For the sub-floor, since we are looking at using a pier foundation for this playhouse, we will use 2x8 joists and rim joists.

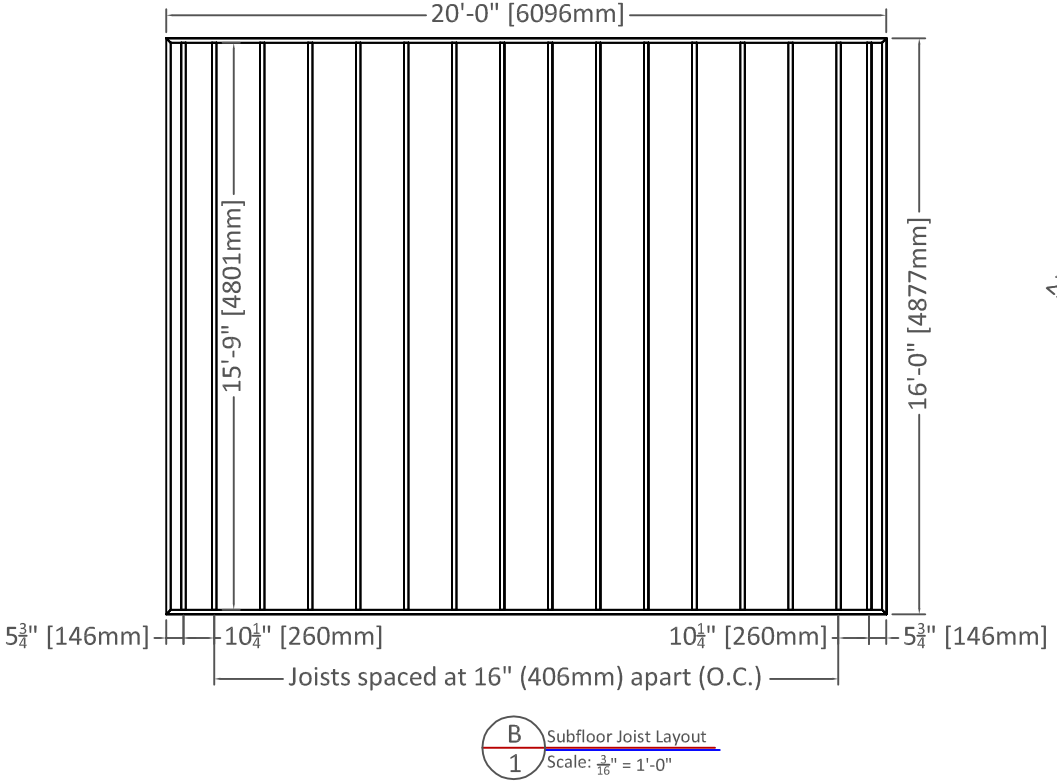
If you decided to opt to use the slab foundation, you may cut the joists to 2x4 (the spans are already supported).

We will use 2x8 pressure-treated joists for the sub-floor materials because of the water-resistance in the material. If you do NOT purchase pressure-treated lumber, the 2x8 joists MUST be either cedar or oak (or equivalent insect and water resistance). If you purchase a "soft wood" (such as pine or fir), you risk the sub-floor rotting out from moisture and/or insect intrusion from below.

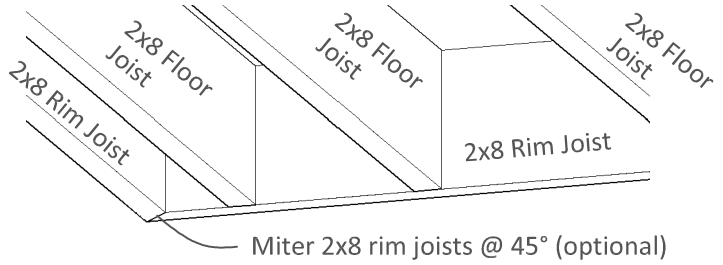
Also, ALWAYS thermally insulate the joists with at LEAST R-13 roll insulation so the floor doesn't let a draft up from below.

Before beginning any construction, please ensure you have all the necessary safety equipment you will need. Always read and understand what the instructions are telling you to do BEFORE attempting any cutting. Make sure all measurements are precise (within $\frac{1}{16}$"), and any miter angles match the opposing angle shown.

1) To begin, you will need two 20'-2x8 planks (see Materials) and seventeen 16'-0" 2x8 planks. Measure and cut the planks to the dimensions as shown below. Remember: Always check the actual length of boards. Some lumber manufacturers cut boards to length, some cut their boards a little longer!



B / 1 Subfloor Joist Layout
Scale: $\frac{3}{16}$" = 1'-0"



A / 1 Subfloor Joist Detail
Scale: NTS

2) Layout the floor joists as shown above. Attach with screws or nails. If you are lucky enough to have a nail gun, use that to make the work load easier.

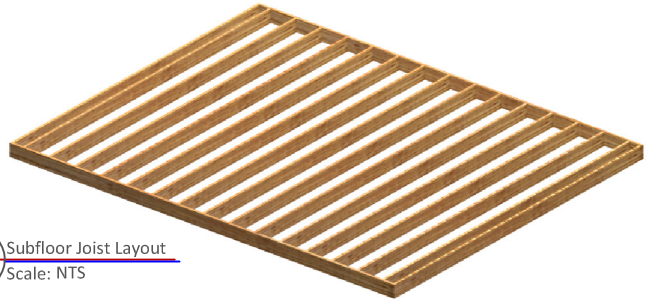
Hint: For aesthetic reasons, we recommend mitering the 2x8 rim plank ends at 45°, it will create a nice, single seam. This is, however, NOT necessary!

3) Purchase 10 prefabricated concrete piers (usually available at local hardware stores or building supply centers for around $10.00 each). The wonderful thing about the prefabricated piers are they are designed to hold a wide range of wooden posts. We are interested in the piers holding a 4x4 nominal cut (3.5" x 3.5") post. They should look something like the diagram below.

Note: These are not the only type of concrete footings available.
Be sure to look around and find the best type for your needs.

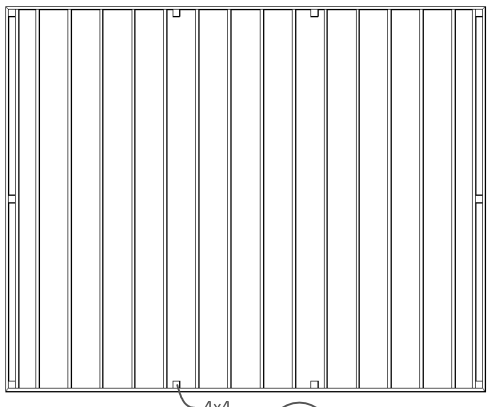
A/2 Subfloor Joist Layout
Scale: NTS

4) Right now, your sub-floor should look something like the diagram below. Locate the position for the playhouse and lay the floor joists in position. Remember to face the playhouse in the direction you want, soon the frame will be way too heavy to move.

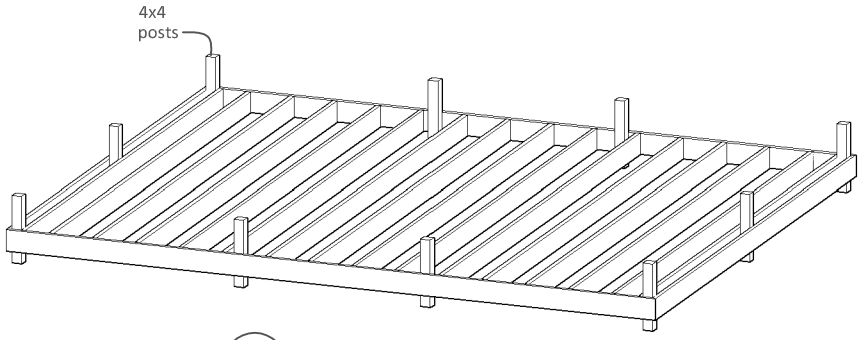


B/2 Subfloor Joist Layout
Scale: NTS

5) When you have the joists laid out and faced the direction you want. You need to do some slight site preparation before mounting the sub-floor on the foundations above. Locate the 4x4 posts as shown below.



D/2 Subfloor Joist Layout
Scale: 1/8" = 1'-0"



C/2 Subfloor Joist Layout
Scale: NTS

Materials

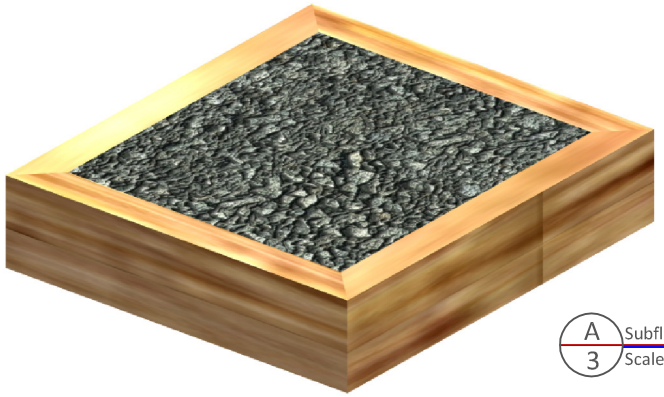
Description:	Qty:
2x8x16' planks	18
2x8x20' Planks	3

6) Once you have the posts located where you will need them, Start in once corner and working you way around, lift the sub-floor frame about 3-4" and tack a post in it's location. Once you have the joists off the ground just look and see if the posts are starting to sink into the ground at all.

IF the posts are sinking excessively, and even if they are not, you will want to add peat gravel to the area before placing your concrete footings under the frame. If you neglect this step, when the posts and footings settle at different rates, the floor will start to bend, flex and bow (not good). IT IS NOT A GOOD IDEA TO SKIP THIS STEP!

