Disclaimer: Read this BEFORE beginning any construction!

These plans are intended for use as a guide only! Adjustments may be needed as circumstances require. Dimensions may be altered at the builder's requirements. Be sure if any alterations occur, that the measurements are adjusted accordingly! If you (the builder) are ever at doubt as to how to construct any structure in these plans, consult a professional. Always use safety equipment when needed and follow manufacturer recommendations for tools, mechanical parts and any components you are not familiar with.

This structure is able to be wired for electricity. Please consult a professional and your local power company before installing any dedicated lines.

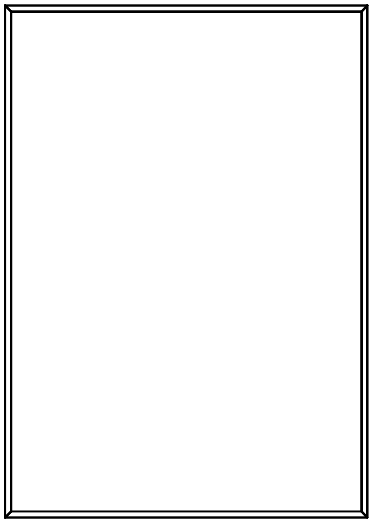
This structure is able to be fully completed inside. These plans do NOT include instructions on interior finishing and any such construction practices will be solely at the discretion of the builder. Materials such as insulation, gypsum board and interior furnishing such as counters, tables, etc are not included in these plans.

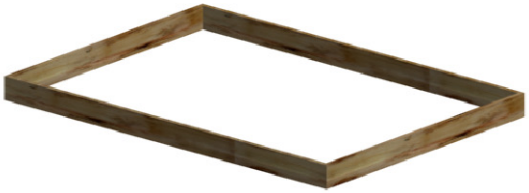
Builder assumes all risks associated with construction! Always use safe construction practices, i.e. sturdy scaffolding when working at heights, safety equipment such as gloves and safety glasses. Make sure all tools are in proper working condition and do NOT use any tools with damaged or frayed cords or broken components.

These plans are intended as a guide only! 3-Dimensional Concepts will not accept responsibility for any measurements misrepresented in these plans and field measurements should always be taken, never assumed. The rule-of-thumb, “measure twice, cut once”, always applies. Accuracy of such measurements are determined by many factors, not limited to, builder competency and experience, tool repair, and tool type. However, should mistakes be found in these plans, we would very much appreciate hearing about them so they may be corrected. Please forward any questions, comments or concerns to jeff@3dimconcepts.com. Once you have read through this disclaimer, it is time to start building. Good luck, and work safe!

1) To begin, you will definitely want a sturdy foundation with which to construct the treehouse. We want the tree house to be as level as possible and as easy to construct as possible. To build a simple scaffold begin with four 6x6x8' (minimum) pressure treated posts. We are going for an untra-solid foundation for your safety and the safety of your children. If you would like to use larger post, feel free.

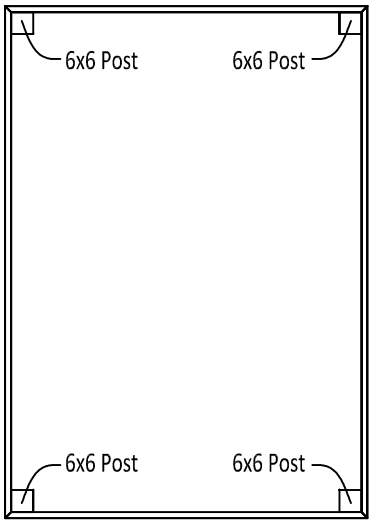
2) Cut a frame out of 2x8 plank as shown below. ASSEMBLE AROUND TREE! You will use this frame to hold the posts upright as you construct the remaining foundation.





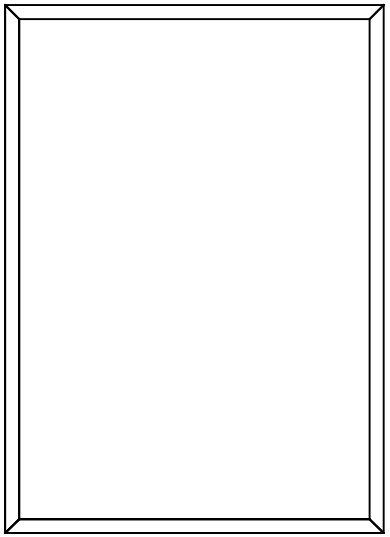
A
1
2x8 Wooden Frame
Scale: $\frac{1}{4}$" = 1'0"

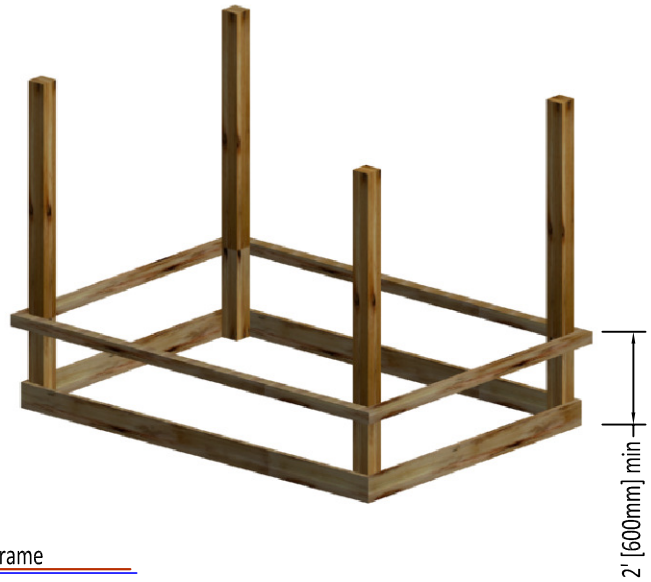
3) Attach the 6x6 foundation posts to the inside corners of the box you just completed. Be sure to use screws or double head nails as you will disassemble the scaffolding eventually.



B
1
6x6 Posts
Scale: $\frac{1}{4}$" = 1'0"

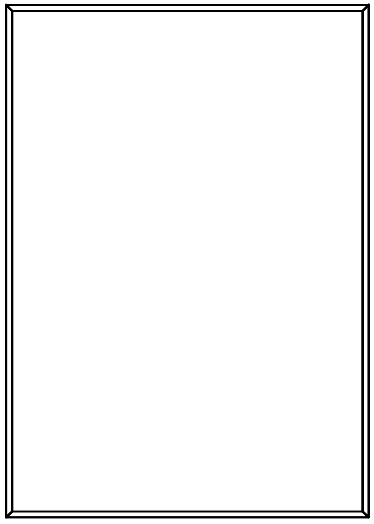
4) Once you have the posts tacked to the wooden frame, cut the 4x4 post frame as shown below. Assemble around the 6x6 support posts a minimum of 2' from ground level. Make absolutely sure the 4x4 posts are level before attaching with screws or nails. Use clamps if necessary.





A/2 4x4 Wooden Frame
Scale: $\frac{1}{4}$" = 1'0"

5) Construct another 2x8 wooden frame exactly like the previous frame. This top frame will support any planks as you slide them around the tree to get them into position.



B/2 4x4 Wooden Frame
Scale: $\frac{1}{4}$" = 1'0"

The finished product should look something like the diagram below.

Here is how NOT to attach tree houses to a tree (copyright treetopbuilders.net). It is excellent information and we believe safety above all else should be the builder's primary concern.

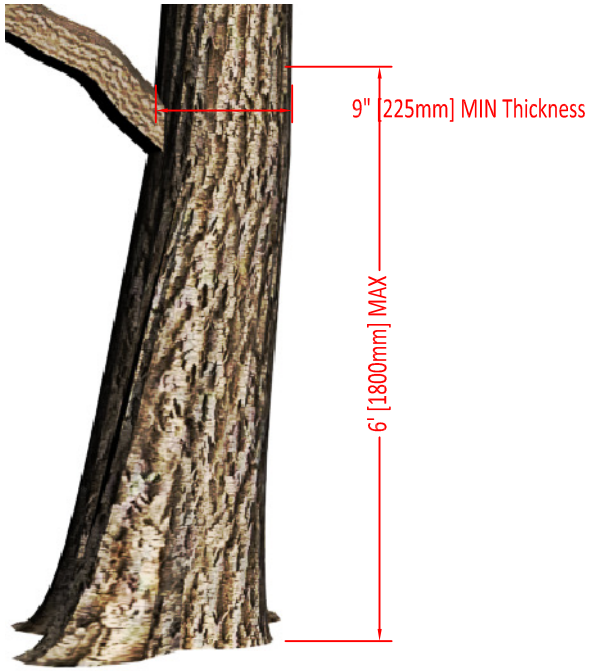
Be wary of these four practices:

1. Don't use threaded rod to support a shear load. Threaded rod is intended to support loads in tension, not shear. When a shear load is applied, especially at any leverage, the rod will bend or break causing the treehouse to fall. The question always arises whether using a larger or higher grade of rod is appropriate for tree houses, and the answer is typically "no." If the tree house is very small so that the attachment point is only going to carry a few hundred pounds, and the load is not applied at significant leverage, then using a large threaded rod (1" diameter absolute minimum) may actually be safe for a tree house. However, there is no situation where threaded rod is anywhere near as strong as a similar diameter lag bolt, and I would avoid any tree house builder who regularly uses it. Would you rather have a cheaper tree house or a safe tree house? Our objective is building quality tree houses - we do not compromise when it comes to the safety of our clients' tree houses or potentially dangerous tree house accessories like zip lines.
2. Don't use too many fasteners. Experienced builders of custom tree houses will understand the safest and least harmful methods of attaching tree house beams to host trees. Trees need to compartmentalize each penetration or wound that they experience. So if you put several nails or small lag bolts in a concentrated area, presumably because just one isn't strong enough to support the treehouse, then the tree may treat the whole area as a single wound and shut the area out from the rest of the tree's vascular system to prevent the spread of decay. Your tree house is likely to be safe and appear fine for several years. But behind that board you put 5-15 nails or screws in, the wood is decaying and eventually the whole treehouse may fall down unexpectedly, revealing a huge wound in the tree. For quality tree house construction the key here is to use one large fastener rather than several little ones. The 1/2" galvanized lag bolts you'll find readily available are not enough. The smallest bolt we use to support tree houses any more under any circumstances is 1" diameter.
3. Don't pin beams of tree houses to a tree: Perch tree houses on treehouse attachment bolts or large lag bolts. We have seen thousands of tree houses built by others over the years as part of our tree house consulting practice. The most common errors we find are tree houses fastened by nailing or lag bolting a main support beam to the trunk of a tree. Our experience tells us that either the tree will push the board out over time pulling the fasteners through the board until the tree house breaks or the tree will try to grow around the board. Typically, the tree will try to grow around the board, but will either fail or take decades to completely seal over the beam. For those decades, the beam will interrupt the flow of nutrients on that side of the tree, and probably create a moist, dark, entry place for disease and decay to start. "perch, don't pin," is a key tree house construction concept to remember. Perch your beam on top of a really large fastener, and allow for tree movement through the use of custom floating tree house brackets made especially for tree houses using artificial limb fasteners. Don't pin tree houses to a tree, essentially creating a tourniquet and a disease magnet on that side of the tree.
4. Don't trust what you read in every tree house construction book. Some of them have great advice, and others are dangerous or harmful to your trees. Many books tell you to do what we just told you above not to do. They are treating a tree like it was a 6x6 post or a telephone pole; not like it is a living and growing organism. Basic tree biology is just as much a part of tree house building as carpentry is. If you want to have a safe and long lasting tree house, then don't believe everything you read out there. We really care about our craft and don't want the whole tree house building industry to get a black eye when someone gets hurt because of poorly designed tree houses or poorly attached tree houses. So if you are considering building your own tree house, please do it safely.

Constructing a tree house can be a fun and exciting challenge. Again, please build carefully and follow all safety precautions. We do NOT recommend building above 6ft [1800mm]. Serious injury can occur at any height.

1) To begin, start by measuring the trunk diameter where you intend on constructing the platform you wish to build. Ideally, it will be over 9" thick, strong and sturdy. Try giving the tree a shake where you would like to build. If it moves or sways, you will need to build lower, in a more sturdy location. If it holds strong, you should be able to build with relative ease.

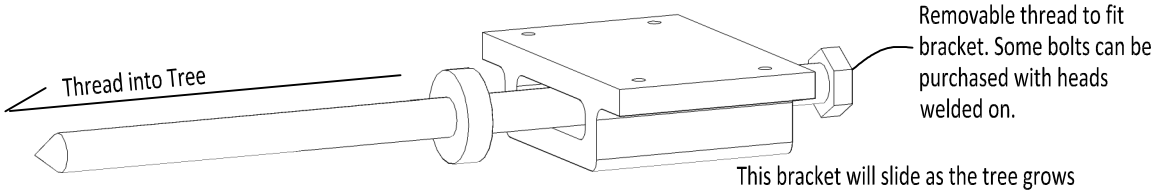
Note: We are assuming single-trunk construction. If the tree you are building on has two trunks, you may opt to build either below the split or use both trunks as building surfaces. As above, always build with caution and use safety equipment.



Note: There are MANY ways to attach planks. NEVER ATTACH PLANKS DIRECTLY TO THE TREE TRUNK! We recommend treehouse lag screws and flaoting brackets. For the structural playhouse, you may opt to use nails or screws. For the support, bigger is better. At least 1" [13mm]Ø x 6" [150mm] (minimum) lag screws. The lag screws MAY need to be longer, depending on the tree. You want to add at least 4" depth to the measurement to sink into the tree. Remember, you want the screws going into solid wood, not bark!

