or some other necessary part. Granted I am getting a little older since I turned 69 and I don't bounce as good as I used to; but my balance was still fairly good. She wanted me to fully turn over the construction of the roof to someone much younger and more experienced. But then again I am a stubborn old man. So I made a trip to Menards and spoke to one of their floor salesman who was almost my same age. His advice was to use scaffolding, one on each side of the structure and brace these together.

Now as it turned out, I had bought four sets of scaffolding a few years ago when they were on sale and had it stored in my pole barn. This was a good excuse to finally use them. One of the problems that I had was the steep slope of the ground. The salesman said the scaffolding, which I had bought was designed for uneven ground. All I had to do was raise the platform and put in the pins at the proper holes. So I purchased some base plates for the bottom of the scaffolding. I mounted two sets of scaffolding (one atop the other) on one side, and two sets of scaffolding on the other side. I tightly braced the scaffolding to the playhouse using a ratchet strap and rope. When it was all done the scaffolding was very stable.

Scaffolding Base Plate

Leveling Scaffolding

As a compromise to my wife, I agreed to hire someone to install the metal roofing. After all I couldn't get my head completely around the metal roofing construction.]

Anchoring Scaffolding

The first step was to create the attic floor. We began by attaching 5 eight-foot long 2x6's to the top plate of the log wall. We evenly spaced these five pieces of lumber on the top plate. These became the attic floor joists. There was a little overhang lengthwise so we split the difference on each side. We used a variety of structural support elements to make this attachment. These 5 pieces of lumber were oriented in the same direction as the 9 twelve-foot long floor joists beneath that made up the support for the main floor. The two outer joists were spaced 91 inches apart in order to form a nailing edge for the plywood floor. We installed 2 eight-foot long 2x6's, one on each end to box in the structure. Refer to Figure 5.

Then we laid two sheets of ¾ inch thick plywood down as the attic floor. This was not a simple process. First we had to determine the amount of setback. This setback allowed the roof rafters to marriage smoothly to the attic floor joists. [We cut up some scrap pieces of lumber and plywood with the proper angles to determine the setback distance. The base of the roof rafters was cut to a 56-degree angle. We also had to take into account the thickness of the plywood and the end board.] Once we knew the setback distance, we marked this distance on each of the five attic floor joists at each end. Since the attic floor joists were 91 inches apart, we cut off 5 inches off one of the end of the first sheet of plywood [making 48" x 91"]. Then we were ready to install the first piece of plywood with star drive screws. This first sheet was laid to the setback distance marked on the joists. Then we measured the distance between the edge of the plywood and the setback on the other side (36 ½"). We then cut the second sheet of plywood lengthwise to this distance. We also had to account for a 22 ½" hatch opening. So the second sheet was 68 ½" by 36 ½". Now we installed the second sheet of plywood, which was cut to an exact fit.

They say that a picture is worth a thousand words. So the photograph on the right explains a lot. At the bottom, the top plate of the log wall is visible. Above it one attic floor joist and the 2x6 used to box the floor joists together. On top this is the plywood used as the attic floor with the proper setback distance. We used a flat nailing plate to attach the attic floor joist to the base of the 56º end of the roof rafter. And everything neatly lined up.

The next step was to cut and install the main attic posts and the roof ridge. We began by cutting the two outer 4x4 posts. We cut these to approximately 66½". We installed one at each end using u-clips. These 2 beams were setback 3 ½" from the edge of the plywood to accommodate the thickness of the roof rafters. These posts were installed at the exact centerline of the roof ridge. We then attached the roof ridge board to the two posts using 4 rafter ties [one on each side of each posts]. We verified the roof ridge board was level and centered properly. Then we tightened up the screws that held the metal structural connectors and the lumber. Then we measured and cut the center post and installed it the same way as the two outer posts. Refer to Figure 6.

Attic Post (bottom/top bracing)

Joining roof rafter to roof ridge

Installation of Roof Rafters

On each attic side, we cut and positioned one 2x4, which was placed half way between the two ridge boards. This centerboard was installed flush with the ridge boards. One of these boards (with a "V" cut on one side) can be seen in this photograph resting on the plywood of the attic floor. In general this gave each decking plank three-attachment points.

We used 5/4" x 6" premium decking lumber to construct the two attic sides. These were individually cut to fit and screwed into the ridge boards.

The attic sides

The plywood making up the attic floor went from the inside of the roof rafters. But this left a large gaping hole on each side of the floor. So we cut up strips of plywood to fit between each roof rafter. We also cut up scrap 2x6s to provide a center support for each of these strips. This brought the attic floor to the outside of the roof rafters.

Plywood Strips (topside)

Plywood strips (bracing on underside)

This photograph shows the hatch opening on the left. We reinforced the outside with 2x4's. That way when the grandkids were up in the attic, they would have a natural barrier to prevent them from falling down the stairs in the dark. We delayed completely cutting away the plywood hatch until we reached the point of installing the metal roof. This prevented us from accidentally falling in the hole while we were constructing the roof.