1. Measure the bottom of the concrete pier perimeter and build a 2x4 wooden frame roughly 1-2" larger than the bottom perimeter of the concrete pier. You will need a frame like this for every single pier!

2. Fill the frame with washed peat gravel (available at any concrete plant or quarry, you may even find bags of it at your home supply store). The finished product will look similar to the diagram below.

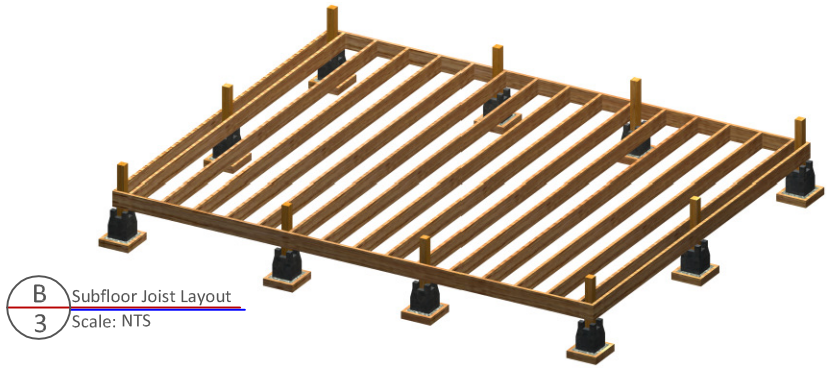


A/3 Subfloor Joist Layout
Scale: NTS

You may be wondering why you even need something like this. Well, in a nutshell, when you start to add the weight of the walls, roof, loft, etc., that is too much weight for grass-covered soft ground to take. The structure will, quite literally, start to sink into the ground. The sinking will cause uneven surfaces and eventually even buckle the flooring which is very hard to repair. These "pads" give the concrete piers a wider surface to sit upon and the gravel will distribute the weight of the structure evenly to the ground, keeping the structure from sinking. Got it? Good!

7) When you have your "pads" in place and filled with peat gravel. Have an assistant help you lift the flooring while you slide the concrete pier underneath each post.

8) Continue around until you have something that looks like the diagram below.



B/3 Subfloor Joist Layout
Scale: NTS

Now, we are getting to the wall structures. Some things to remember:

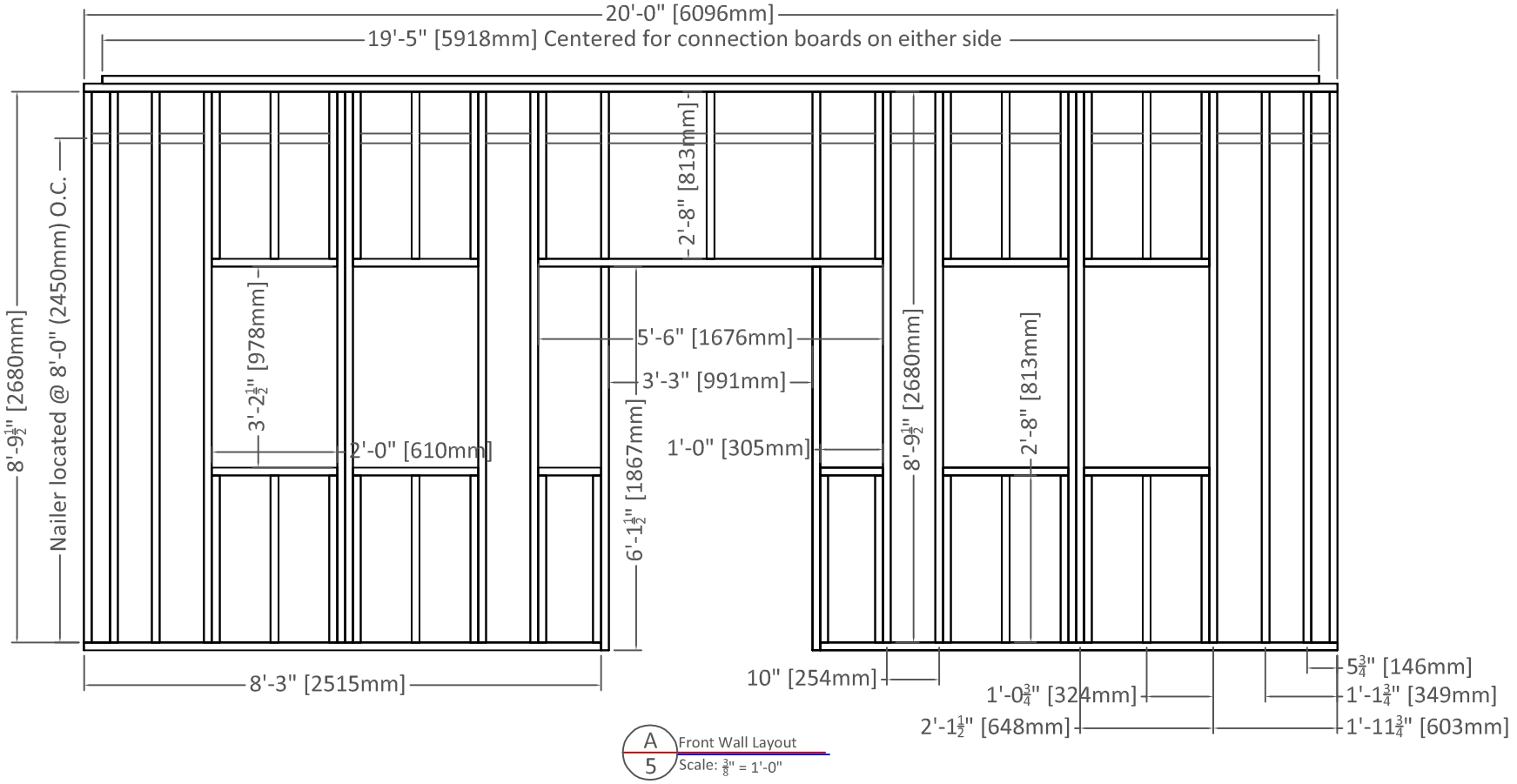
1) Always measure openings and cuts carefully!

2) Give yourself a small amount of rough opening space if you intend on purchasing windows and doors. We would recommend purchasing windows and doors prior to building wall structures so you may measure accurate rough openings. This set of plans will assist you in building some general doors and windows, but you may feel free to purchase doors or windows at your discretion. PLANS MAY NEED TO BE ALTERED!

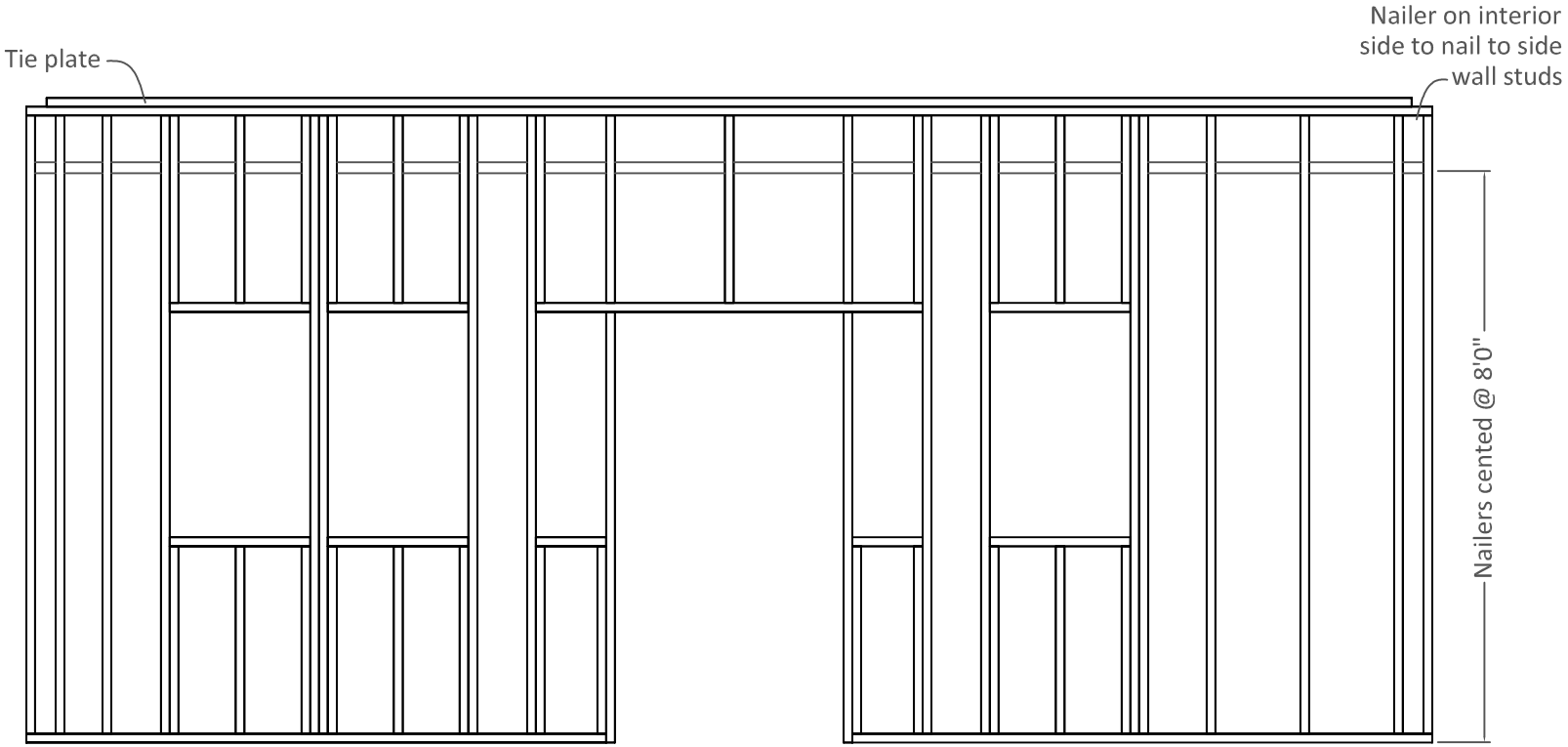
3) These plans are to be intended as a guide ONLY! Should you choose to alter these plans at any time, remember to adjust measurements accordingly!