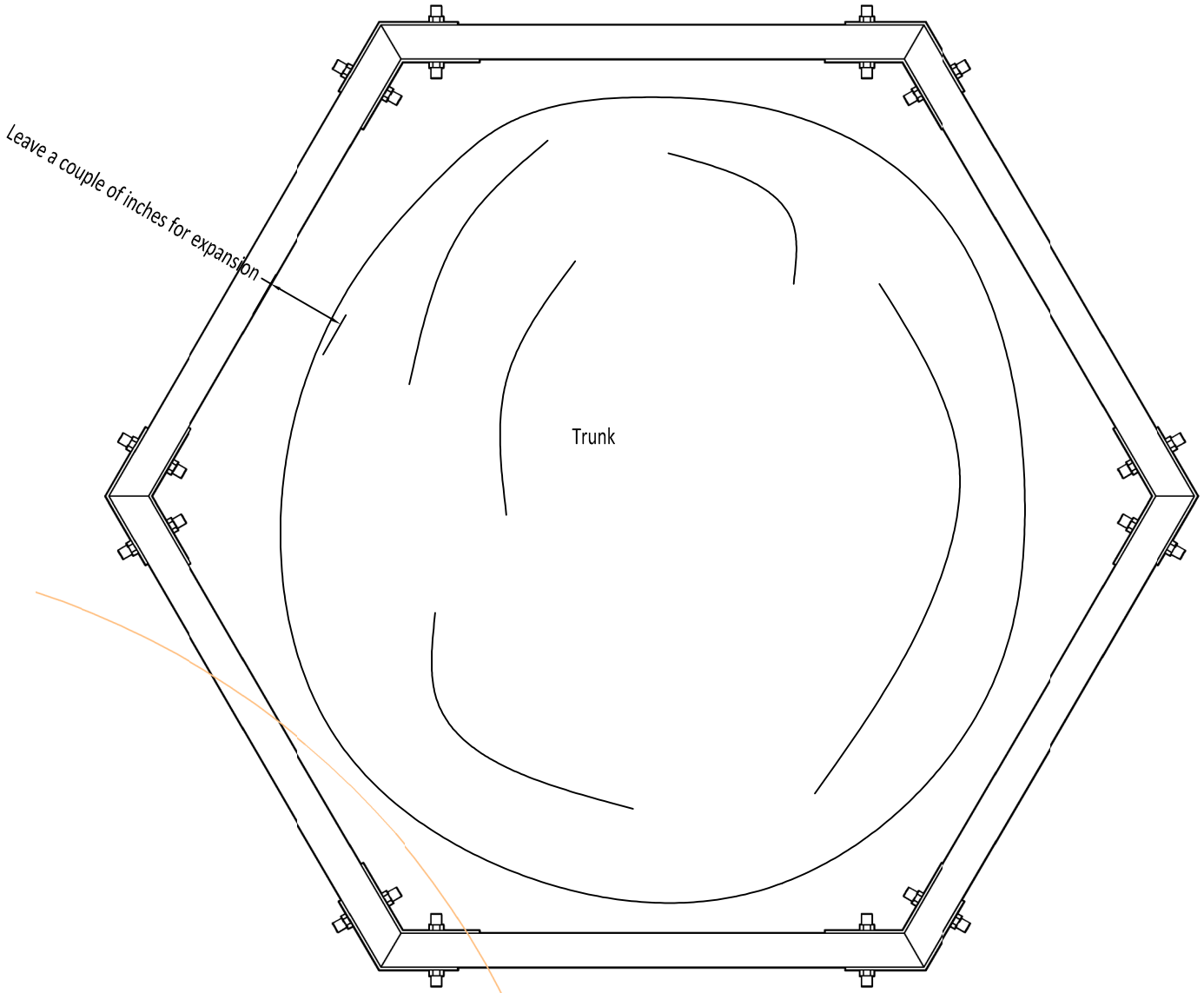
Some manufacturers make "collars", others make tree screw systems that allow the tree house to continue to grow, and others use cables and pulleys. You need to determine what kind of system you wish to use before beginning any construction. Contact jeff@3dimconcepts.com with any questions or recommendations as to types of base connections available.

We are going to use a free-anchor system in this example. This system uses extended length bolts with floating anchors that the builder attaches to the frame boards. An example of a floating anchor is shown below. Notice how the plate "floats" on the rear of the bolt, with a stopper plate in front and a nut behind. This is so you can allow for the tree to grow without impeding the tree house.



The important thing to understand is that we cannot offer actual dimensions. What we can do is offer a very good glimpse of what you, the builder, need to accomplish. Tree sizes vary, branches may be in the way, just too many variables to give accurate, solid dimensions. We will do so when we can.

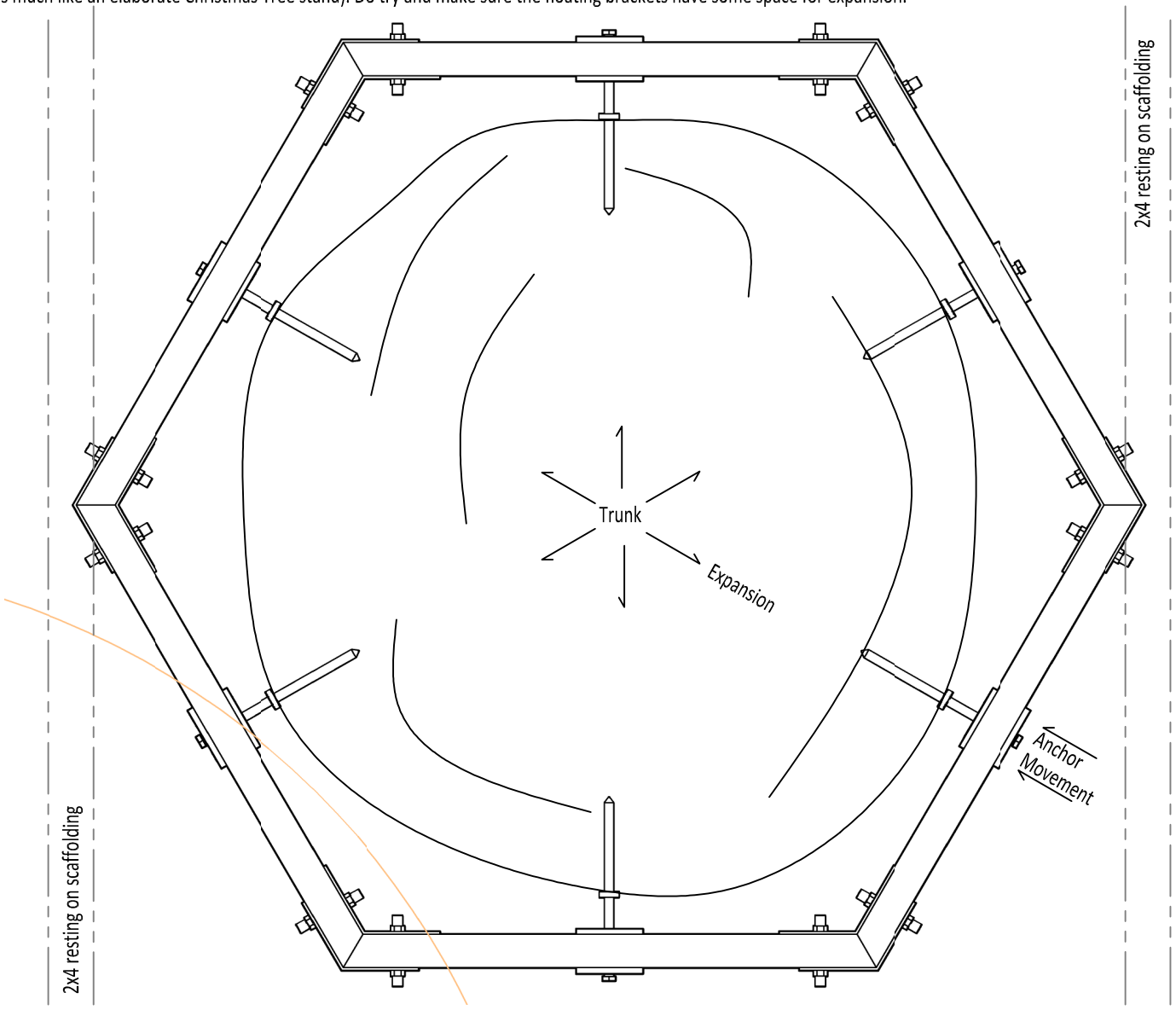
To begin, start by measuring the diameter of the trunk WHERE YOU WANT THE FLOOR TO GO. You will need to construct a "ring" as shown below around the tree. The strongest hold would come from angle brackets and bolts. Notice we have put brackets on both the inside and outside of the boards forming the collar.



A 6 2x8 Wooden Collar Detail
Scale: NTS

Once the ring is constructed, Use the scaffolding you have already constructed to level the ring around the trunk where you want the floor to go. We have found that using 2x4s across the span of the scaffolding (to hold the frame) and door shims (to level the frame) works very well.

Once you have the frame level (for the time being), Position your anchors as close to the center of the frame pieces as possible. Anchor them to the bottom of the frame FIRST, only then may you penetrate the tree (really, it is much like an elaborate Christmas Tree stand). Do try and make sure the floating brackets have some space for expansion.



A
7
Anchor Detail
Scale: NTS

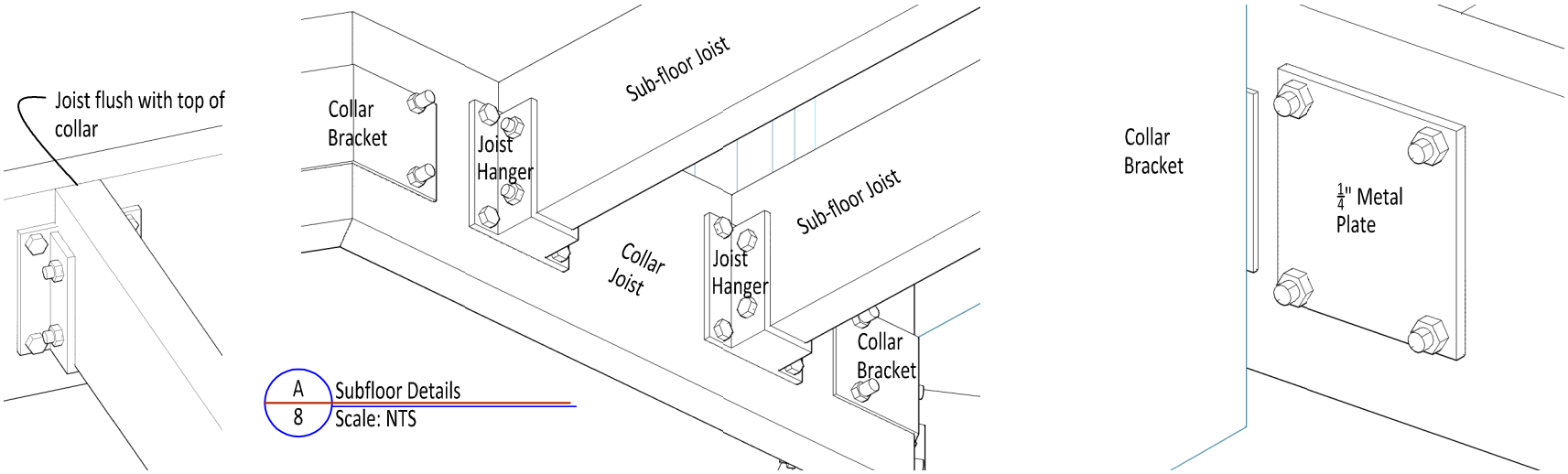
It may seem backwards, but you want the floating bracket as far towards the REAR end of the anchor bolt as possible. As the tree expands, the bolts will move outward and the floating bracket will migrate toward the center. The bolts do NOT actually move, the tree grows and the floating brackets move along the anchor bolt.

So far, the structure should look like this. For the next step, you are going to be very glad you have the scaffolding to hold materials while you measure.

For the sub-floor you can use the scaffolding to support any materials you need to measure. Be sure to be careful in laying out any flooring. There shouldn't be any branches in the way of the flooring,. If there are, you will need to cut them down or else they risk the chance of growing into the flooring or separating the flooring frame - not good.

This tree house has a rectangular floor, so it should be fairly easy to construct with the use of joist brackets and your scaffolding. We recommend joist brackets because they offer a more flexible hold than screws. Yes, most of the flooring frame will be bracketed. Once you get to the walls, screws will be perfectly acceptable. NEVER USE NAILS, they will come out as the tree sways and could cause complete failure.

For the sub-floor, we recommend using 2x6 material with at least $\frac{1}{8}$" ($\frac{1}{4}$" preferred) joist hangers.

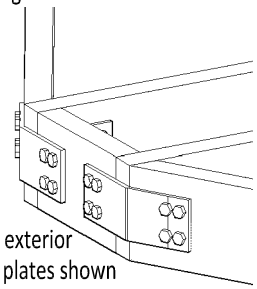


A/8 Subfloor Details
Scale: NTS

Notice we recommend using a metal plate. This will take the load from the front and disperse it evenly across the surface of the collar planks. Use your scaffolding to hold the timbers in place and make sure the top edges are flush.