Metal roofs have improved greatly over the past couple decades. Many carry a 40-year warranty today. So after looking at the various options, we decided this was the way to go.

Wood Nailers (batten boards)

On the roof support beams, we installed 3 wood strips (1x4s) horizontally on each side of the roof. One of these wood nailers (batten boards) was installed 3 inches from the top (roof ridge) and one 3 inches from the bottom and one in the middle. Over these, a thin strip of insulation was stapled in place. The insulation sheet came in a roll and was called Vapor Barrier 1/8" white scrim/foil. This insulation has a shiny aluminum side and a white side. The shiny side was installed up facing the metal roofing. This insulation prevents moisture from collecting on the underside of the metal roofing due to condensation.

When applying the strips of metal roofing to the wood nailers, we used special screws. These were color coordinated with the color of the metal roofing (in our case Burnished Slate Frost). These were called Woodbinder screws. Each screw had a small plastic washer on the top. Generally the screws were drilled into the wood nailer on the flat surface (eave) next to the ridge. In our case we used two lengths of screws. Normally we used 1-1/2" screws but we had a few 2" screws to mount the metal ridge cap.

We used 6 sheets 36" x 8-foot sheets of G-Rib 29 gauge metal roofing (burnished slate frost) along with 4 metal corners (6") and one metal ridge cap (14") for the roof. Additionally we used 3 sheets of metal roofing for the roof of the porch.

Each metal roofing sheet is designed to fit over the next – ridge over ridge. Screws can interfere with this seam line. So any screws drilled into the edge of the metal sheet must be removed before the next sheet is overlaid. (It is common for one screw to be placed on the edge to help set the sheet in place.)

E. Finishing Touches

After the metal roof was installed, there were many large air gaps that needed to be plugged. We used leftover scrapes of lumber to plug these holes. These scrapes included plywood, 2x6 and 2x4 lumber and some 1" thick lumber. We cut these pieces to create a tight fit. When all the plugs were in place, We used foam insulation and silicone caulking to complete the sealing process.

Plugging Air Gaps

Sealing Roof Ridge

We used some PVC boards as trim boards to protect the thin strip of exposed floor plywood on the exterior of the playhouse. We found that we could join the boards using PVC cement and form an exceptionally strong bond. It was easy to fabricate "L" shape trim boards to protect the exposed plywood. We used caulked adhesive and some nails to bind the PVC boards to the exposed plywood. After it was attached, we used brown paint to cover the PVC boards.

White PVC boards on plywood lip

Next we stained the landscaping timbers and all exposed wood. We let the stain dry for a month before we began to chink the cracks between the landscaping timbers.

We applied chinking into the cracks between the logs using a large chalking gun, we smoothed out the chinking using a small rubber kitchen spatula and also with our hands covered by thin plastic gloves. We only chinked the outside. We used a lot of chinking (30 quart tubes). I felt like my biceps may have grown an inch from all the hard work manhandling the oversized caulking gun.

Air gap between logs

This photograph shows the logs after staining and chinking. [The chinking makes the structure water/wind tight. It also goes along way towards keeping any insects out. The grandkids really hate spiders. So chinking essentially made the playhouse spider proof.]

Then we stained the inside of the log cabin walls using a Glacier (almost white) stain. We painted the door.

One of the final steps was the cabin floor. I came across a ceramic tile that looked like ash barn wood so we decided to go with that. So we cut the tile to fit and laid the tile floor down. It was very beautiful and strong.

To access the attic of the playhouse, we installed a ladder. We took a Werner 20-foot aluminum extension ladder and separated it into its two halves. We put the half with the shoe rest in the playhouse.

Next we constructed a guardrail around the deck and a railing leading down the stairs. We used white architectural aluminum spindles in this construction and it really set off the front quite beautifully.

The total cost of the project was $4,188.31. The costs are broken down in Section III, the parts lists.