Now, time to start on the walls.

1) Start by cutting the entrance wall as shown below. Cut lengths carefully and make sure edges are flush and corners are square.



2) The rear wall is much the same as the front wall. The fourth window is missing to accommodate the stairs to the loft.



Again, you may skip the tie plate on the top until you are ready to tie the walls together.

Assemble walls on the ground. Be careful when following the detail, there are many studs and it is easy to become confused. Refer to the full-color diagram below if you are having problems keeping the components in order.

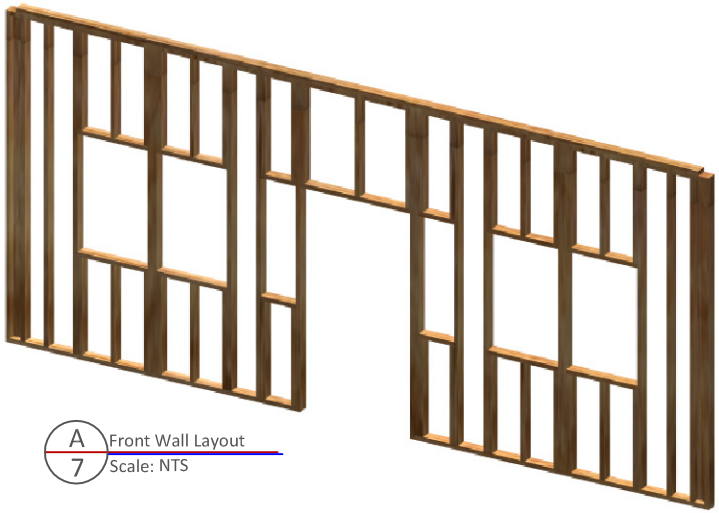
3) Start with the main outside frame. Assemble the base plate, sill plate, jamb plates and exterior studs.

4) Assemble one window structure at a time. Use a speed square and level to ensure timbers are straight vertically and horizontally.
Repeat for the other side.

5) Layout the location of the window assemblies with a pencil and insert into the assembled exterior frame.

6) Assemble the door header assembly and locate in the main door location. These dimensions may change depending on if you decide to purchase or build the door! Measure carefully!

7) We recommend purchasing windows, but if budgetary constraints prohibit, we have included plans for basic sliding windows later in these plans.



Note: This diagram does NOT show placement of the nailers for clarity. Do NOT forget to put the nailers in place or you will not have a nice, tight seam between sheathing pieces! You will have a "floating seam" which MUST be filled with sealant or sealed with an alternative method. Failure to do so will allow water and insect intrusion.

Note: You should be able to cut the studs and the headers, and header supports out of the 12' studs. We have included two 20 2x4 planks to cut into nailers.

Materials

Description:	Qty:
2x4x12' Stud	44
2x4x20' Stud	6

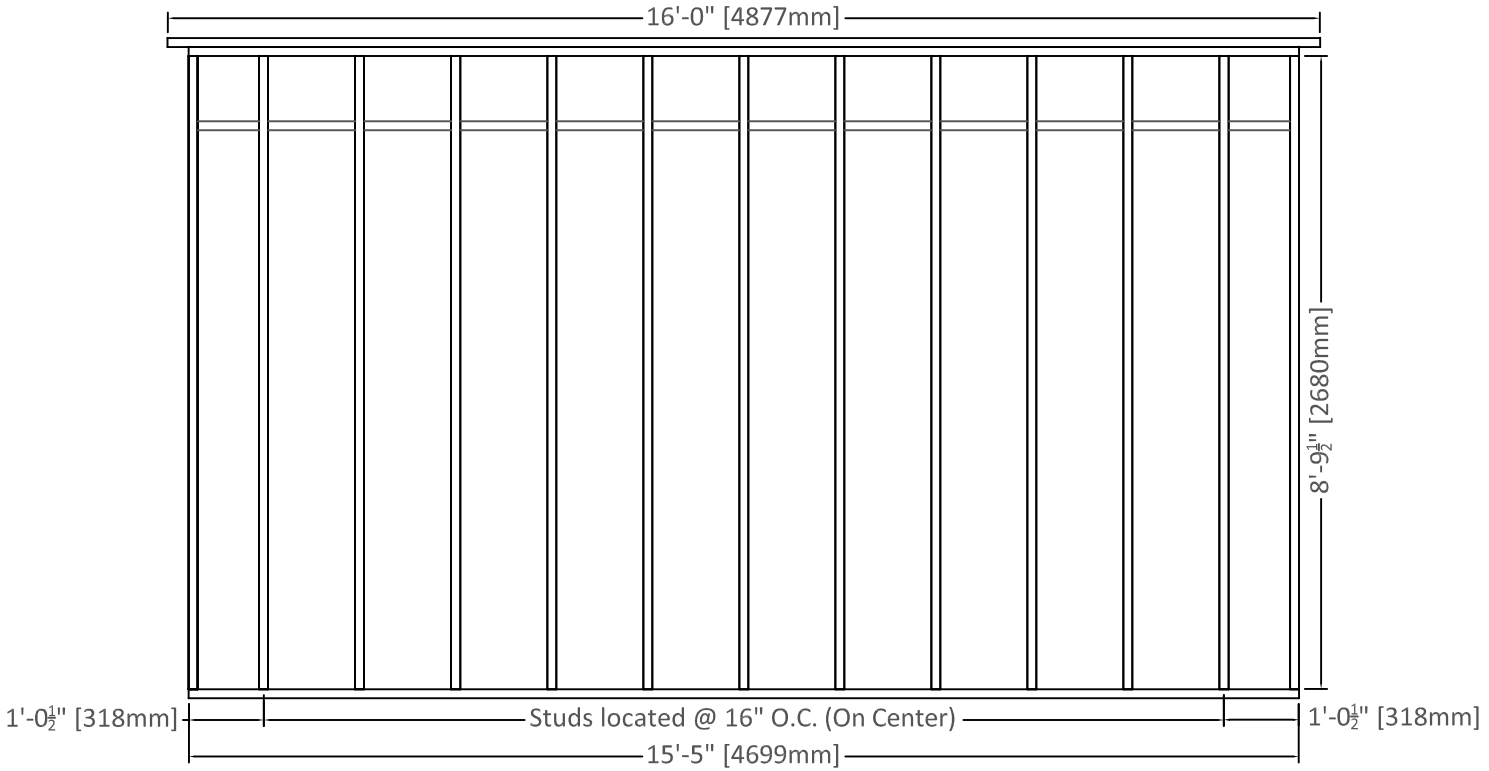
1. Always measure openings and cuts carefully!

2. Give yourself a small amount of rough opening space if you intend on purchasing windows and doors. We would recommend purchasing windows and doors prior to building wall structures so you may measure accurate rough openings. This set of plans will assist you in building some general doors and windows, but you may feel free to purchase doors or windows at your discretion. PLANS MAY NEED TO BE ALTERED!

3. These plans are to be intended as a guide ONLY! Should you choose to alter these plans at any time, remember to adjust measurements accordingly!

Now, time to start on the side walls.

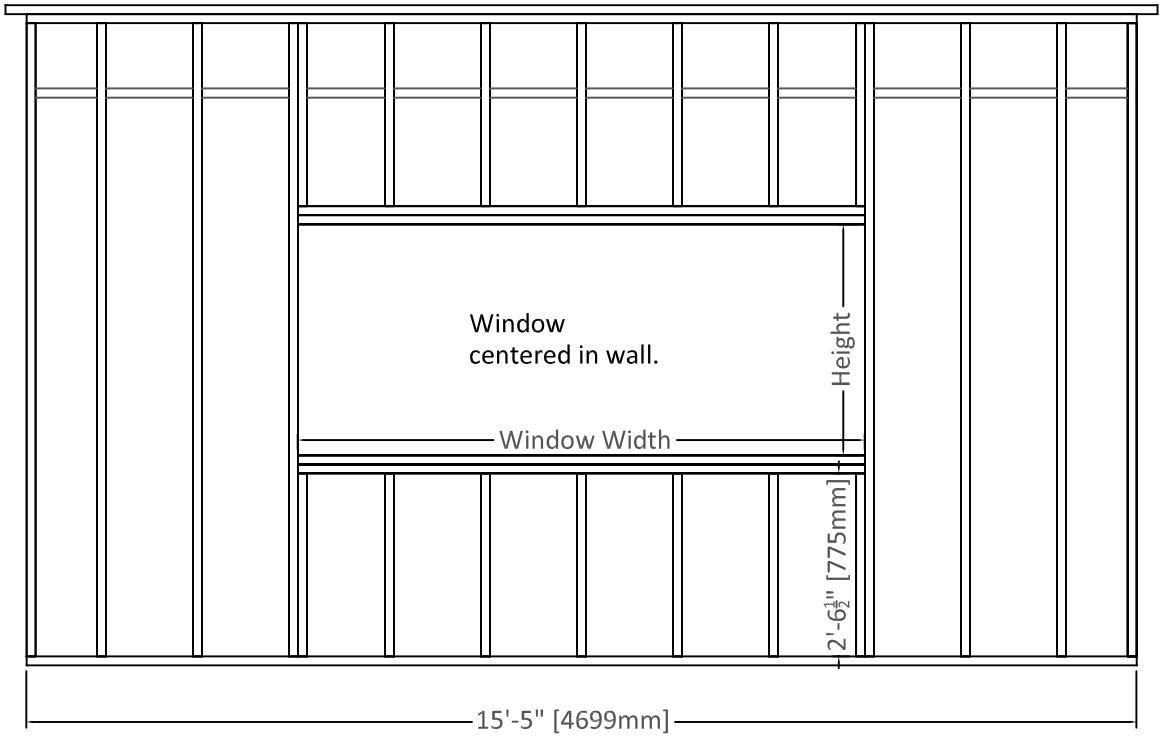
1) Start by cutting the entrance wall as shown below. Cut lengths carefully and make sure edges are flush and corners are square.
This wall will be easiest, as the stairs will be inside, there are no windows.