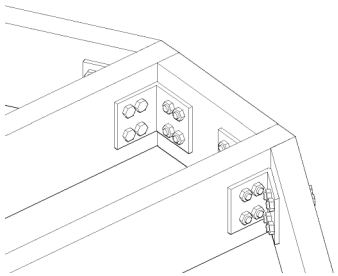
B/8 Scaffolding Support Diagram
Scale: NTS

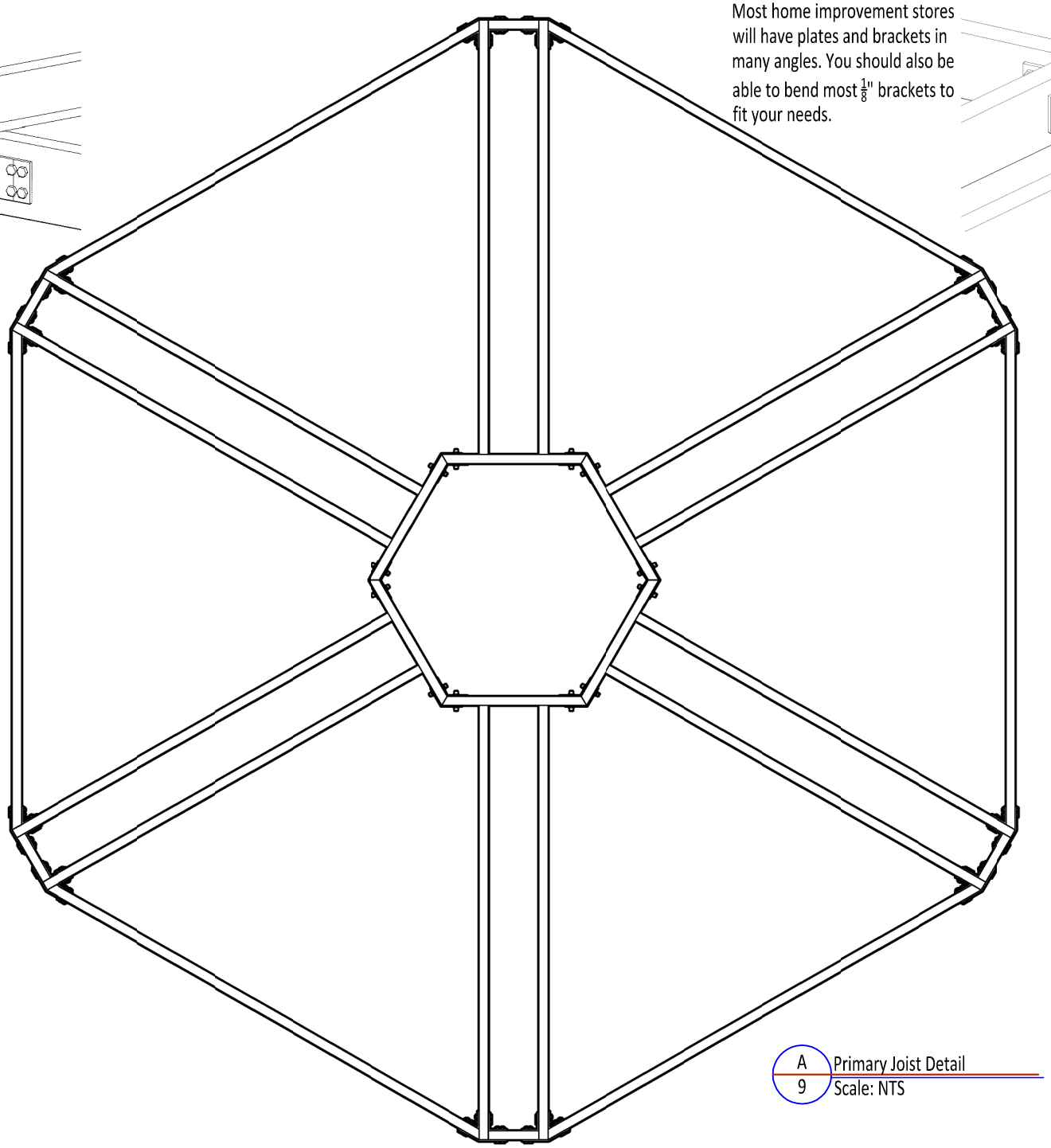
You may cut the 2x6 joists off at the end to form any shape decking you wish. We are going to stay with the hexagon shape since it would be easiest with the style of collar we are using and would require less cutting.



Custom exterior bracket plates shown

Most home improvement stores will have plates and brackets in many angles. You should also be able to bend most $\frac{1}{8}$" brackets to fit your needs.

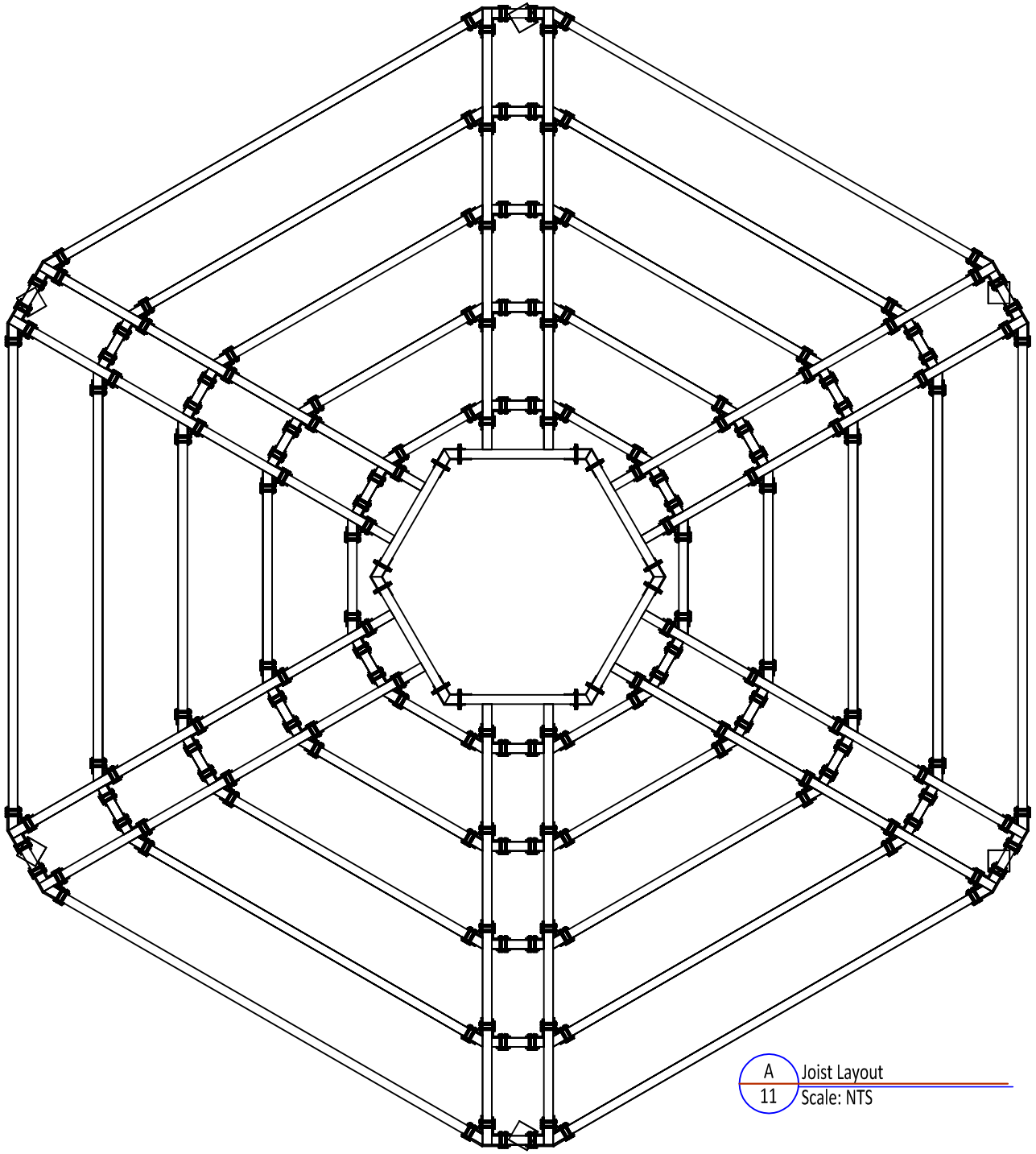




A/9 Primary Joist Detail
Scale: NTS

So far, the flooring should look like the diagram below. If you would like to order the custom exterior brackets shown here, contact jeff@3dimconcepts.com.

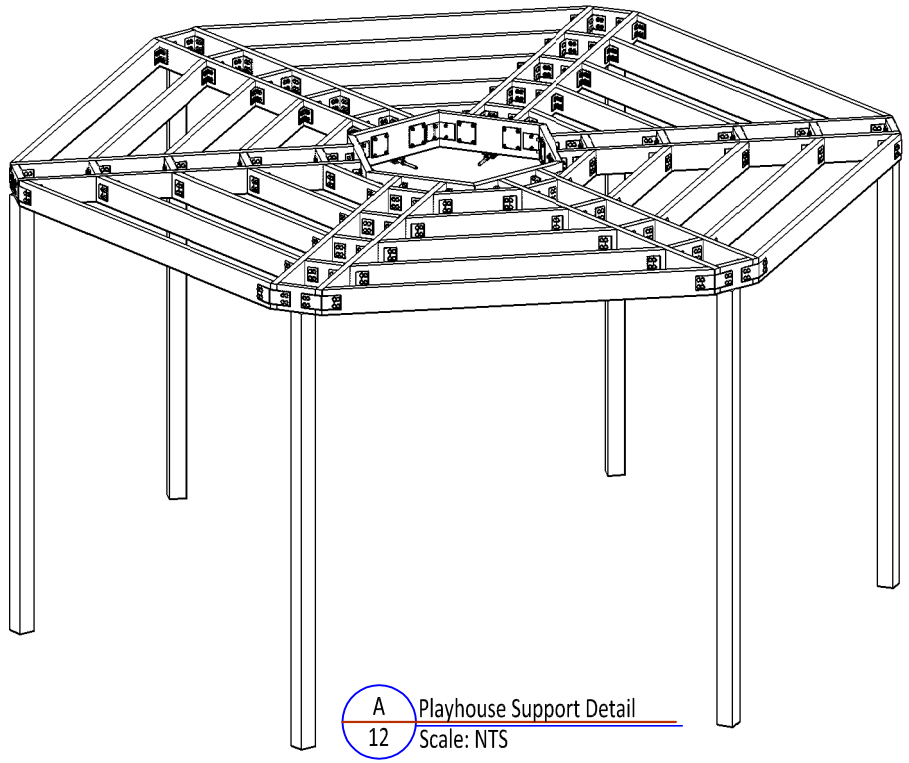
Layout your interior joists as shown below. Joists are spaced @16" apart.



A
11
Joist Layout
Scale: NTS

Ok, the last thing we need before sheathing the floor are knee-braces. The knee-braces take the load from the sub-floor and transfer the weight into the tree. The braces will be anchored directly to the trunk of the tree via brackets. See the diagrams below.

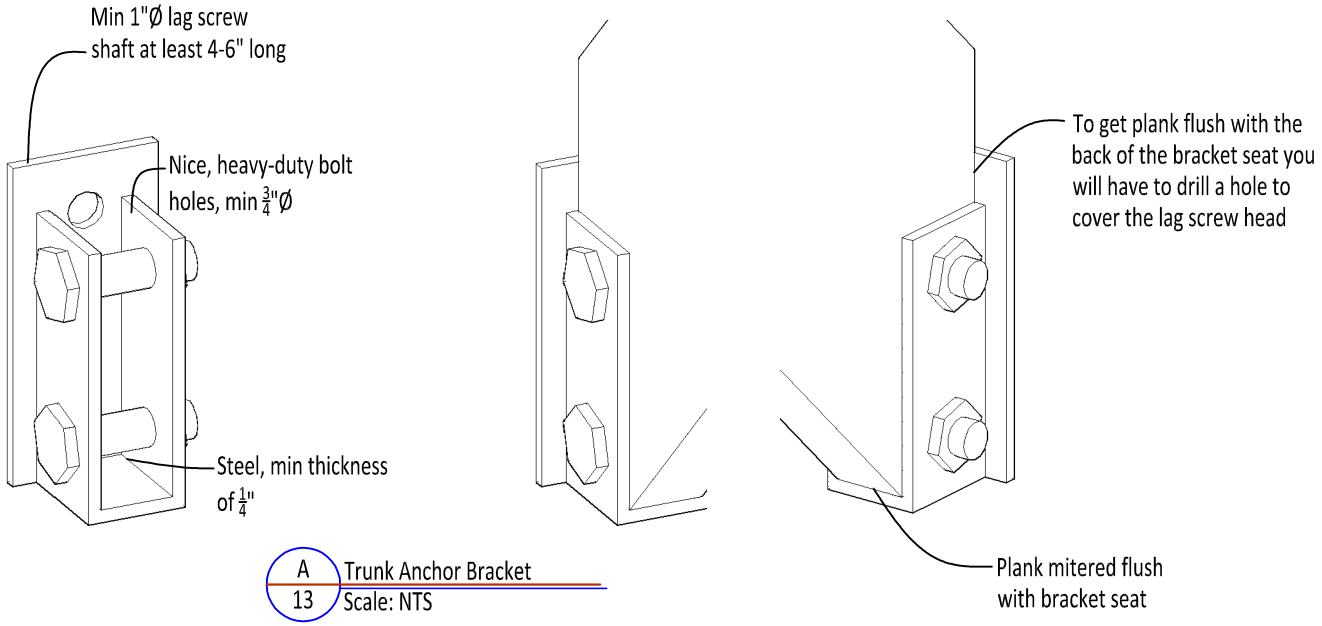
First, you will need to remove the scaffolding. Cut 4x4 post just long enough to fit snugly under the very exterior rim of the sub-floor. Yes, until you get the knee-braces in place, the sub-floor is still "floating" freely. Cut 6 of these and place them under the very exterior rim of the sub-floor.