Completed Log Cabin Playhouse

F. Lessons Learned

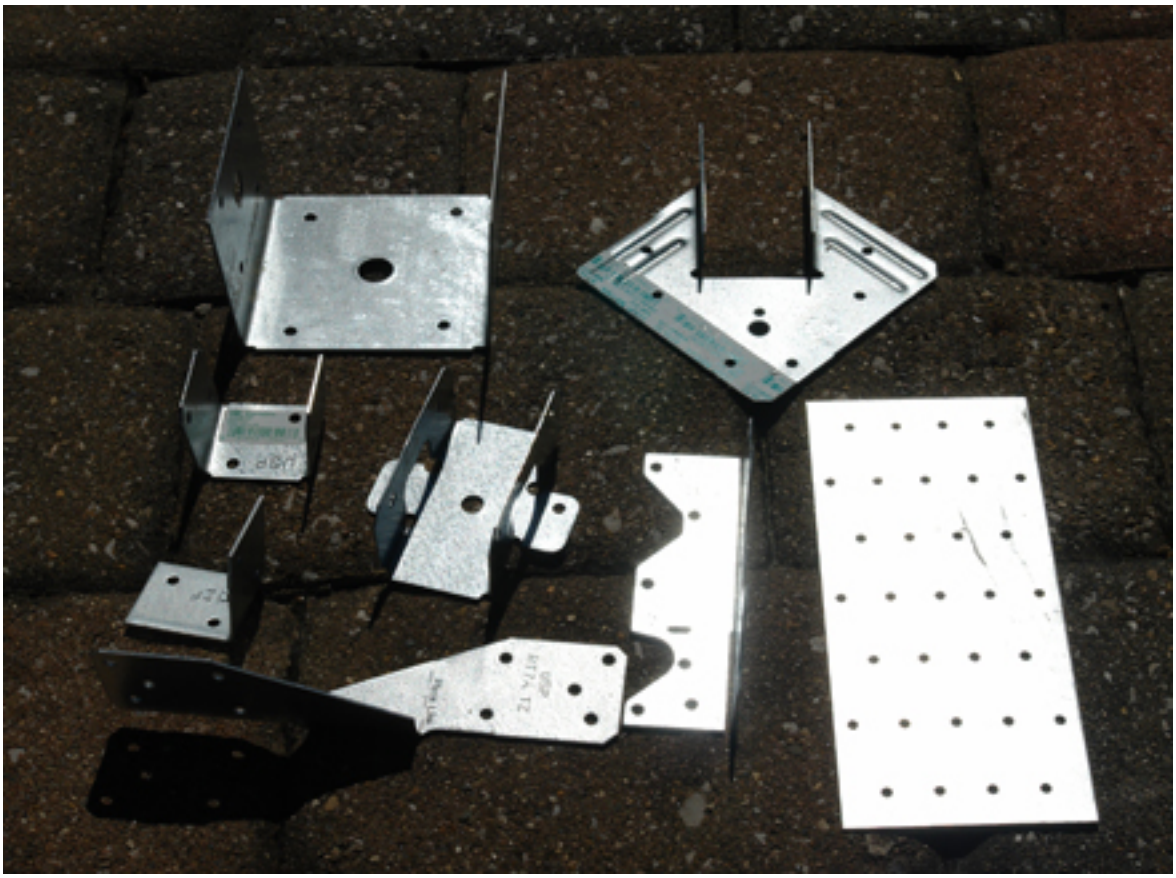
Although it appears that the 4x4s were strong enough to support the structure, I always like to go beyond the specs. And if I had a do-over I would have probably used 6x6s for the posts instead of 4x4s.

The buried plastic buckets used in the construction ranged from 14 to 18 inches in depth. As a general rule, the footing should be buried below the frost line. The frost line is the depth to which the groundwater in soil is expected to freeze during a very severe winter. At my location, the frost line is defined as 36 inches. Therefore this construction does not meet this rule because it is not deep enough. Time will tell if this is a significant problem. I used the same construction techniques when building my deck 26 years ago and it is still holding up quite well. Also because the outside dimensions (8 by 12 feet) of the structure are small, much shorter than my 50-foot long wooden deck, I suspect that it will survive quite well. But if I had a do-over, I would be tempted to use rigid fiber building forms. These are long cardboard tubes that can be buried in the ground and then filled with cement to create footers. They are generally 4 foot long but can be cut to shorter lengths.

It was a really good idea to use scaffolding when constructing the top of the structure and to anchor the scaffolding to the building using a long nylon ratchet strap. It provided a great deal of stability and probably prevented me from breaking my neck during the process.

Use of modern metal structural connectors adds significant strength to the structure and makes the construction process quicker. These were not common when I built my house 40 years ago. I was very pleased with this improvement to modern construction techniques.

Always keep all the lumber protected with tarps until they are used. Raise the wood up so it is not sitting directly on the ground. This will prevent the wood from twisting or warping before you have a change to use it. I noticed that some of the landscaping timbers develop twists prior to installation and as a result produces gaps in the log wall and unevenness during log construction. This complicated the construction process unnecessarily.



Metal Mounting Hardware

III. PARTS LISTS

Lumber

114@	8 foot long landscaping timbers	$ 368.38
9@	8 foot long 4 x 4 treated beams #2 grade	$ 73.53
2@	8 foot long 2 x 12 treated lumber #2 prime	$ 32.06
6@	8 foot long 2 x 10 treated lumber #2 prime	$ 75.63
9@	12 foot long 2 x 6 treated lumber #2 prime	$ 119.46
37@	8 foot long 2 x 6 treated lumber #2 prime	$ 242.72
11@	8 foot long 2 x 4 treated lumber #2 prime	$ 64.46
1@	8 foot long 1 x 12 top choice lumber	$ 11.07
10@	8 foot long 1 x 4 treated lumber	$ 40.30
9@	10 foot long 5/4" x 6" premium decking lumber	$ 72.90
7@	8 foot long 5/4" x 6" premium decking lumber	$ 42.02
4@	4 foot by 8 foot treated CCX plywood ¾" thick	$ 57.48
10@	8 foot long ChoiceDek foundation composite deck planks (5½" wide) (Beach House Gray)	$ 217.90
2@	6 step pine deck stair stinger, top choice pressure treated lumber	$ 33.47
5@	8 foot long 1 x 2 white PVC trim	$ 32.00
1@	8 foot long 1 x 3 white PVC trim	$ 10.69