A/8 Side Wall Layout
Scale: 3/8" = 1'-0"

2) We will add a large picture window to the opposite side. The windows may vary depending on builder preferences so be sure to measure openings carefully.

Again, you may skip the tie plate on the top until you are ready to tie the walls together. Don't forget the nailers for the sheathing - centers @ 8'-0".



A/9 Front Wall Layout
Scale: 3/8" = 1'-0"

Assemble walls on the ground. Be careful when following the detail, there are many studs and it is easy to become confused. Refer to the full-color diagram below if you are having problems keeping the components in order.

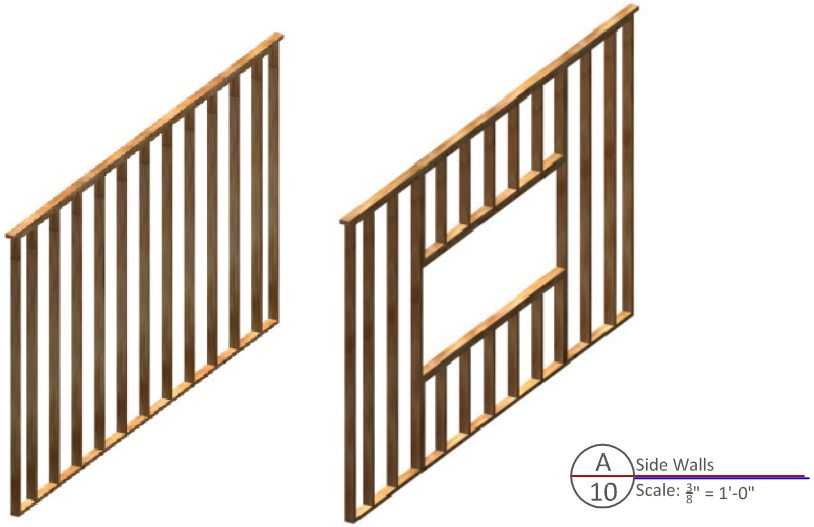
3) Start with the main outside frame. Assemble the base plate, sill plate, jamb plates and exterior studs.

4) Assemble one window structure at a time. Use a speed square and level to ensure timbers are straight vertically and horizontally.

5) Layout the location of the window assemblies with a pencil and insert into the assembled exterior frame. Measure from center outward for stud locations. Studs are located at 16" centers.

6) We recommend purchasing windows, but if budgetary constraints prohibit, we have included plans for basic sliding windows later in these plans.

7) If you opted to hold off on the tie sill, once all of the walls are complete, now would be the time to install the tie sills.



Note: This diagram does NOT show placement of the nailers for clarity. Do NOT forget to put the nailers in place or you will not have a nice, tight seam between sheathing pieces! You will have a "floating seam" which MUST be filled with sealant or sealed with an alternative method. Failure to do so will allow water and insect intrusion.

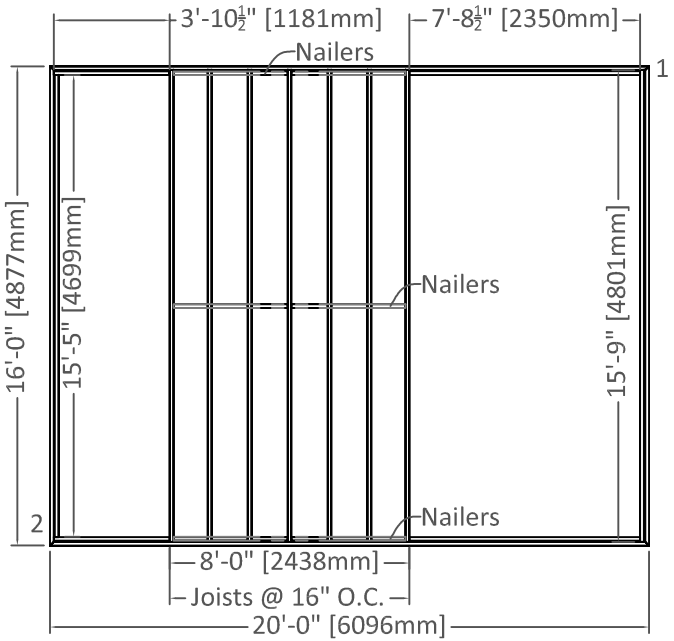
Note: You should be able to cut the studs and window header supports out of the 12' studs. We have included two 16' 2x4 planks to cut into nailers.

Materials

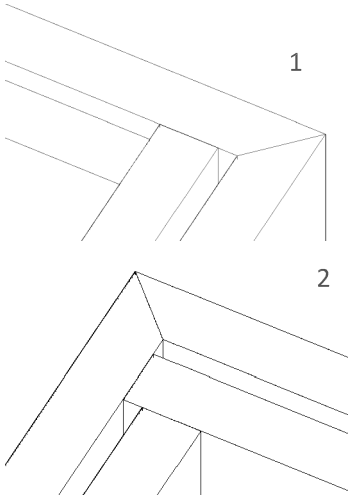
Description:	Qty:
2x4x12' Stud	21
2x4x16' Stud	8
2x4 Window Headers (by builder)	4

Once the walls are in place you should have something like the diagram below.

1) Now you are going to start the loft construction. The construction method is very similar to the base construction. At minimum, 2x8 construction is recommended because of the open span beneath. You will need a column and brace if you intend on using smaller joists.



A/12 Loft Layout
Scale: ⅜" = 1'-0"

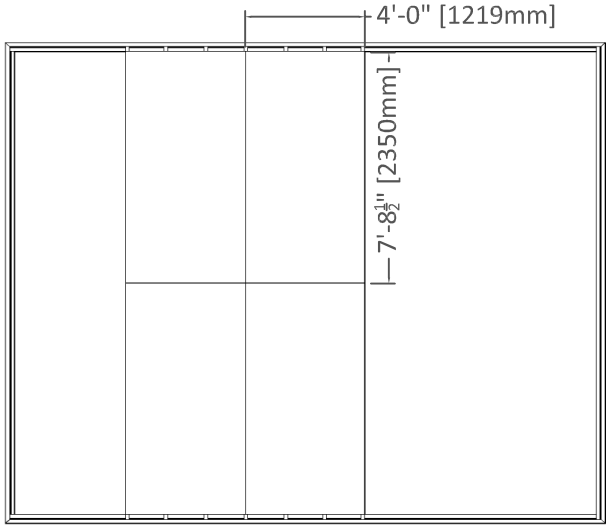


Notes:

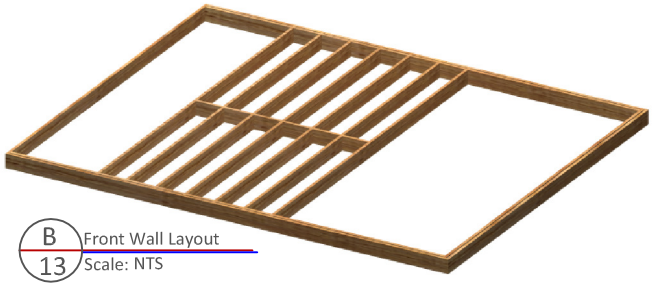
1. Notice the 2x8 rim joist around the perimeter of the walls beneath.
2. Also, place 2x8 joists along inside rim of walls beneath. These will give you a nice, rigid surface to construct the upper floor walls. There are two different connection types shown (1&2), either one, or both, will work fine as long as the interior perimeter is solid.
3. If you would like, we recommend filling the air space with some type of roll insulation.
4. DO NOT FORGET THE NAILERS IN BETWEEN THE LOFT JOISTS! THESE ARE VITAL FOR THE LOFT FLOORING. ALSO, NOTE THE NAILERS ALONG THE CENTER OF THE JOISTS. THE FLOORING WILL ATTACH TO THESE.

2) You are going to want to give yourself a nice platform to work on, so go ahead and sheath in the loft. Just remember, you need the perimeter to nail to, so don't run the sheathing beyond the very inside edges!

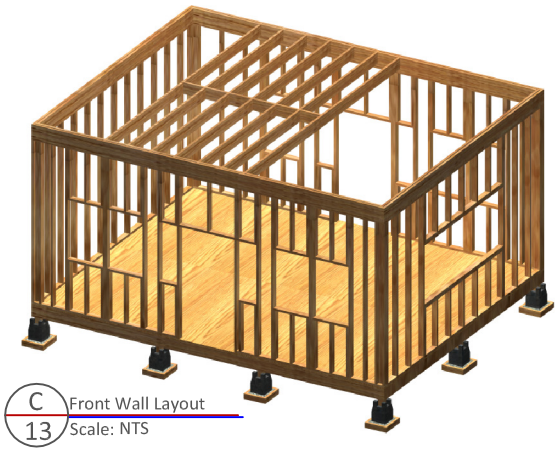
Hint: These plans show a centered seam, if you want, shift the nailers to 8' so you don't have to cut two of the sheets of plywood.