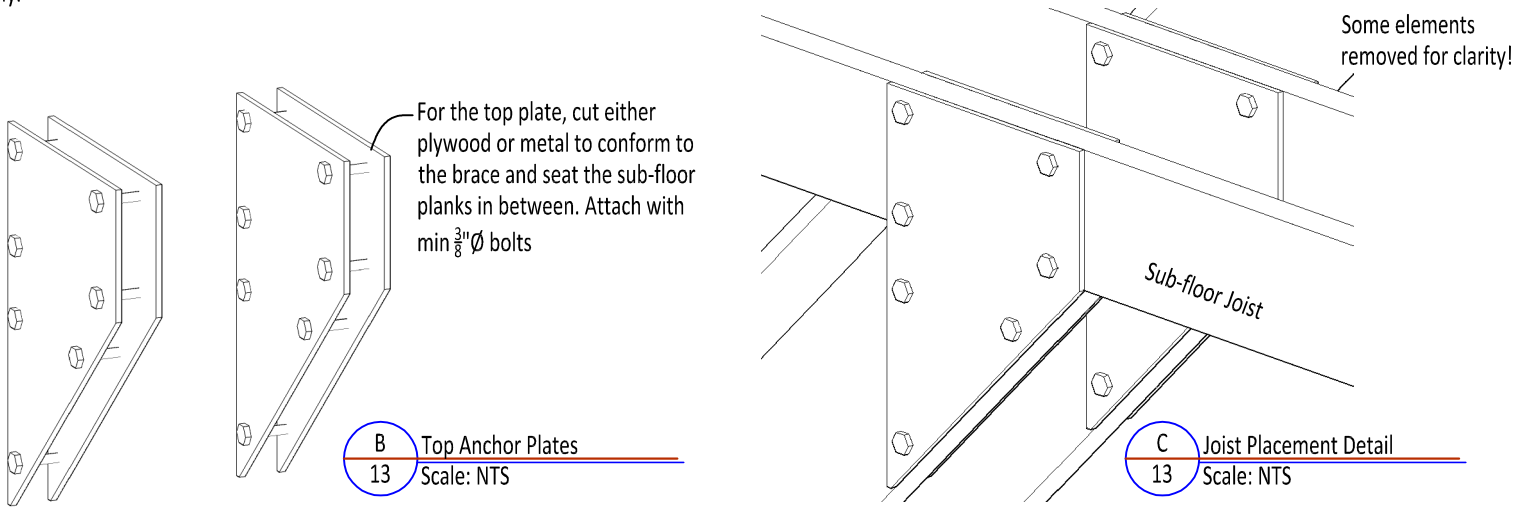
A
12
Playhouse Support Detail
Scale: NTS

You want to make sure the posts are long enough to carry the weight off of the scaffolding. You may have to use some muscle to get them into place, but most of the force required should be horizontal. Once you have the exterior rim braced, go ahead and take apart the scaffolding. Interestingly, some of the planks from the scaffolding look long enough to convert into knee-braces; 2x8 planks roughly 6-8' long...perfect!

The bracket on the tree is going to have to be very stout. You will want to look at anything metal over $\frac{1}{4}$" thick, a minimum lag screw shaft diameter of 1" with minimum length of at least 6". Do NOT cut corners on this! These brackets will literally be holding the entire weight of the sub-floor and the house itself and transferring that weight to the ground.

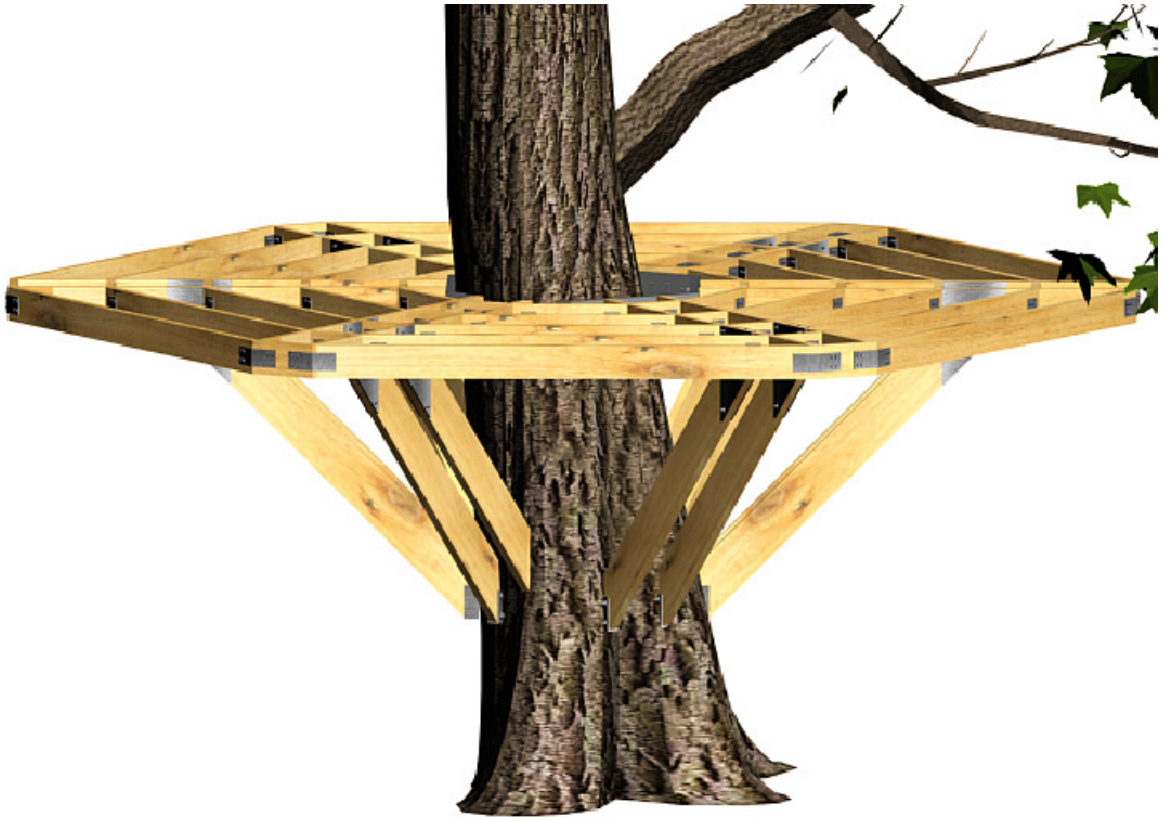


For the connection to the sub-floor, if you are good with metal, you can fabricate the plates needed. Otherwise, measure and cut plywood sheet something like shown below. Still use the $\frac{3}{8}$"Ø bolts though. Not screws or nails! Now, before you ask, plywood is acceptable because the plywood itself is not under any load. The plywood is to keep the load centered on top of the knee-brace. It is still a great idea to anchor it thoroughly.



Because trees are different, we cannot dimension up the braces. Some may have to be longer, others shorter. There may be a branch you can use instead of a brace and other factors. If you would like to order more detailed component details, or have any questions about substitutions, contact jeff@3dimconcepts.com.

notice, even when designing, we have to work with the tree. Even though this tree is digital, we needed to adjust the braces length. The important thing is to make sure each brace is anchored at the same spot on the sub-sub floor for uniform weight dispersion. It is a good idea to work from the top and find out where your base bracket is going to be located while the temporary supports are in place.

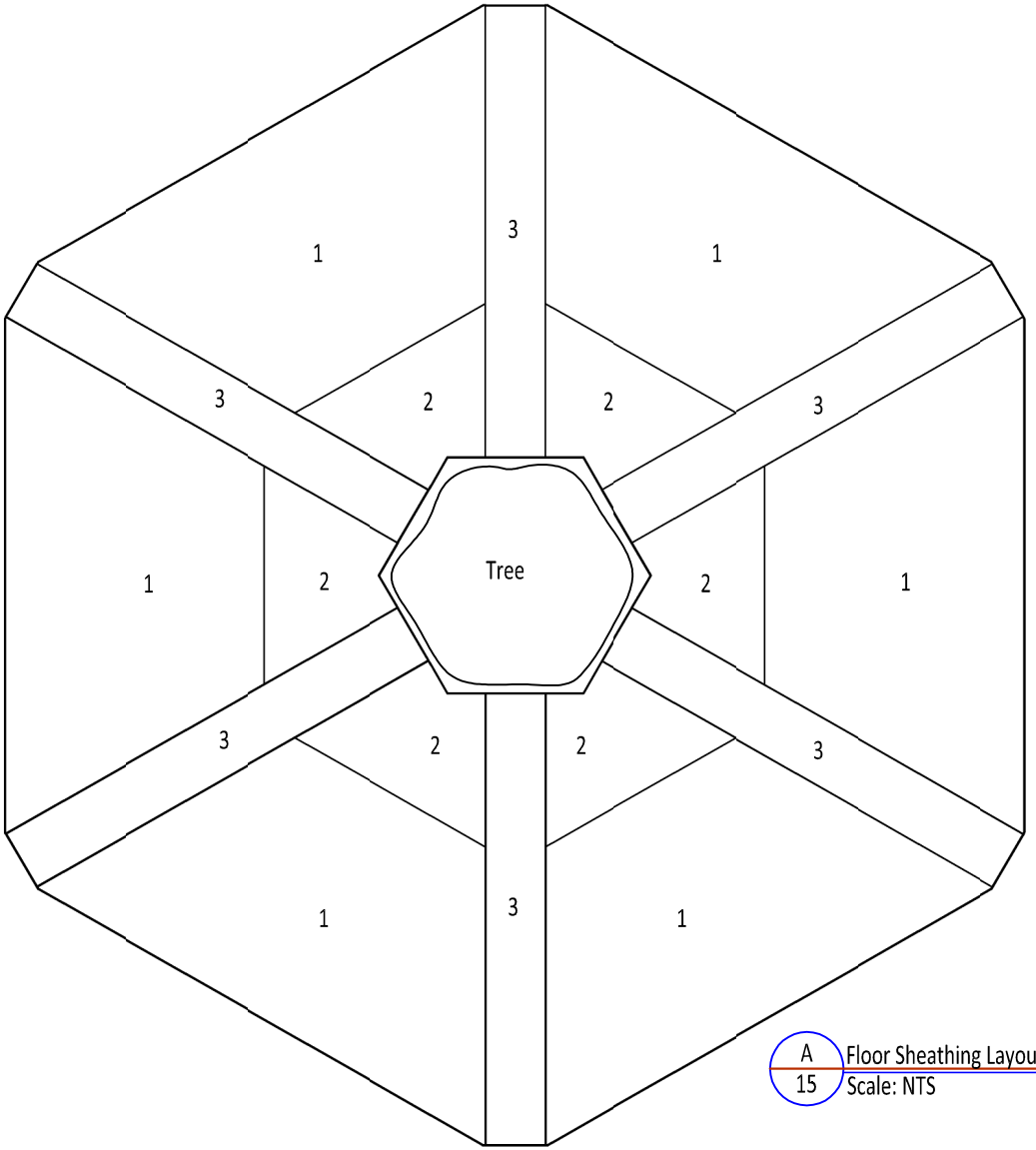


When the braces are in place, give them each a good pull and a push to make sure the lag screws are in solid wood and not just bark. You may need longer lag screws than mentioned previously. Again, it all depends on the tree. Do try as hard as you can NOT to just punch holes in the tree. If you wish, follow the steps outlined below.

1. Have an assistant climb up on the sub-floor and hold the uncut brace piece in place. Move the brace piece around until it sits just to the side of where it needs to go. Mark that location.
2. Have your assistant mark the top cut with a pencil. Remember, the top cut will be along the bottom edge of the sub-floor joist.
3. Cut the plank roughly 6" longer than the mark (room for error) and go back and have your assistant hold the piece in place along the bottom of the sub-floor.
4. Line up the brace under the same sub-floor joist. Can you see your mark? Does it seem to be about right, just lower? If so, go ahead and miter the bottom end so it is flush with the tree.
5. Both you and your assistant hold the brace in place (you may tack the brace in place if needed). Does the brace feel solid simply tacked in place? If so, great!
6. Mark the bottom edge of the plank on the tree. Make an outline of the brace piece so you will know approximately where it will sit.
7. Hold the seat bracket where you marked the location of the brace piece. Move the bracket up roughly 2-3" and use a long lag screw to anchor the bracket into the tree.
8. Hold the brace in place against the bracket. The brace piece should not fit into the bracket until you cut the bottom flush with the bracket seat. You may use a reciprocating saw to make things easier.
9. Seat the brace in place in the bracket. Is it snug with the bottom of the sub-floor joist? Do you have room to anchor the sub-floor joist with the plates on the previous page? Great! Have your assistant hold the brace in place until you can get the bottom of the brace anchored in place with bolts.
10. Have your assistant hold the top of the brace in place while you anchor the piece into place. Make sure hands and feet are out of the way! Wear eye protection!
11. Anchor the top plat into place and you should be done with the first knee-brace! Nobody said it would be easy.

Safety first! Before you remove your temporary braces, make sure every one is safely out of the way and off of the sub-floor structure. Carefully take the braces out one-by one in a star pattern (kind of like putting the lug nuts back on your car tire). Try and hang heavy objects (not yourself) from the frame. You will want to be able to put at least 2 times the expected weight on the sub-joists. This will be the first test of it's sturdiness. If the frame feels solid with load, it should be OK to climb onto. Please use the temporary supports until the tree house is complete for safety reasons!

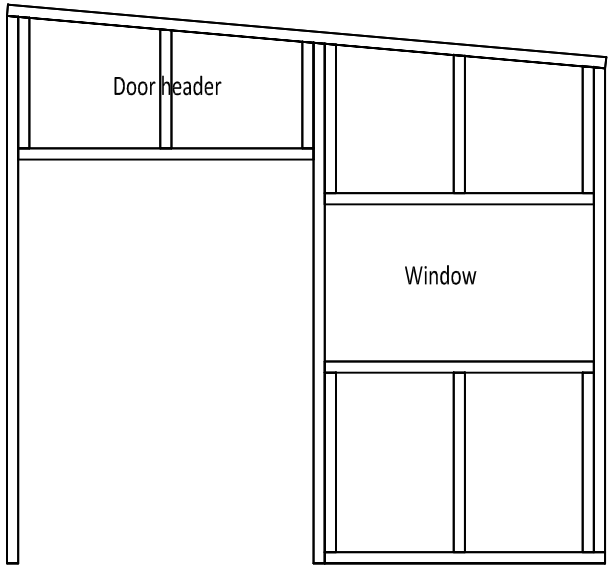
The nest step in the process will be to cover the sub-floor with either decking or plywood of some kind. For this example we will use $\frac{3}{4}$" oak or cedar plywood. Oak and cedar have high water and insect resistance, therefor it makes great exterior flooring. If you want to make one piece and use the piece as a template, your flooring pieces should look something like the diagram below. You may have to deal with branches. If so, you will have to cut around the branch and slide an opposite piece in behind it. Make sure you leave a couple of inches of growth space around the branch!