Hardware (Fasteners)

FastenMaster Headlock ECoat Spider Drive Structural Wood Screws (box of 50)		
	2 boxes of 4 ½" long	$ 58.18
	1 box of 6" long	$ 36.34
Countersinking Head, Polymer-Coated Star Drive Deck Screws (5 pound box)		
	1 box of 1 5/8" x 8	$ 23.93
	1 box of 2" x 8	$ 25.12
	1 box of 2½" x 9	$ 25.12
	2 boxes of 3½" x 10	$ 47.74
45 pounds	5" #40 Common Steel Nails	$ 84.15
6@	½ by 8" long hex head bolts	$ 11.56
6@	½ x 13 hex nuts	$ 0.58
50@	Hillman 0.438" – 1.25" zinc plated standard (SAE) Flat Washers	$ 2.68
25@	Hillman 0.625" – 1.718" zinc plated standard (SAE) Flat Washers	$ 3.48
20@	Hillman 0.755" – 2.0" zinc plated standard (SAE) Flat Washers	$ 3.64

Hardware (Structural Connectors)

27@	USP Rafter Ties 6½ x 1½, Model RT7A-TZ	$ 15.93
6@	USP Rafter Ties, Model RT15-TZ	$ 5.22
19@	USP Framing Angle 1 7/16 x 1 7/16 x 2 ¾, Model JA1-TZ	$ 11.21
4@	USP U-Clips, Model TTU2-TZ	$ 3.40
2@	USP Double Clips, Model TTR-TZ	$ 2.48
22@	USP Framing Angle 1½ x 1 7/16 x 4½, Model MPA1-TZ	$ 13.20
21@	USP Nail Plates 3 1/8 x 7, Model NP37	$ 23.52
3@	USP Steel G185 Post Base (for 4x4 posts), Model D44-TZ	$ 15.24
3@	No Dig Steel Post Base (for 4x4 posts)	$ 52.71
1@	USP Fence Speedpost Base, Model 04 (for 4x4 posts)	$ 27.04

Stains/Paints/Caulking

2 gallons Cabot Australian Timber Oil (Jarrah Brown)	$ 64.03
1 gallon Cabot Semi-Solid Deck & Siding Stain (Glacier)	$ 40.64
1 gallon Thompson Water Seal	$ 14.84
1 can (29 oz.) Valspar Duramax Satin Latex Exterior Paint	$ 18.81
1 plastic jar (8 oz.) Dutch Boy Maxbond Satin Exterior Latex Paint (Brown)	$ 4.06
30 tubes (30 oz.) Triple Stretch Textured Chinking (Woodtone)	$ 477.00
2 tubes (10.1 oz.) G.E. Silicon II Caulking	$ 12.18
1 can (12 oz.) Great Stuff Pond & Stone Waterfall Foam Sealant (Black)	$ 7.99

Other Material

6@ plastic buckets (5 gallon)	$ 28.50
1@ Commander Exterior Steel Entry Door, 2 panel, 9-Lite with Window Inserts Pre-hung, 32" x 80"	$ 166.18
3@ IPS Single Hung Vinyl Utility Windows 18" x 24"	$ 128.37
1@ Plastic Square Gable Vent 15" x 15"	$ 20.63
2@ Clear Polycarbonate Sheets 11x14	$ 17.08
34@ White Architectural Aluminum Spindles 32"	$ 126.96
21@ Natural Timber Ash Wood Look Porcelain Floor Tiles 8" x 48"	$ 228.06
1 bag (10 lbs.) Mapei Keracolor Sanded Powder Grout (Pearl Gray)	$ 11.75
1 bag (50 lbs.) Mapei Floor Tile Polymer Enriched Mortar	$ 21.38
1 pack (of 100) Tavy 1/8" Tile Spacers	$ 5.87
7 bags (80 lbs.) Quikrete Gray High Strength Concrete Mix	$ 29.82
1 can (8 oz.) Regular Clear PVC Cement	$ 3.52
2@ Plastic White Post Top Caps (for 4x4 beams)	$ 2.12
24 Solid Concrete CMU Blocks, 4x8x16	$ 31.33
½ ton #5 gravel	$ 10.00
1@ Werner 20-foot Aluminum (225-lb Type II) Extension Ladder	$ 166.92