A/13 Loft Floor Layout
Scale: 3/8" = 1'-0"



B/13 Front Wall Layout
Scale: NTS



C/13 Front Wall Layout
Scale: NTS

D/13 Front Wall Layout
Scale: NTS

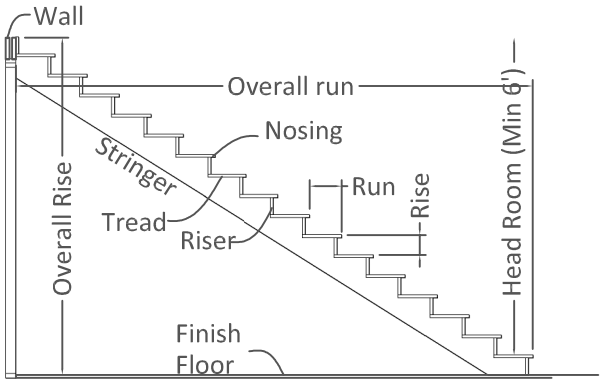
Materials

Description:	Qty:
2x8x16' Joist	11
2x8x20' Rim Joist	4

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 $10\frac{1}{2}$".

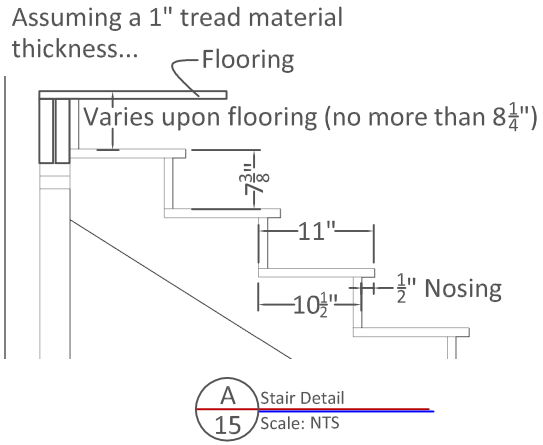
3) Using the first "rule of thumb" from above (rise x run = 75), a good rise for a $10\frac{1}{2}$" run (from step 2), is 75 divided by $10\frac{1}{2}$" = 7.14. As long as the number is never greater than $8\frac{1}{4}$, you will be fine.

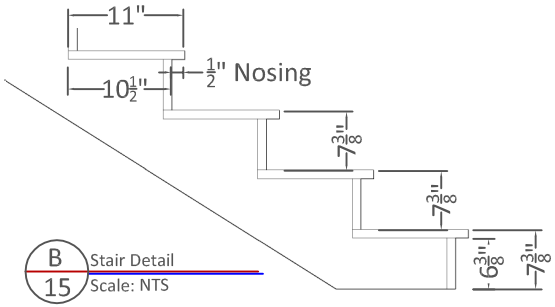
4) Measure the overall rise for the proposed stair. We will use 8' or 96" for this purpose.

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 $7\frac{3}{8}$".

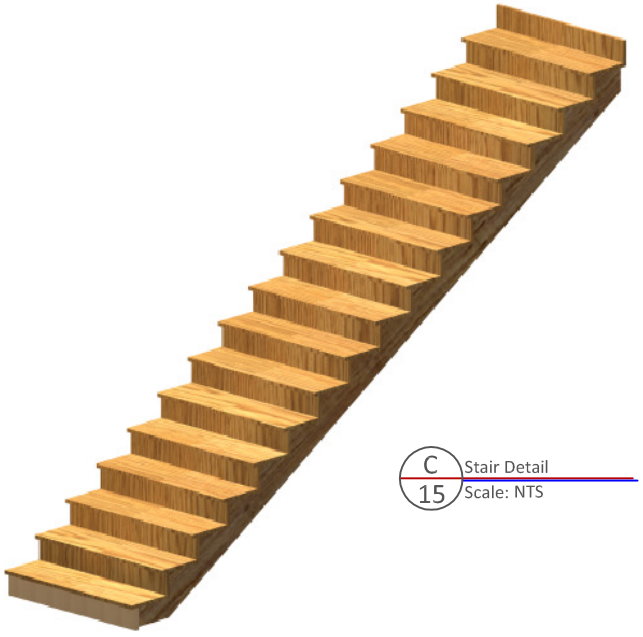
7) Layout a 2x10 or 2x12 pattern stringer. Make the first cuts with a circular saw and finish them with a jigsaw, hand saw or reciprocating saw (saws-all) to prevent over-cutting. Try the pattern in place to see how it fits. Use this to cut the other remaining one or two stringers using the pattern.





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

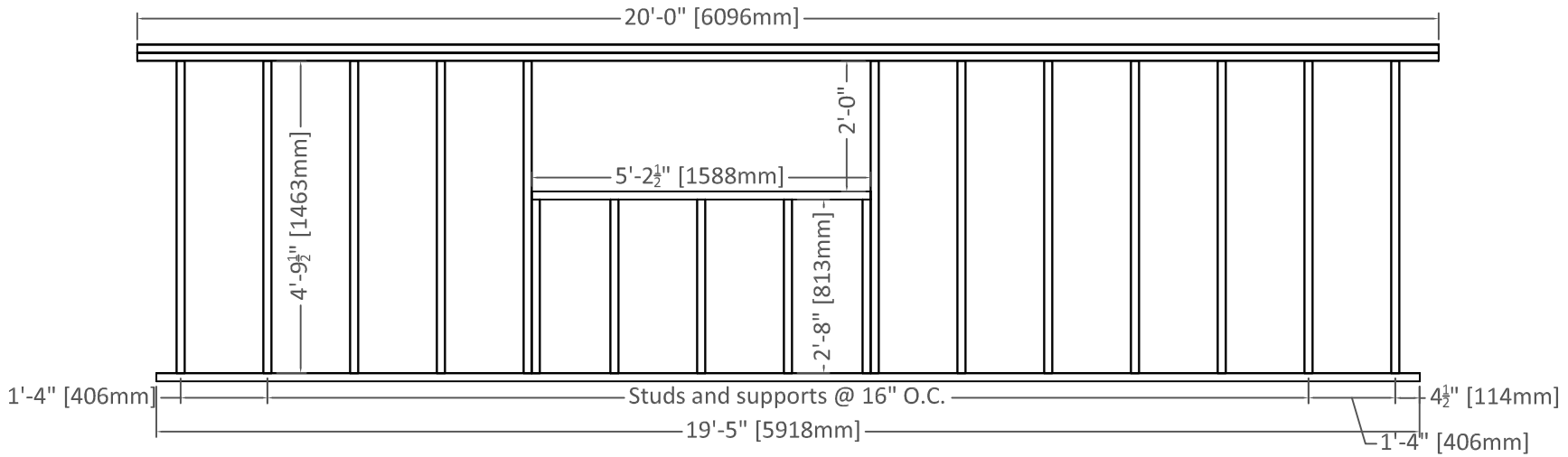
Description:	Qty:
2x10-12 Stringer	Varies
Tread Material	Varies

1. Always measure openings and cuts carefully!

2. Give yourself a small amount of rough opening space if you intend on purchasing windows and doors. We would recommend purchasing windows and doors prior to building wall structures so you may measure accurate rough openings. This set of plans will assist you in building some general doors and windows, but you may feel free to purchase doors or windows at your discretion. PLANS MAY NEED TO BE ALTERED!

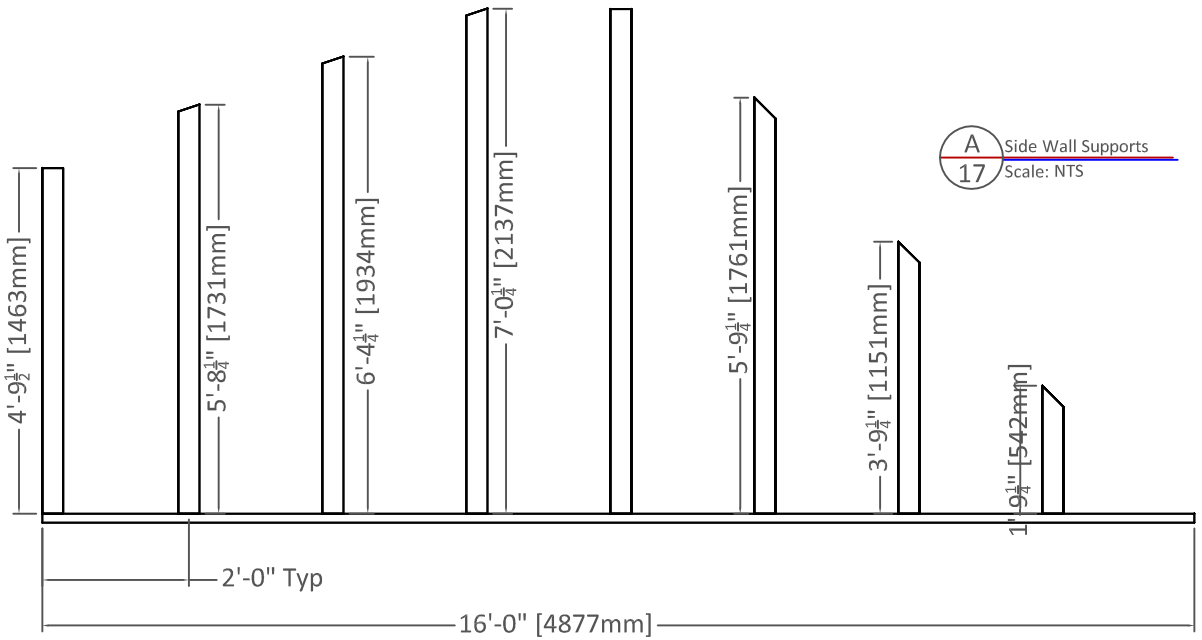
3. These plans are to be intended as a guide ONLY! Should you choose to alter these plans at any time, remember to adjust measurements accordingly!