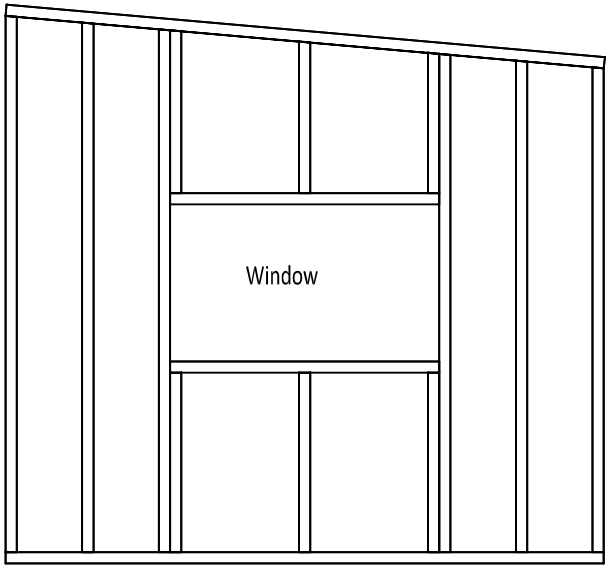


You can see, how each piece is basically a mirrored copy. You COULD only measure each piece once, and cut a total of 6 of each piece. You also have the option to cut the flooring how you want. The important thing to remember is to make sure each flooring piece ends on a joist. You definitely do not want any floating edges!

Honestly, the platform itself makes a pretty good tree house. AFTER you test it for weight, it is time to get started on the actual "house" part of the tree house. Be sure to put your temporary braces back under the sub-floor.

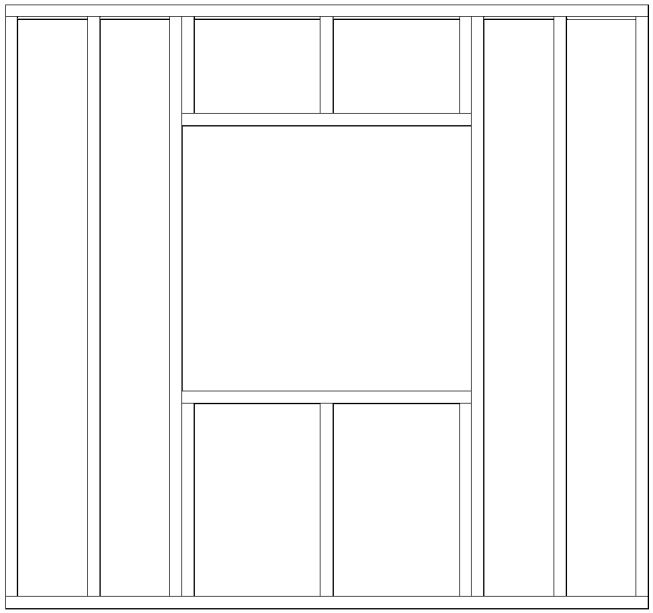
Now, to work on the walls will take some careful planning, especially if you have many branches in the way. Construct the window frame and the door header first. If needed, construct the wall frame around any branches or cut branches clear. We have included some basic plans on constructing simple doors and windows. See the appendices for further details.

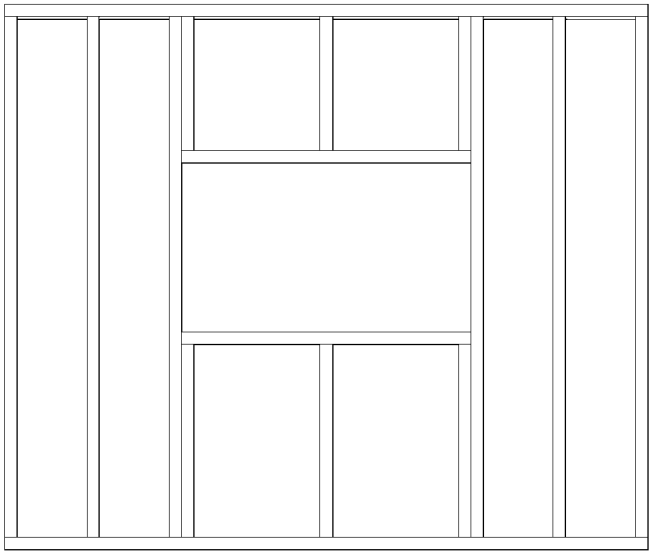




A
17
Front and Rear Wall Detail
Scale: NTS

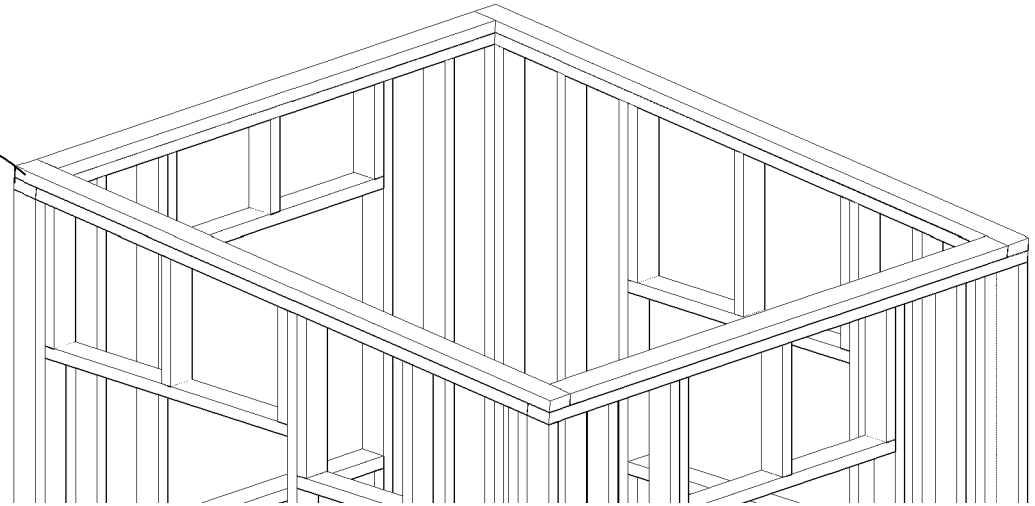
The side walls are the same general construction. One side will be shorter than the other.





A
18
Side Wall Details
Scale: NTS

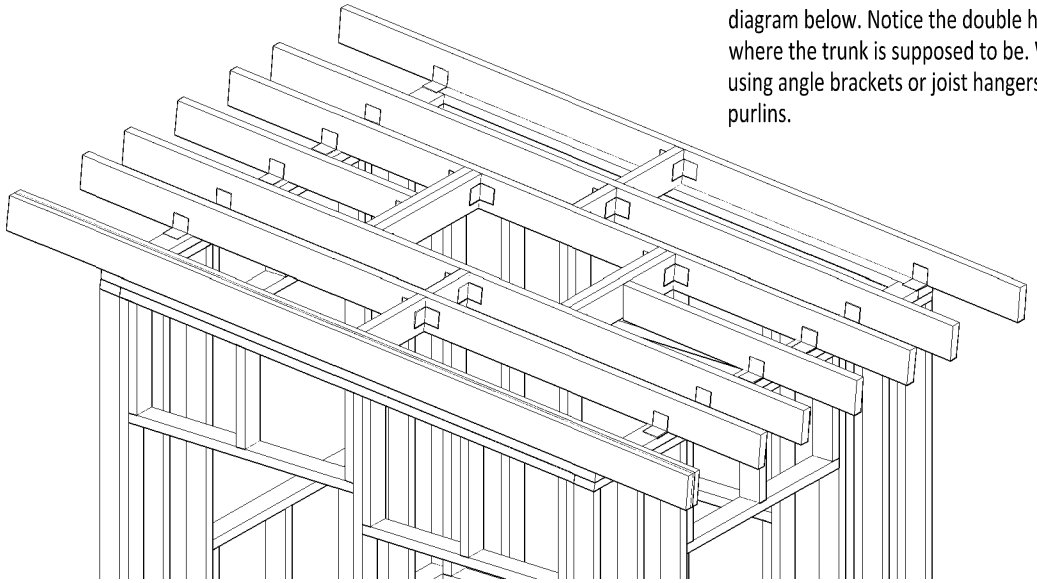
Next, you will need to tie the top of the walls together. To cut a top plate, measure the total length of the walls combined, and cut a plank that will overlap where the wall top plates connect.



A 19 Tie Plate Detail
Scale: NTS

We just use 2x6 board for rafters. Connect them to the top plate with "L" brackets. You will have to take the trunk into account while placing rafters. Make sure the rafters do not butt against the tree trunk, allow room for expansion.

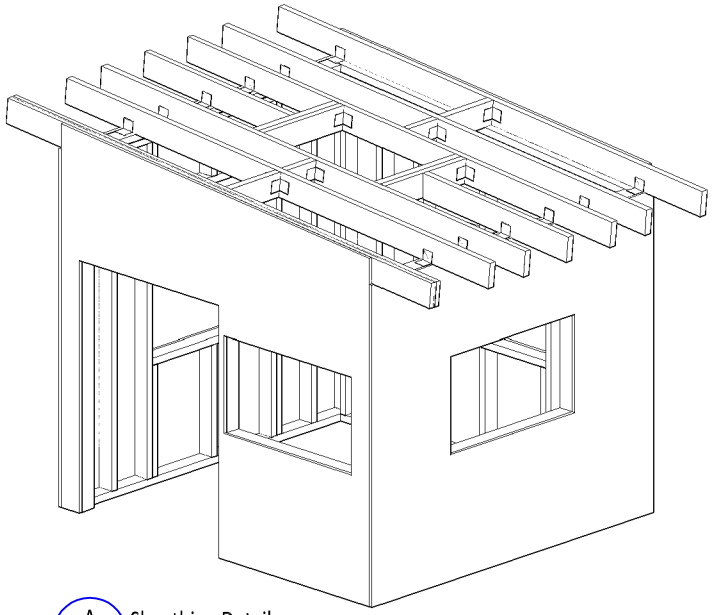
Your roof structure should look something like the diagram below. Notice the double header around where the trunk is supposed to be. We recommend using angle brackets or joist hangers to support the purlins.



See how you need to take the trunk (not shown) into account? We recommend a double header just to give yourself extra nailing surface. You will have to place the rafters around the trunk, leaving space for tree growth.
Try to center the rest of the rafters at 16" O.C.

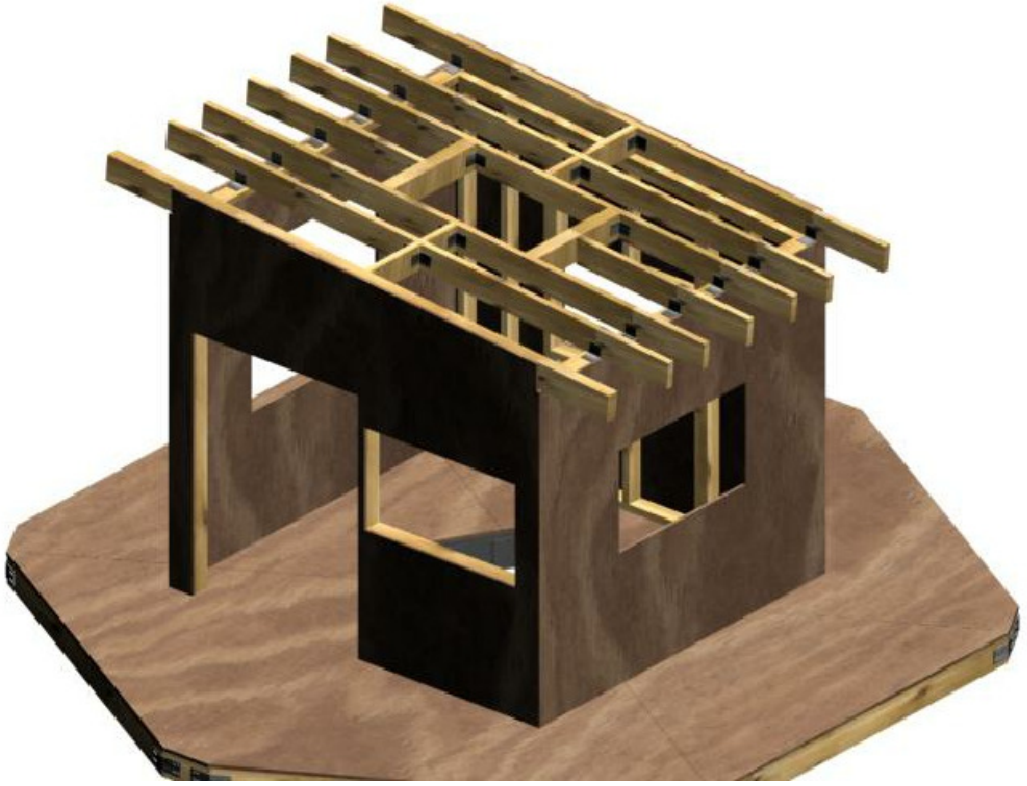
B 19 Purlin and Rafter Detail
Scale: NTS

Once the rafters are on, it is time to go ahead and sheath the structure. It is pretty simple. Just remember to measure your cuts of plywood and plan ahead a little bit.