Metal Roofing

9@ G-Rib Steel Roofing Sheets (29 gauge), 8 foot long (Burnished Slate Frost)	$ 189.52
4@ Steel Roofing 6" Corners, 8' 4" long (Burnished Slate Frost)	$ 90.60
1@ Steel Roofing Ridge, 14"x10'6" (Burnished Slate Frost)	$ 23.95
200@ Woodbinder Screws, 1 ½" (Burnished Slate Frost)	$ 14.74
25@ Woodbinder Screws, 2" (Burnished Slate Frost)	$ 2.08
1 partial roll Vapor Barrier 1/8" thick, White Scrim/Foil (4 feet wide) with strips of adhesive tape on one side	$ 42.84
Labor for installing metal roofing	$ 200.00

IV. AS-BUILT DRAWINGS

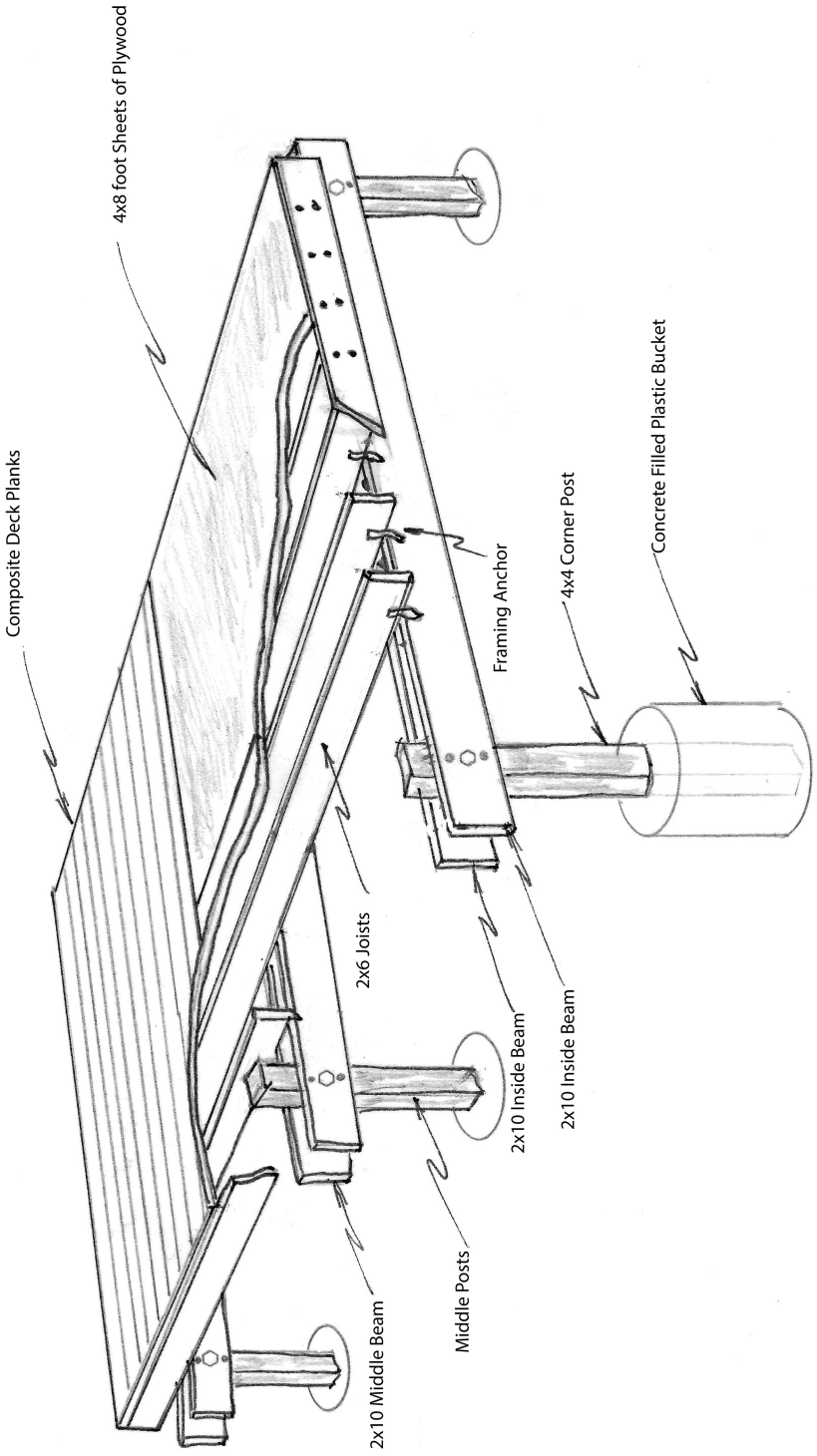


Figure 1. Foundation

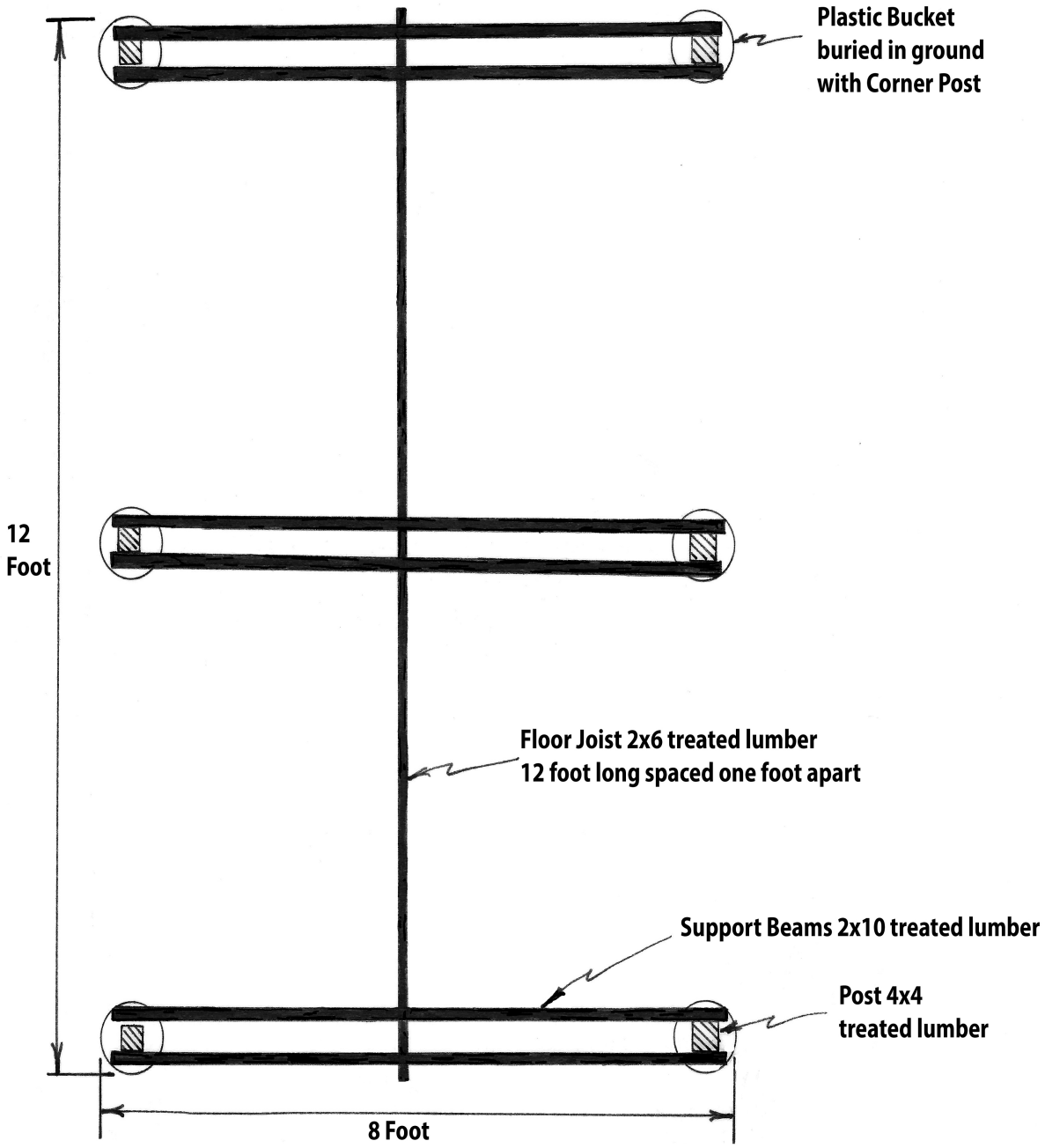
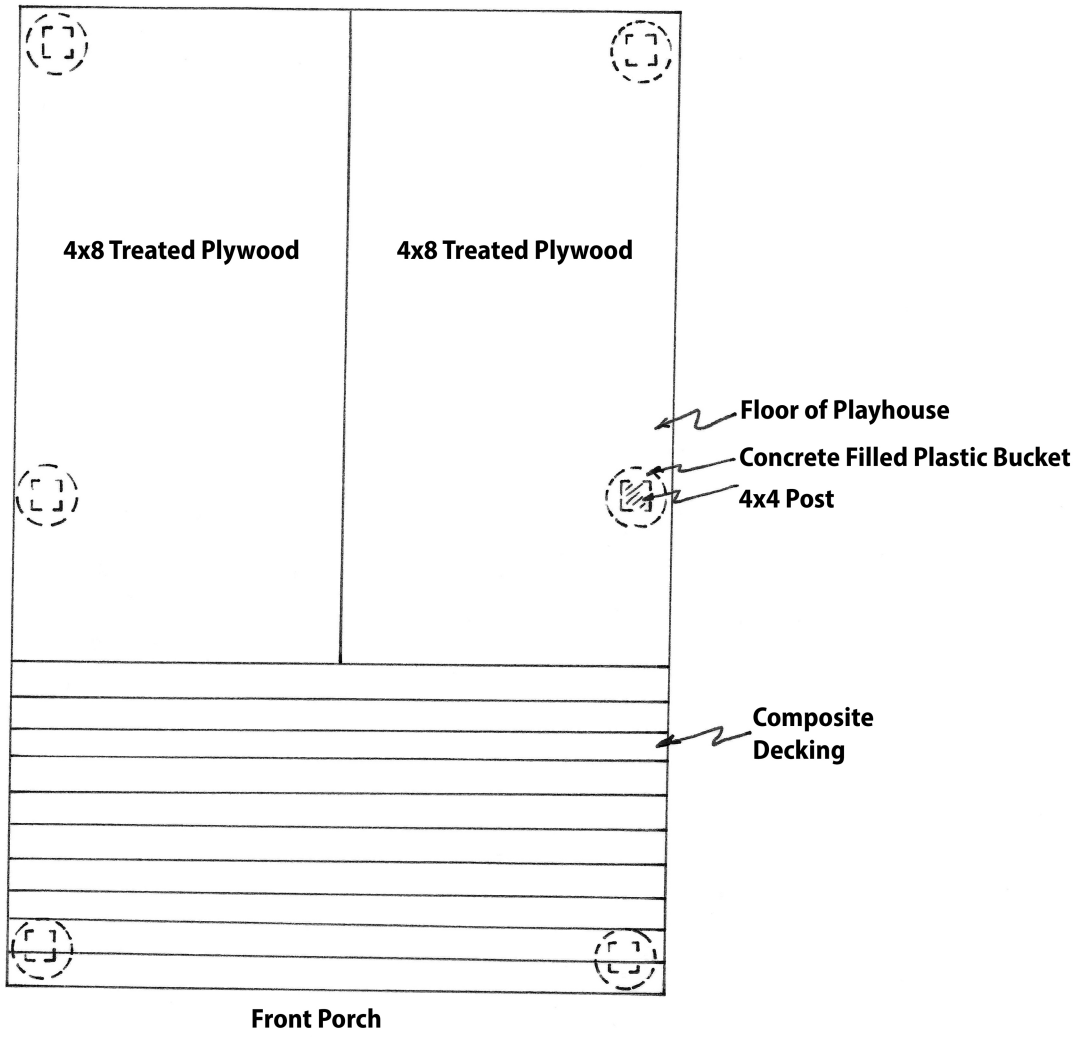