1) Now that you have a safe route to the top and a nice platform to place your materials, construct the rear wall on the ground as shown below. Center on the 2x8s above the rear wall. You DID cut the plywood flooring correctly, right?

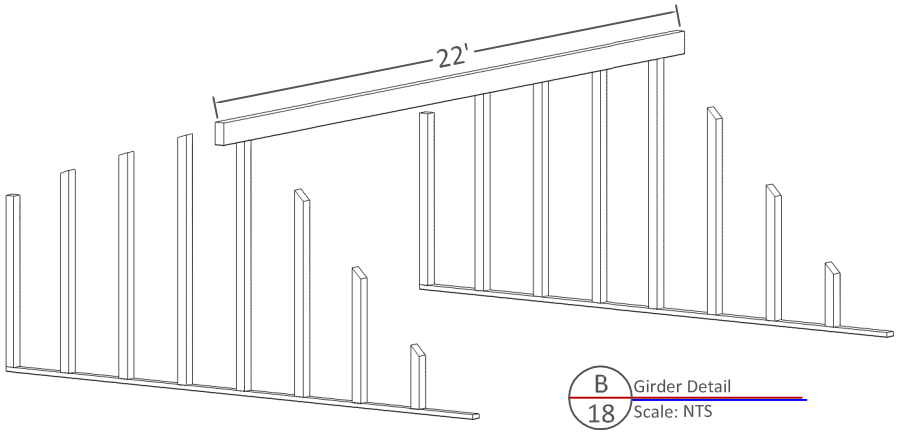


A/16 Loft Rear Wall Layout
Scale: NTS

2) The side walls are made from 4x4 posts and the sill will actually be rafters. If you are wondering why the center post is shorter than the one directly left of it, you are going to be putting a girder on the flat cut post which will give it an additional 3 ½". Got it?

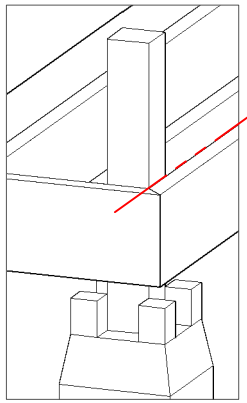


3) In speaking of the girder, once you get both of the side walls up, why not put the girder in place? You may use many methods of anchoring the girder, but we would recommend using a 8x4 post anchor on top of each 7' flat-cut post. That way the girder will be "cradled" as you get it centered.



Hint: Can't find a post anchor that will fit? Fit some flat brackets on either side and "sit" the girder between. The brackets will not be in the way of the sheathing or the interior finishing.

9) Starting with one corner, level the floor joists by loosening the tack to the posts and sliding the joist up or down until level. Once level, mark each post with a pencil just where the top of the sub-floor is flush with the post as shown.



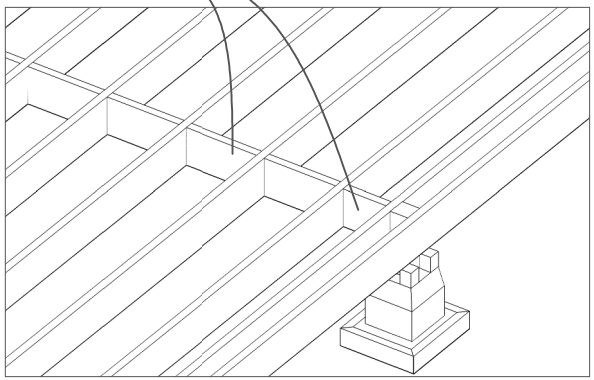
Mark this line on each post ONLY WHEN LEVEL!

A/4 Subfloor Joist Layout
Scale: NTS

10) Cut the posts at the lines marked with a miter or circular saw. Cut one post at a time and flush up ends before continuing on to other posts.

10) Once you cut and anchor the final post, take a look at what you have so far. It should resemble the diagram below. Before you get around to the flooring, it is a good idea to add nailers and some thermal and vapor barrier between the joists (nailers cut from 3rd 20'-2x8 listed on previous page).

Nailers for flooring centered in span



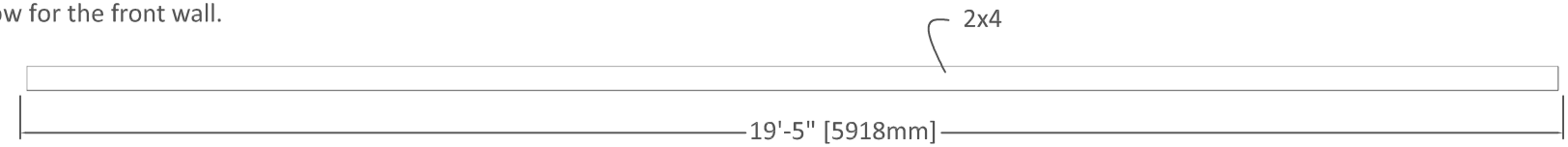
C/4 Subfloor Joist Layout
Scale: $\frac{3}{8}$" = 1'-0"

B/4 Subfloor Joist Layout
Scale: NTS

Materials

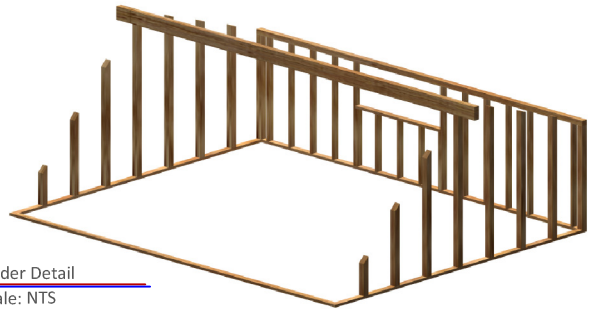
Description:	Qty:
2x4x8' Plank	10
4x8'x$\frac{3}{4}$" Plywood Sheet	10

4) Now for the front wall.



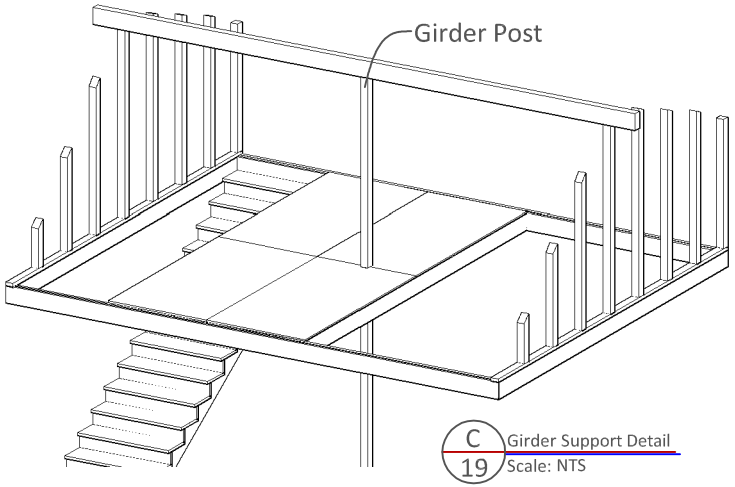
A/19 Girder Detail
Scale: NTS

What? Not everything has to be "building impossible" does it? Here's the deal: On the next page you are going to start constructing rafters for the roof. The $\frac{12}{12}$ pitch rafters are going to "sit" on the "front wall". This effectively eliminates the need for a front wall (in this instance). If you were building a real sized house, you would want a front wall, but the rear and sides would be much taller.



B/19 Girder Detail
Scale: NTS

5) One more critical detail. See in the materials, how we have put two 10' 4x4 posts? Those are to hold the center of the girder. It's not hard to install. Simply use a post anchor, cut the bottom post to size and place it around the center of the loft (centered below a joist, please). Take the second post, and anchor it right above the first one placed below. This will help disperse the load of the rafters over the span.