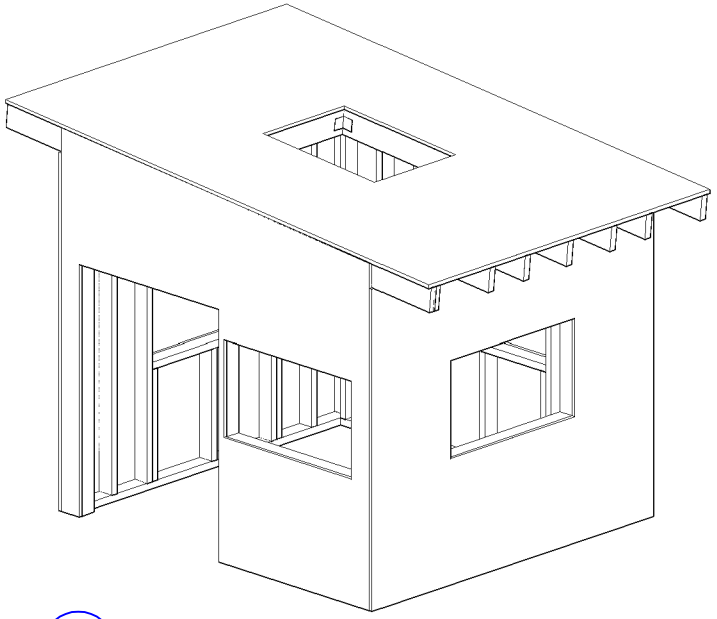


A
20
Sheathing Detail
Scale: NTS

The sheathing will follow the outline of the framing. The only difference is the front and rear wall sheathing will need to be flush with the top of the rafters.

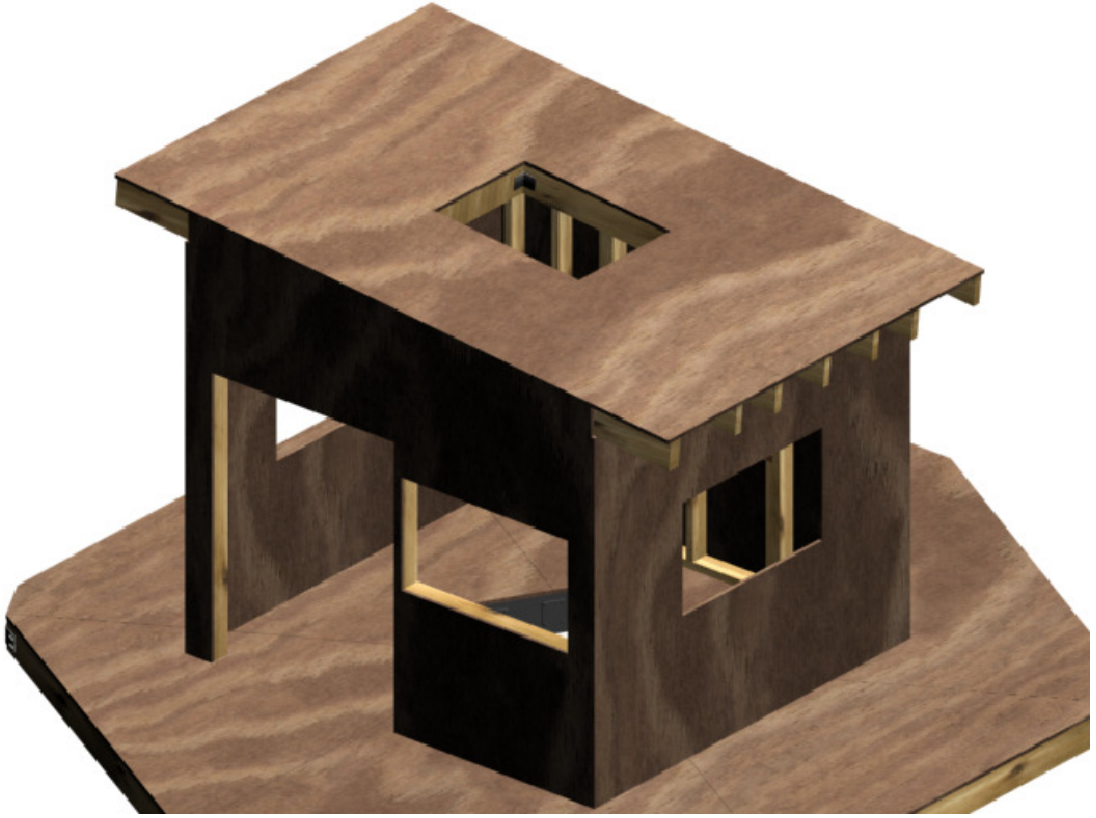


The roof sheathing is even easier. Measure and cut your plywood sheet. Remember to take the trunk into account. We are not going to frame around the rim of the roofing. Trim will take care of any open joists.

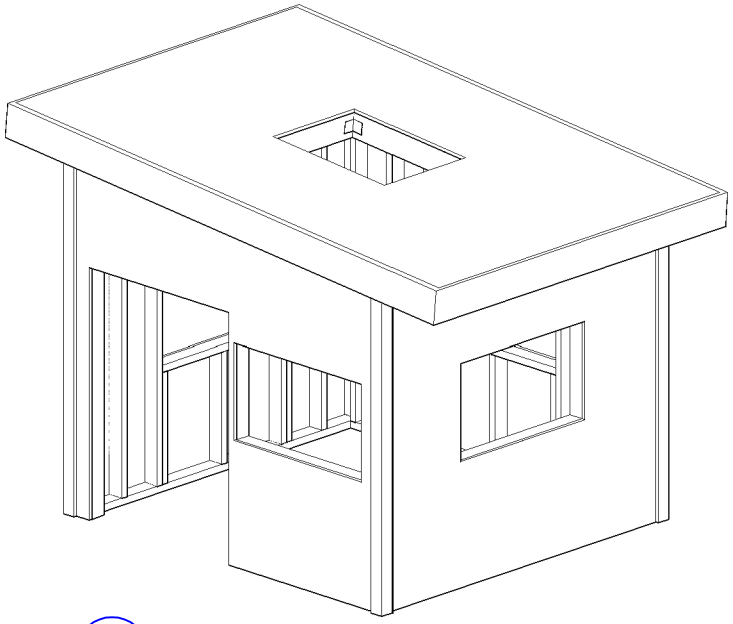


A
21
Roof Sheathing Detail
Scale: NTS

REMEMBER, THIS IS AN EXAMPLE ONLY! YOUR TREE AND STRUCTURAL LAYOUT MAY NEED TO BE DIFFERENT THAN THAT SHOWN HERE. THESE PLANS ARE INTENDED AS A GUIDE ONLY.



The roof sheathing is even easier. Measure and cut your plywood sheet. Remember to take the trunk into account. We are not going to frame around the rim of the roofing. Trim will take care of any open joists plus...it's a treehouse.



A
22
Trim Detail
Scale: NTS

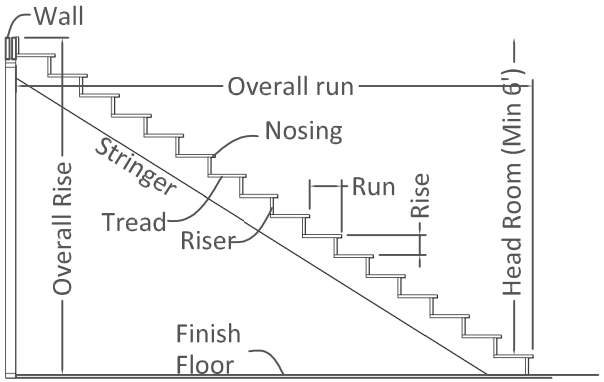
REMEMBER, THIS IS AN EXAMPLE ONLY! YOUR TREE AND STRUCTURAL LAYOUT MAY NEED TO BE DIFFERENT THAN THAT SHOWN HERE. THESE PLANS ARE INTENDED AS A GUIDE ONLY.

This is what the finished product will look like if you decide to add windows and a door. It is up to the builder preferences whether to add doors and windows. If you do, remember to add trim around them and you will need to take any branches into account or cut them off. It is the determination of the builder as to which kind of access to put in place. Stairs, ladders and rope ladders are all excellent choices. If you would like a recommendation on where to find such accessories, contact jeff@3dimconcepts.com.

For the stairs, you (the builder) have many options. You could build a simple ladder if you wish. We choose to include plans for a full set of stairs, but rather than break them down into a step-by-step process, we are going to use a generic format in outlining how to build stairs. We will list the stair components and leave it up to the builder in determining what type of stair they would like to use.

First, some general rules about stair building. You will want to follow these, especially if you are intending on converting the playhouse to another structure (such as a shed) once the children are grown.

A) Minimum stair width is 36" Railings may protrude into the stairway a maximum of $3\frac{1}{2}$".
B) Minimum tread length is 9". It is generally best to shoot for 10-11" tread width.
C) Maximum riser height (step height) is $8\frac{1}{4}$". For kids, we recommend less, generally around 6-7".
D) All risers MUST be within $\frac{3}{8}$" of the same size excluding the bottom riser (which may be smaller).



A
14
Stair Elevation
Scale: NTS

As a general rule-of-thumb,
-The rise times the run should approximately equal 75.
-Rise plus run should be between 17 and 18 inches.
-Two times the rise, plus the run should equal 25.

1) Determine the width of the stair tread (typically 11", you can use two 1x6s ($5\frac{1}{2}$"x2 = 11").

2) Subtract the nosing width, typically $\frac{1}{2}$", so that leaves $10\frac{1}{2}$".

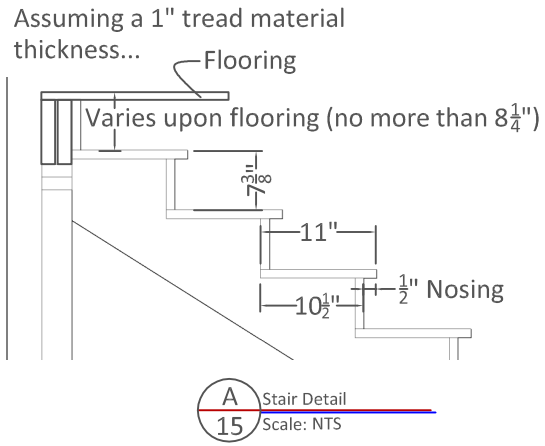
3) Using the first "rule of thumb" from above (rise x run = 75), a good rise for a $10\frac{1}{2}$" run (from step 2), is 75 divided by $10\frac{1}{2}$" = 7.14. As long as the number is never greater than $8\frac{1}{4}$, you will be fine.

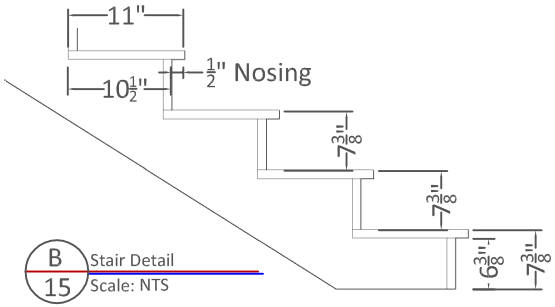
4) Measure the overall rise for the proposed stair. We will use 8' or 96" for this purpose.

5) Divide the number by the optimum rise (7.14). 96" / 7.14 = 13.45. There cannot be a partial step, so round to the nearest whole number 13. There will be 13 risers for a 8' overall rise.

6) Divide the overall rise (96) by the number or risers (13) = 7.38" or $7\frac{3}{8}$". Each riser will be $7\frac{3}{8}$".

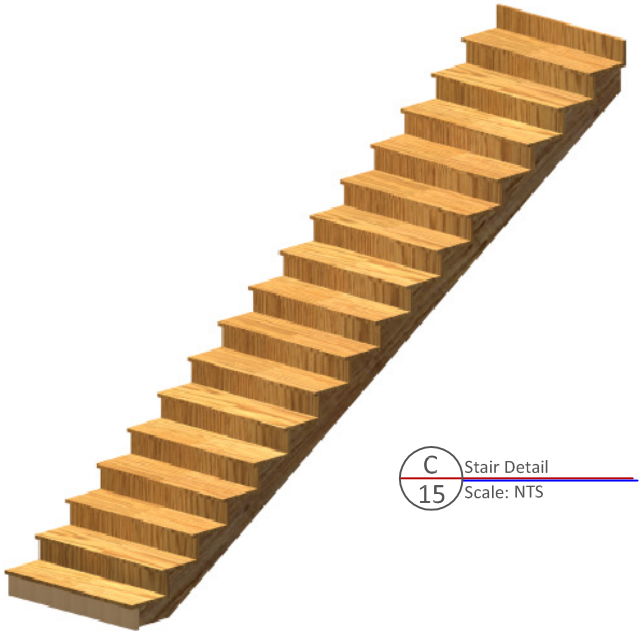
7) Layout a 2x10 or 2x12 pattern stringer. Make the first cuts with a circular saw and finish them with a jigsaw, hand saw or reciprocating saw (saws-all) to prevent over-cutting. Try the pattern in place to see how it fits. Use this to cut the other remaining one or two stringers using the pattern.





NOTE: YOU WILL WANT TO FINISH ANY SURFACE THE STAIR WILL COME INOT CONTACT WITH BEFORE MAKING YOUR MEASUREMENTS! Otherwise, you will have to cut your finish material AROUND the stairs and that can be a bit of a pain. This includes walls, floors and upper flooring.

Or, at least allow the thickness of your finish materials in your calculations, construct the form so you can use it for the rough carpentry and then take it down to finish the interior and put the stair back into place and finish.