Figure 2. Playhouse Foundation (facing down)

Figure 3. Playhouse Floor (top down view)



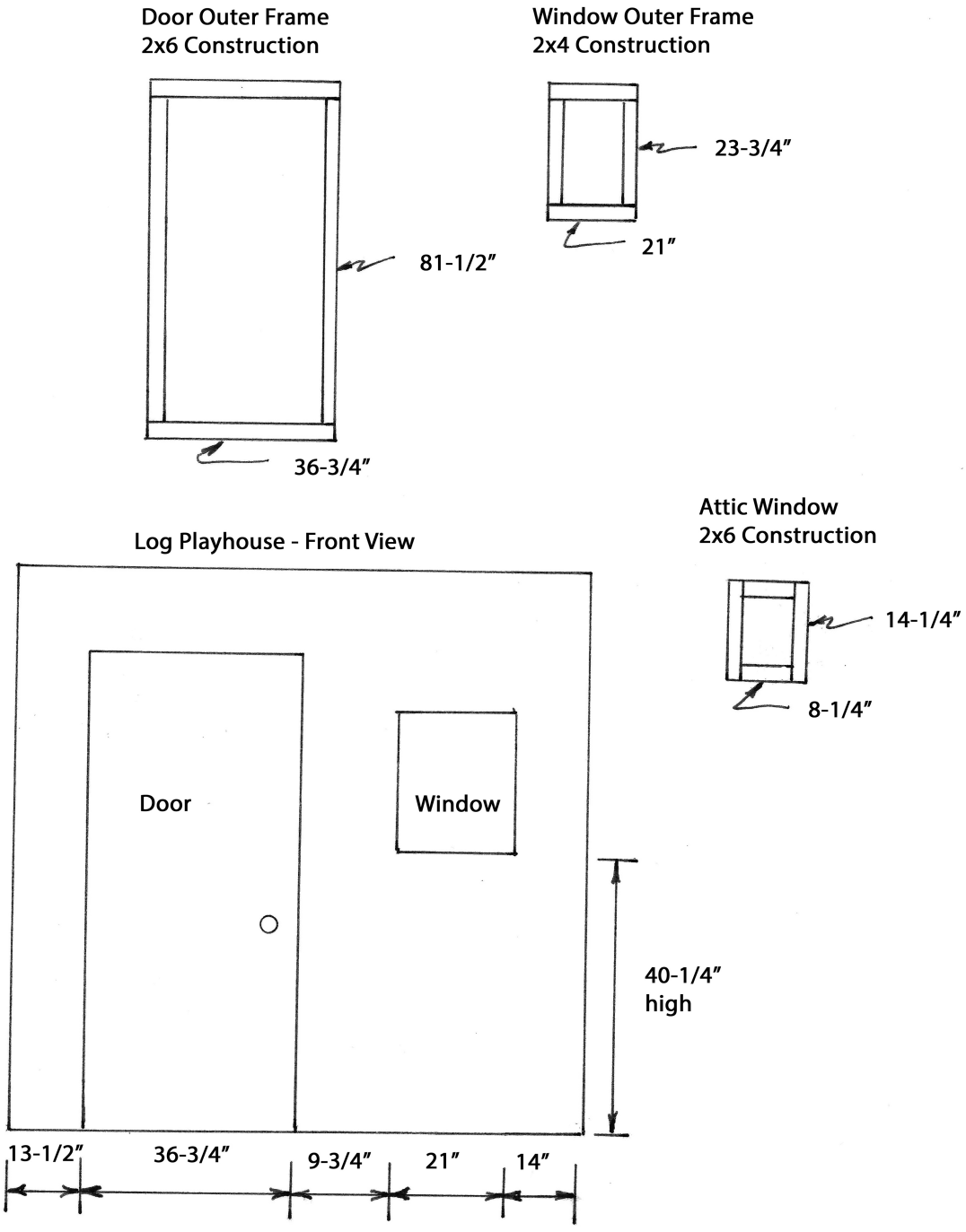
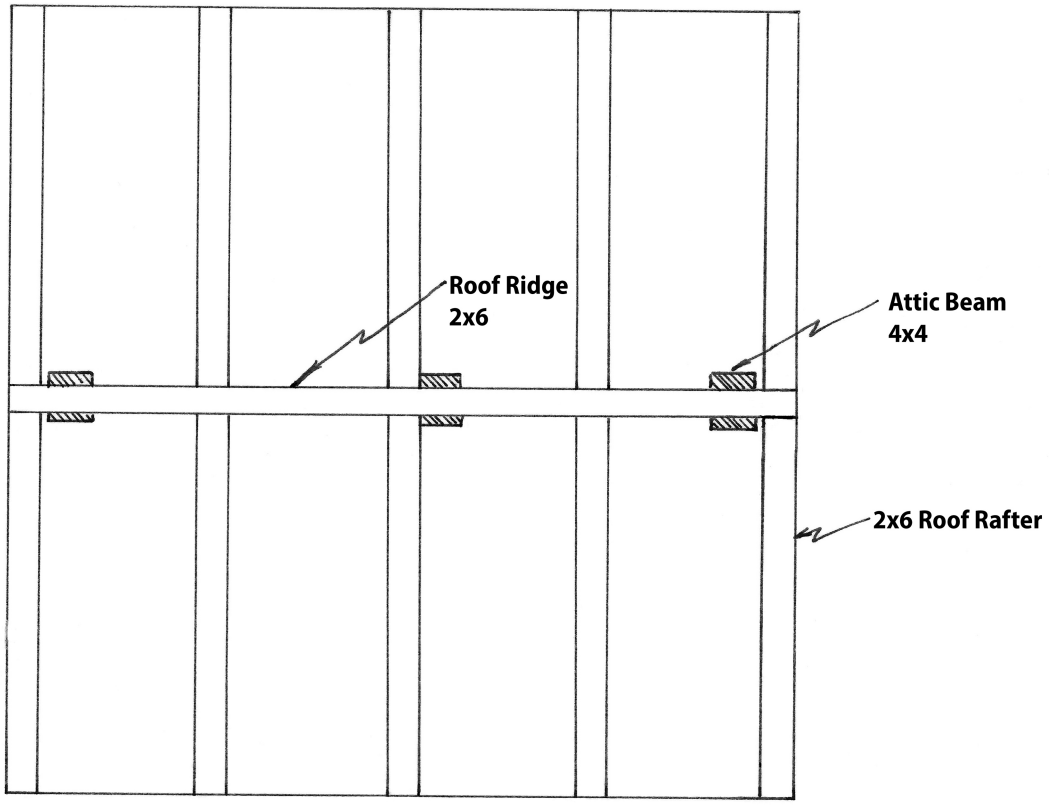


Figure 4. Door and Window Frame Construction

Figure 5. Roof Support (top down view)



Attic Floor (side view)

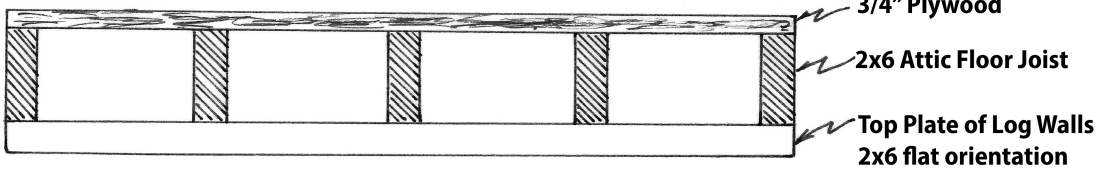


Figure 6. Roof Construction (side view) --not drawn to scale --