C/19 Girder Support Detail
Scale: NTS

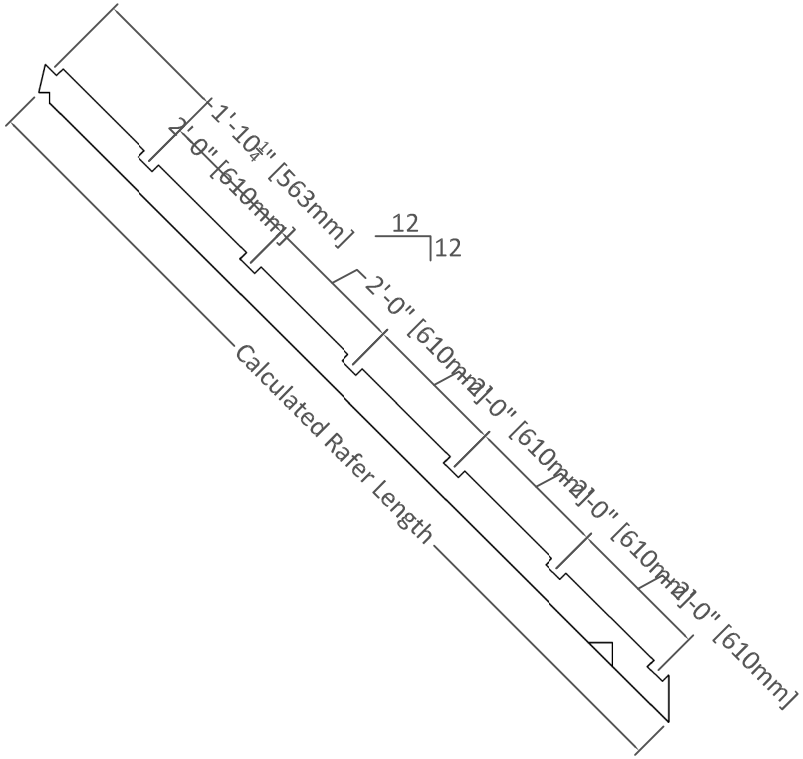
Materials

Description:	Qty:
2x4x6' Stud	13
2x4x4' Stud	5
2x4x20' Stud	6
4x4x6' Post	8
4x4x8' Post	6
4x8x22' Girder	1
4x4x10' Post	2

OK, you have your girder ready to go, the span is supported by posts below, you have a nice open loft and a safe way to get there with the stairs. For the rafters, there will be two types of rafters. One will be a $\frac{12}{12}$ pitch and one will be a $\frac{4}{12}$ pitch. This means that for every inch horizontally, the $\frac{12}{12}$ will rise 12" and the $\frac{4}{12}$ will rise 4".

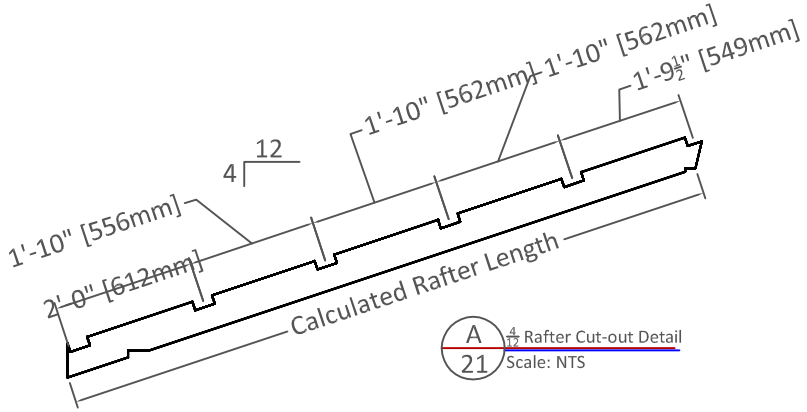
These plans include cutting rafters, calculating rafter lengths and cutting seats in appendix 1 & 2.

1) Cut the $\frac{12}{12}$ rafters as shown below. Notice the crown is pitched so the $\frac{4}{12}$ and $\frac{12}{12}$ slopes come together cleanly.



A/20 $\frac{12}{12}$ Rafter Cut-out Detail
Scale: NTS

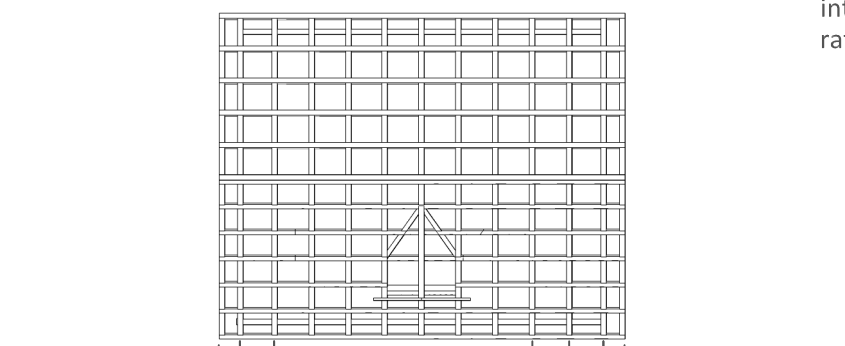
2) The $\frac{4}{12}$ roof rafters are similar.



A/21 $\frac{4}{12}$ Rafter Cut-out Detail
Scale: NTS

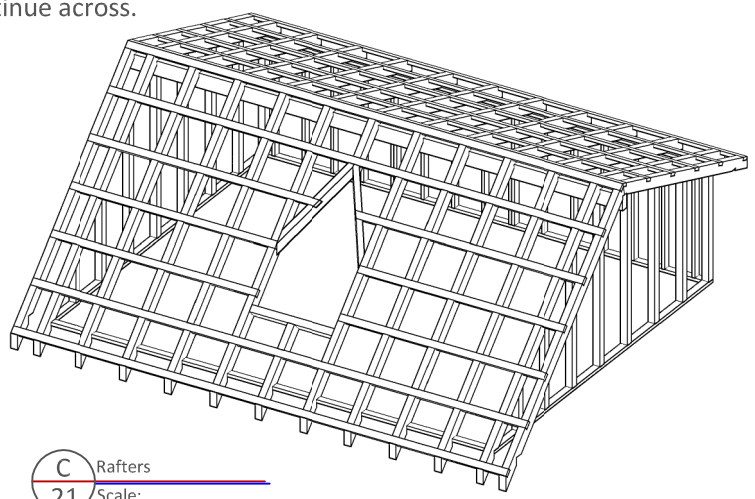
3) With both rafters, do not neglect the purlin seats. The purlins will give stability and strength to the roof structure.
Measure carefully and calculate lengths ahead of time. Layout cuts on the first rafter and hold it in place to see if the cuts will fit before making any real cuts. Be smart and be safe.

4) Once the rafters are in place, go ahead and cut and attach the purlins in place. Make absolutely sure the rafters are straight vertically before solidifying with nails or screws. Once the purlins go up, you are going to have to dismantle the purlins if your roof starts to lean and start over. So make sure the rafters are straight vertically!



B/21 Roof Layout
Scale:

If you want a dormer, plan for the diagram shown here. If you are not intending on adding dormers, or any dormers will be false, expect the rafters to continue across.



C/21 Rafters
Scale:

A
22
Roof Structure
Scale: NTS

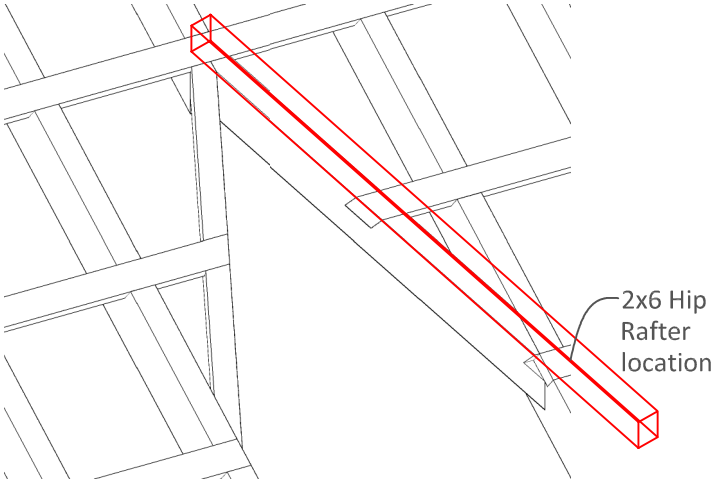
Materials

Description:	Qty:
2x6 Rafter (by builder)	26
2x4x12' purlin (by builder)	28

Now that most of the roof is taken care of, the next thing you are going to want to do is to install the dormer components. These plans will incorporate two types of dormers 1) A false valley dormer is a dormer that is in every essence, fake. It will be constructed on top of the roof sheathing and will not be visible from inside. 2) The dormer in the middle will be genuine and the builder will be able to see out the window. Both will look the same from the outside though.

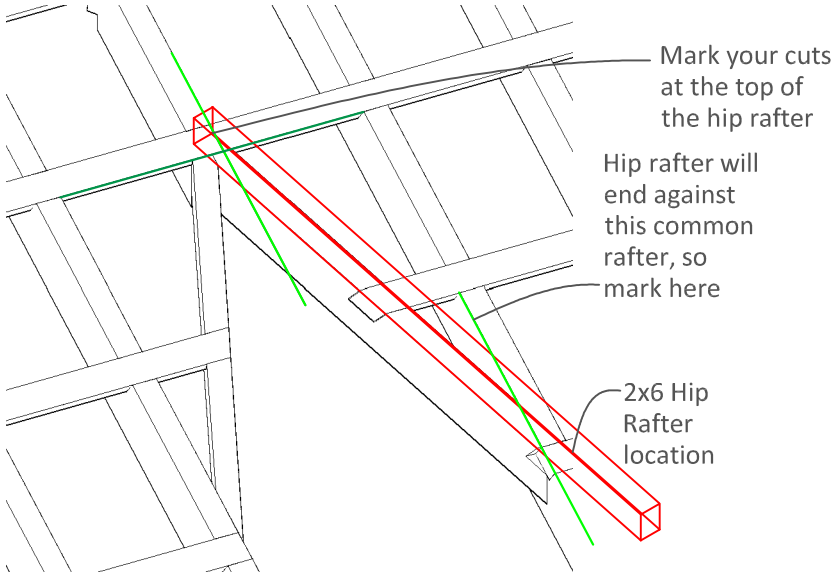
All you need to concern yourself with at this point is where to put the dormer and how big you wish it to be. These plans will lay out the steps to building a dormer in the simplest terms. The actual dimensions will be left up to the builder.

1) Start by picking a point on the roof you wish to start from. For all intensive purposes, the dormer is not going to match the roof peak, so we recommend somewhere in the middle.