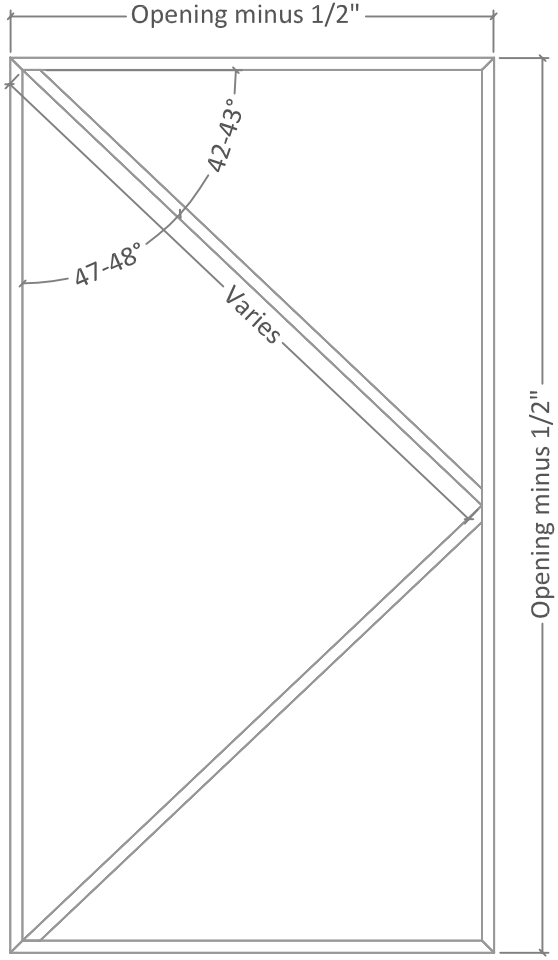
Materials

Description:	Qty:
2x10-12 Stringer	Varies
Tread Material	Varies

For the door, construction is relatively simple. If you want to install a latch, that is up to you. We do not show the details because there are special tools involved, most of which the normal person does not have. However, if you DO happen to come across such tools, you will be able to add a doorknob and catch should you desire.

As with the window, this is a very simple door and you do NOT have to construct the door in this way.
If you prefer to purchase a door, make sure the rough opening size is adequate. The frame rough opening in this instance is 2'-6 $\frac{1}{2}$"x56", minus $\frac{1}{2}$" for swing on both the sides and the top and bottom, that leaves a door size of 2'-6"x55 $\frac{1}{2}$".

1) To begin, we are using 1'4 planks and $\frac{1}{2}$" plywood sheeting. Cut the frame pieces as shown below. You DO NOT have to miter the corners, we just recommend it for aesthetic purposes.



A/A1 Rear Sheathing Diagram
Scale: NTS

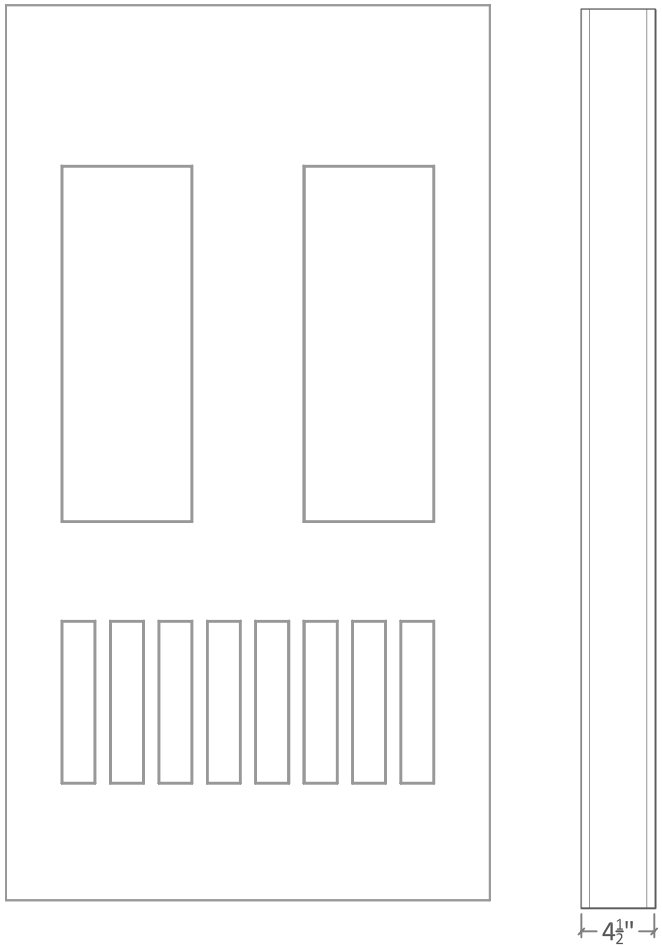
We will show the door in this example with a pattern cut out of the front and back sheeting, but this is not required. It is purely for looks and does not affect the integrity of the door at all.

Before you attach the panel to the door frame, you will want to check the swing in the doorway. We have allowed for $\frac{1}{2}$" swing, but depending on construction methods and accuracy, swing may be affected by as much as 1".

Please ensure the frame will swing in the opening without getting stuck or caught. You should allow more swing once you add the door panels so check after each step to ensure swing is not impeded.

Materials

Description:	Qty:
1x4x6' Planks	5
4x8'x$\frac{1}{2}$" Plywood Sheet	2
Hinges	3



B
A1
Rear Sheathing Diagram
Scale: NTS

2 Attach the front panel to the door frame, and MAKE SURE THE CORNERS ARE SQUARE and edges are flush. You may even want to sand the corners of the inside swing so they are rounded a little bit.

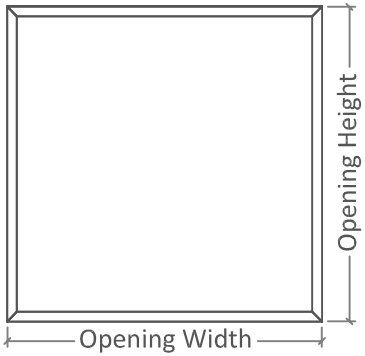
3) Insulate the door with either blow foam or regular R-13 roll insulation will work.

4) Enclose the door with the second panel. You may want to round the edges on this side also.

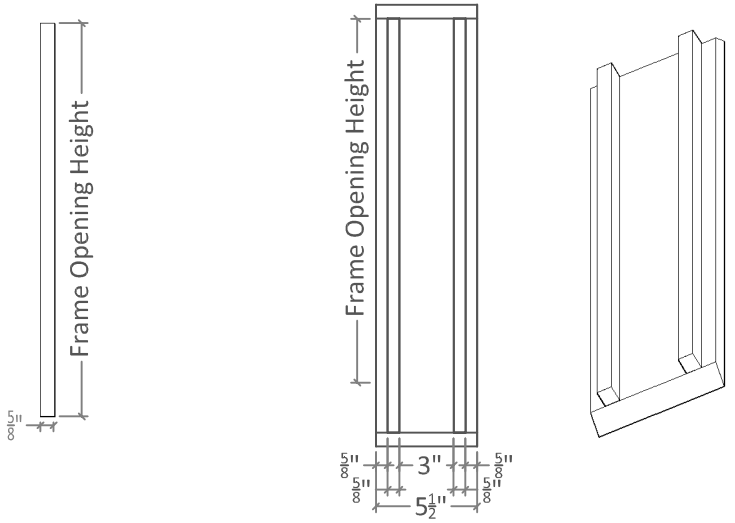
5) A single slide bolt works wonders on the outside and inside to lock the door shut. If you don't want your kids to be able to lock the door, only install the slide bolt on the outside! The slide bolt also offers a grip to pull the door open.

Windows are complicated to design and when at all possible, should be purchased. These details are for a very simple sliding window. You will need, and know how to use, a miter saw, a router (preferably with a guide) or table saw with an adjustable gouging blade (or blade kit, and a square (speed square, carpenter square, either works).

1) Cut and miter 1x6 planks as shown below. DO NOT ASSEMBLE YET!

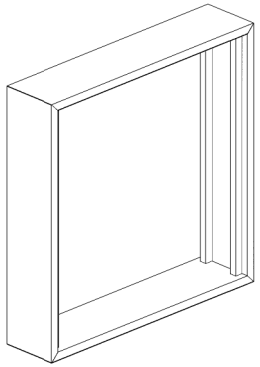


2) Rip a 1x4x8' into strips $\frac{5}{8}$" thick. These will serve many purposes in the future but for now, we just want four of them to match the opening, so either rip and cut one piece or rip an entire board into $\frac{5}{8}$" strips and place the pieces to the side for late.



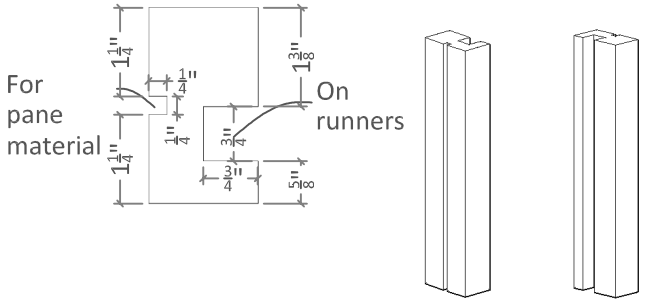
3) Using 1" screws and a level, screw two runners onto one of the exterior frame pieces. Repeat for the second side (see above).

4) Check to make sure the runners will fit inside the frame when assembled. Make any adjustments if necessary. DO NOT ASSEMBLE!

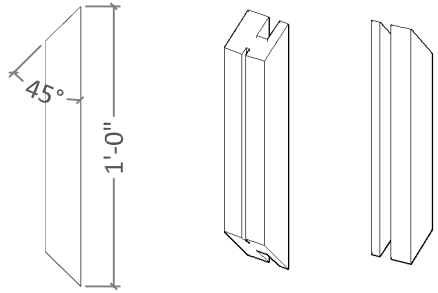


5) Rip a 8'-2x6 down the center lengthwise.

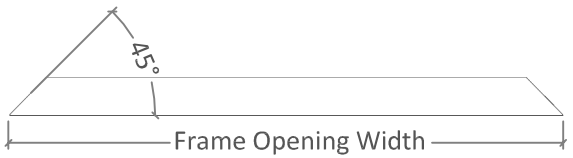
6) Use a router to gouge a $\frac{3}{4}$"x$\frac{3}{4}$" groove down the center of one side. Flip the board over and gouge a $\frac{1}{4}$x$\frac{1}{4}$" groove down the center of the other side (see detail)

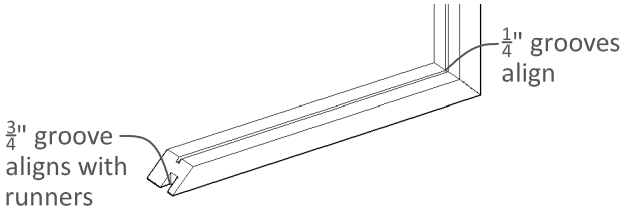


7) Miter the ends. Make sure the narrow ($\frac{1}{4}$x$\frac{1}{4}$") groove is facing inwards! The wide ($\frac{3}{4}$x$\frac{3}{4}$") grooves go out toward the runners, the inside grooves will hold a pane of window material.



8) Rip a 2x6 lengthwise down the middle and miter ends as shown below. Run a $\frac{1}{4}$"x$\frac{1}{4}$" groove down the middle, just as with the 2x6 above. Hold them together and MAKE SURE THE GROOVES ALIGN PROPERLY! You will need to gouge a $\frac{3}{4}$x$\frac{3}{4}$" groove out of the ends.





Materials

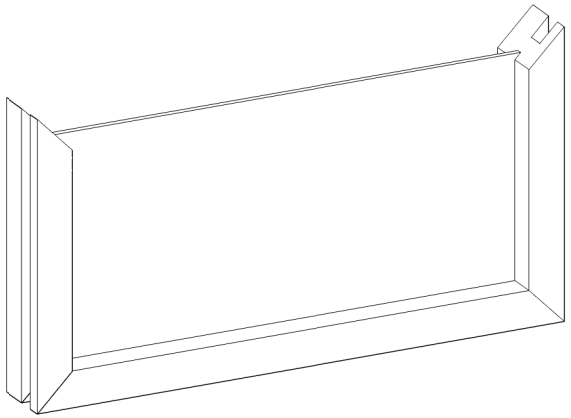
Description:	Qty:
2x6x6' Planks	24
1x6x8' Planks	6
1x4x8' Planks	6

9) Lastly, before construction, you will need to determine what type of pane material you want to use. For a playhouse, we would recommend against using glass and go with clear acrylic or polyvinyl pane.

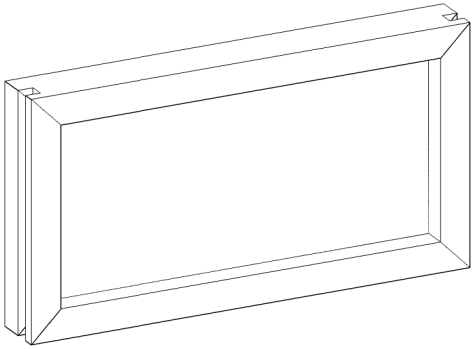
IF YOU DECIDE TO USE GLASS, WE HIGHLY RECOMMEND PURCHASING $\frac{1}{4}$" THICK PROFESSIONALLY CUT PANES. YOU WILL NEED 2 PER WINDOW. ON THIS SET THAT EQUALS 12 PANES OF GLASS TOTAL.

SHOULD YOU DECIDE TO CUT YOUR OWN GLASS, YOU DO SO AT YOUR RISK! USE ALL SAFETY PROCEDURES AND EQUIPMENT WHEN HANDLING GLASS!

10) Assemble the window frame around the pane. Run a bead of epoxy or polyethylene (or equivalent) seal down the frame pieces as you assemble the window to get a good, weather-tight, bond. You could increase rotting and mildew growth if you choose not to.

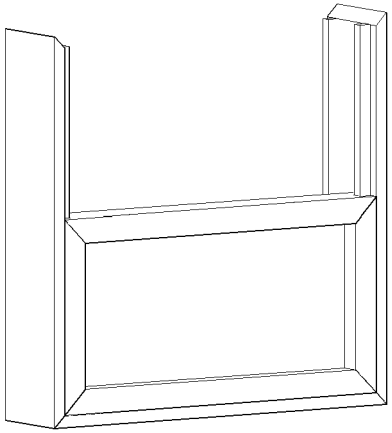


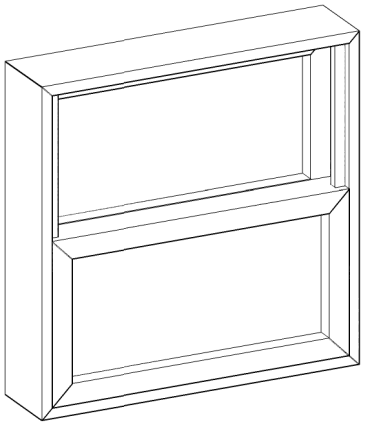
11) Cap off the window with the top piece and connect all pieces with 1" small radius ($\frac{1}{4}$" or smaller) screws. Be sure you don't screw down into the window pane!



12) Repeat for second window.

13) Once you have two window assemblies, two exterior frame pieces with runners on them, and two exterior frame pieces for the top and bottom, carefully assemble the exterior window frames AROUND the window assemblies.





14) Cap off the window assembly, Ensure the windows slide easily and there is about $\frac{1}{16}$-$\frac{1}{8}$" gap between the window assemblies so they will not impede each other's movement.

15) Place the window in the window frame. Screw the exterior frame to the opening provided. You may have to use a soft mallet or a dead-blow hammer to get the window centered in the opening.

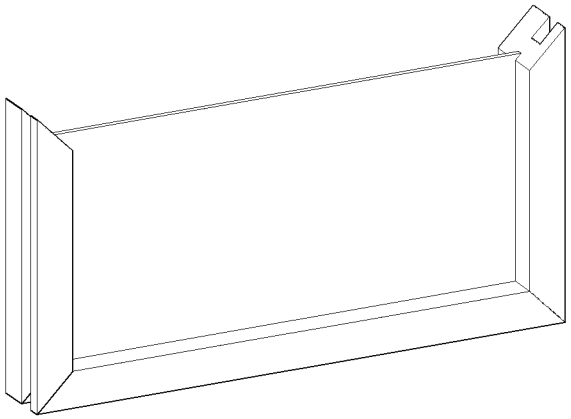
16) How the windows stay up or down is up to the user. We recommend getting a slide bolt and installing at least one on the movable assembly. Which assembly moves or stays stationary is up to the builder.

17) Lastly, before construction, you will need to determine what type of pane material you want to use. For a playhouse, we would recommend against using glass and go with clear acrylic or polyvinyl pane.

IF YOU DECIDE TO USE GLASS, WE HIGHLY RECOMMEND PURCHASING $\frac{1}{4}$" THICK PROFESSIONALLY CUT PANES. YOU WILL NEED 2 PER WINDOW. ON THIS SET THAT EQUALS 12 PANES OF GLASS TOTAL.

SHOULD YOU DECIDE TO CUT YOUR OWN GLASS, YOU DO SO AT YOUR RISK! USE ALL SAFETY PROCEDURES AND EQUIPMENT WHEN HANDLING GLASS!

18) Assemble the window frame around the pane. Run a bead of epoxy or polyethylene (or equivalent) seal down the frame pieces as you assemble the window to get a good, weather-tight, bond. You could increase rotting and mildew growth if you choose not to.



Additional Stuff for the Window Assemblies:

1) Use weather striping along the seam between the window assemblies to keep wind, and weather out as much as possible.

2) We recommend having one stationary, and one movable window. Most often, anchor the exterior window to the top of the assembly and let the interior window slide up and down.

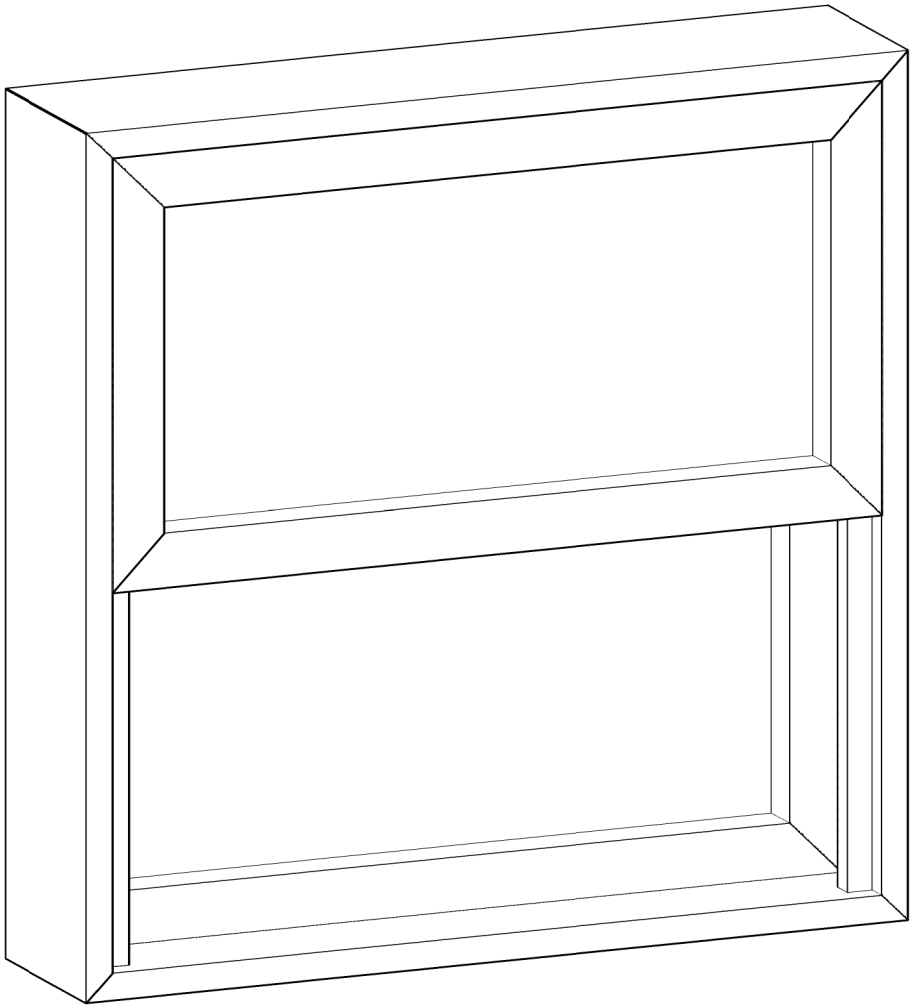
1) Drill a $\frac{1}{4}$" pin hole in the interior, left or right, side of the movable window assembly.

2) While the window is closed, drill into the runner about $\frac{1}{4}$".

3) Keeping the drill bit inside the pin hole, pull the drill bit back out a little, raise the window and drill back in about $\frac{1}{4}$" into the runner. We recommend about 3" increments.

4) Repeat as necessary for how much you wish the window to open. Cut a length of $\frac{1}{4}$" dowel (may need sanding to slide freely) to use as a pin.

5) Add a slide pin to both the top and bottom of the movable window so the windows can be "locked" shut if you wish.



To determine the rafter lengths,

1) Divide the entire span by two (example: If the roof span is 20 feet, divided by 2 = 10 feet, 0 inches.

2) Now add the overhang (example: 18-inch overhang makes the length 11 feet 6 inches).

3) Now, convert the 6 inches of the 11 feet 6 inches into a fraction. It happens to be 0.5 (6 divided by 12). Thus 11 feet 6 inches is now 11.5

4) Suppose you desire an 5/12 roof pitch, or for every 12 inches horizontally, you get 5 inches up and 12 inches vertically. Convert that number by using the rafter conversion chart below or can be found on any framing square.

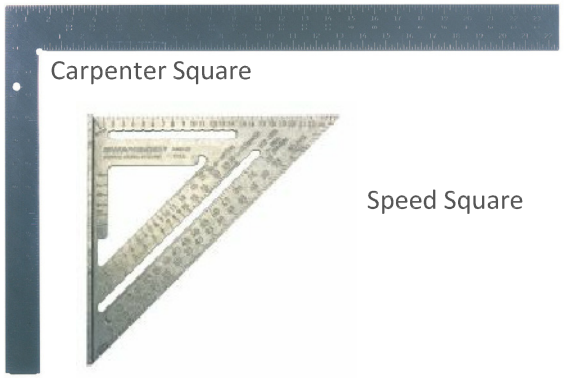
5) For the purpose of this article, the 5/12 roof pitch converts to 1.083 on the rafter conversion chart found on any framing square.Therefore, 11.5 x 1.083 = 12.4545 feet is what the rafter length will be.

6) Obviously, getting to the thousands of an inch is a feat in itself, so lets just round to the nearest $\frac{1}{8}$" which is 12.5 feet or 12'-6".

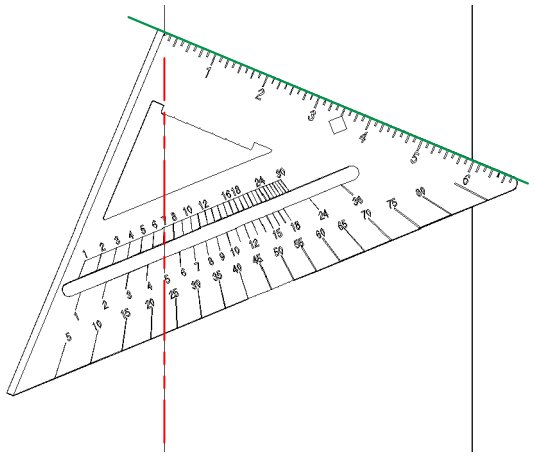
Roof Slope	Factor
Flat	1.0
1:12	1.003
2:12	1.014
3:12	1.031
4:12	1.054
5:12	1.083
6:12	1.118
7:12	1.158
8:12	1.202
9:12	1.250
10:12	1.302
11:12	1.357
12:12	1.414
13:12	1.474
14:12	1.537
15:12	1.601
16:12	1.667
17:12	1.734
18:12	1.803
19:12	1.873
20:12	1.943
21:12	2.015
22:12	2.088
23:12	2.162

If you feel at all uncomfortable constructing roof elements, consult a professional. Also, you will need to be comfortable with heights and please use all safety precautions when placing the rafters. Not every rafter will be directly above a solid surface and there will be open spans beneath them. We recommend use of a ladder and assistant(s) to help you get the rafters into position.

1) If you need to be introduced to the tools most professionals work with when cutting rafters. There are basically two tools used commonly, the speed-square and the carpenter square. Both are shown below.

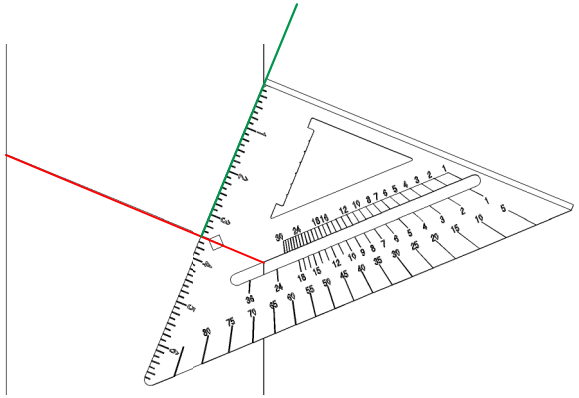


For the speed square, start by lining up your plumb cut by aligning the pivot point on the speed square with the desired pitch. This example is going to use a 5-12 slope but the principle is the same with any slope. See the diagram below.



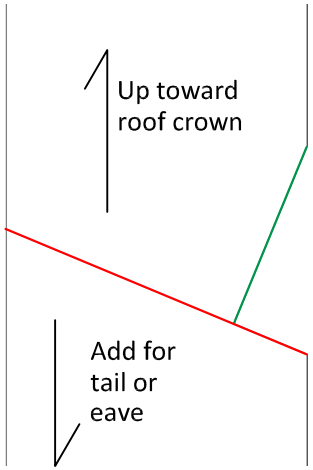
See how the red line lines up with the little notch in the back of the speed square and the number 5 in the "common". The common simply refers to a common rafter. Notice also, how the "HIP/VAL" lines up quite nicely with 7? For a $\frac{5}{12}$ slope, the corresponding hip/valley slope would be 7. Easy peasy.

2) Anyway, mark your line along the GREEN side with all the numbers.To make your seat cut, simply plumb the other side at the length you need and follow the diagram below for a nice $3\frac{1}{2}$" seat cut.



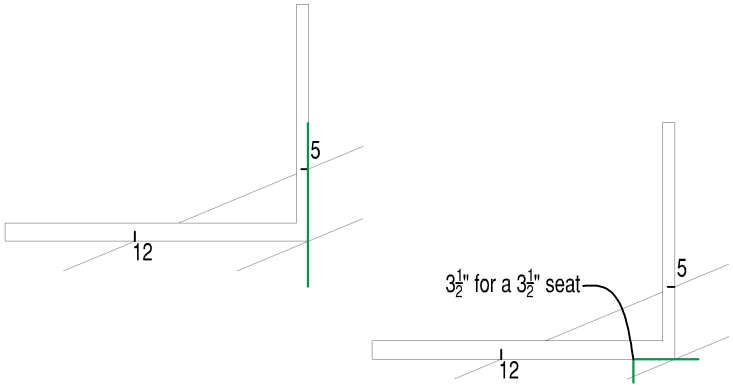
Align the diamond sight so the line cuts the sight down the center and your pivot point is flush against the outside edge of the rafter to be cut.

The RED line represents the mark you just made for plumb. Now again, mark along the green line for your seat cut. See the nice "L" shaped seat? Cut your seat out and it should look something like below.



The previous page contains instructions with a table which will help you measure the overall rafter length.

For a Framing (Rafter) Square it is basically the same principle. Align the 5 and the 12 as shown below. Mark the GREEN line shown in 1 for plumb.



To mark the seat measure the $3\frac{1}{2}$" on the square and mark the plumb at the end as shown above in 2.