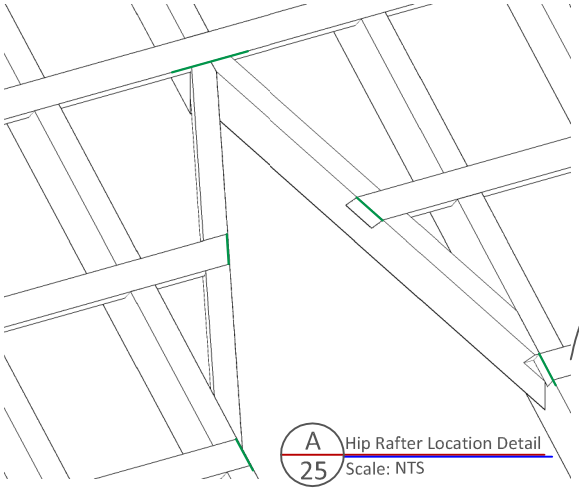


A/23 Hip Rafter Location Detail
Scale: NTS

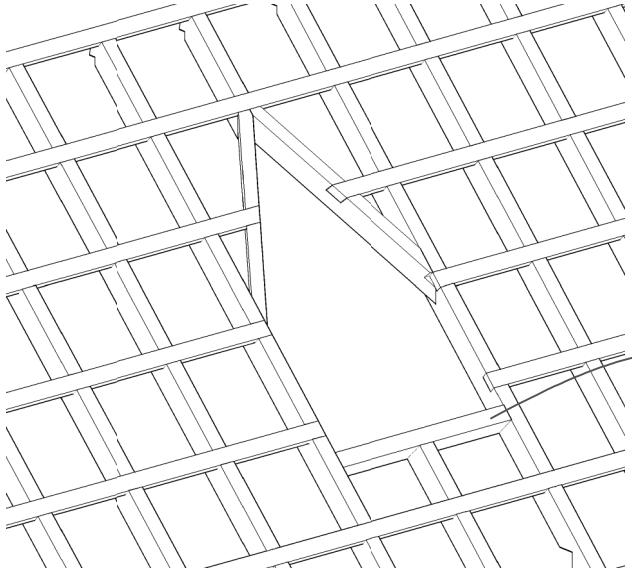
2) Mark the placement of the hip rafter on the rafter itself, so you will know where to cut the rafter. Notice how the rafter is aligned with the center of the common rafter below it and extends beyond the center of the common rafter immediately to the right. Your actual hip rafter may extend further, depending on your preferences. Just remember to mark the location of where the hip rafter will begin and end. Example marks are in GREEN.



3) Mark on the common rafter where you are going to have to cut the top and bottom portion to open the dormer up. While you are at it, mark the purlins that are going to have to be cut also.



Hold the cut hip rafter in place BEFORE you make any cuts on the common rafter or purlins. Always make sure you have an assistant on a ladder with you, and make sure the ground below you is free of traffic! If you measure correctly, you should have an open space you can literally just insert the hip rafter into. The purlins should hold the rafters, but still be very careful when removing ANY roof components!



Materials

Description:	Qty:
2x6 Hip Rafter (length by builder)	2

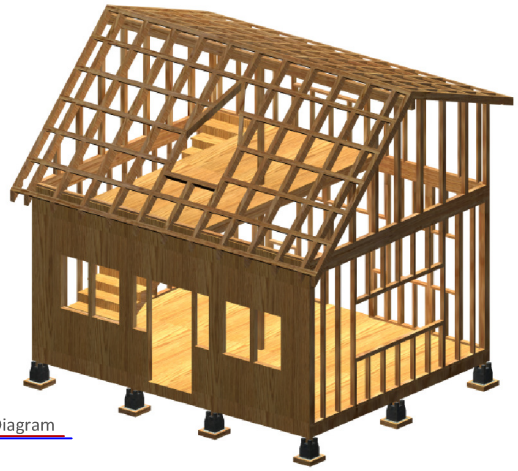
After everything, the main structure is now complete. Before completing the dormers, or even getting to the false dormer, you will need to sheath the exterior of the building.

If you followed these plans carefully, you should be able to sheath all of the walls and the roof without much effort.

Measure your edges, make sure the sheets of plywood are going to line up nicely.

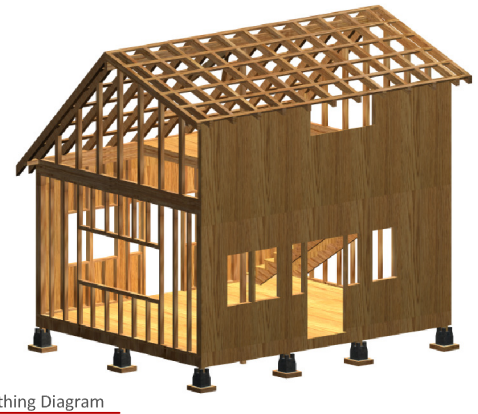
If you haven't added nailers to the ground floor walls, now would be a great time to do so.

Start with any side you wish, the sheathing will overlap.



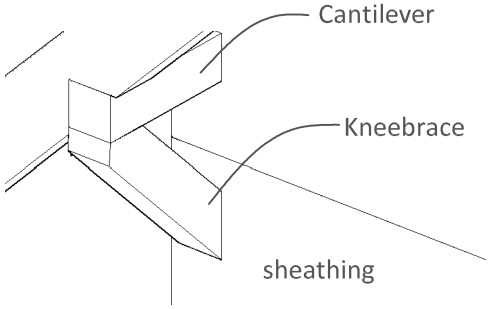
A/26 Front Sheathing Diagram
Scale: NTS

Go ahead and sheath up the entire rear wall at once. If you located your nailers correctly, you shouldn't have many problems.



B/26 Rear Sheathing Diagram
Scale: NTS

While you sheath up the side walls, go ahead and attach a couple of kneebraces and cantilevers to hold those end rafters up. We know the purlins are holding them just fine, but once you add water or snow loads to the roof sheathing, it may be a different story. So go ahead and reinforce those rafters!



If you are careful, some sheets may be able to be used on multiple surfaces. We have accounted for every exterior sheathing cut as though it is it's own sheet. Not all sheathing will require a full sheet of plywood. We also do not include interior gypsum board or sheathing in this material list.

C/26 Rear Sheathing Diagram
Scale: NTS

Once the side sheathing is taken care of, nothing left but to enclose the roof (for the sheathing).

A/27 Side Window Sheathing Diagram
Scale: NTS

Measure carefully around the dormer opening!

1. If you wish, sheath around the opening as much as you can.
2. Have an assistant hold the sheathing in place, while you mark the location of the cuts from the bottom.
3. Cut the sheathing as marked from below and you should be able to "slide" it into place.

Professionals miter the top edges so the roof sheathing comes together cleanly. It is not necessary in for this application, but you MUST at least use some sort of waterproofing (such as silicone sealant) on the crown or water will leak into the roof structure!

B/27 Rear Sheathing Diagram
Scale: NTS

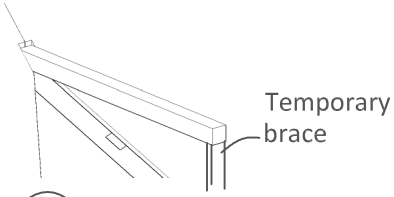
Materials

Description:	Qty:
4x8 Plywood Sheeting	60

1) To this point, you should have a roof structure that looks similar to the diagram below.

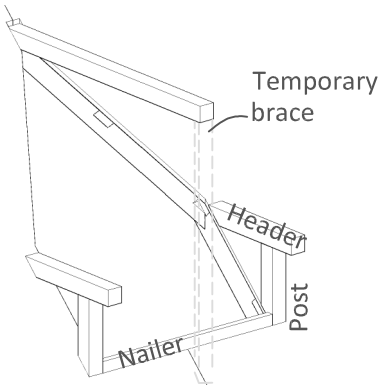
A/28 Sheathing Diagram
Scale: NTS

2) Let's complete the rest of the primary dormer. The secondary dormers will be constructed in much the same way, only they will be purely aesthetic. Go ahead and have an assistant hold a 4x4 girder in place while you screw it down. You should be screwing into the rafter underneath so it should hold just fine. If you like, set up a temporary brace to hold the girder until you can finish the front wall structure. If you didn't cut out the sheathing around the girder, don't worry about it, just line up the girder directly on top of the sheathing. Either way, the bottom of the girder should be flush with the rafter below. Don't forget to make copies for any other dormers!



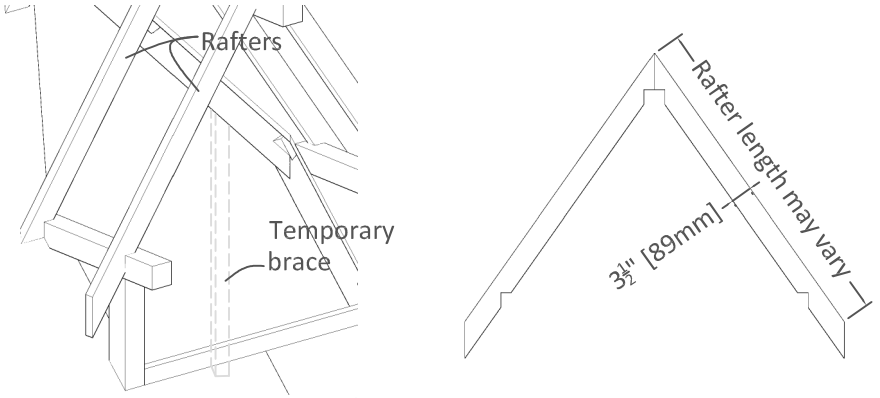
B/28 Rear Sheathing Diagram
Scale: NTS

3) Measure and cut a sill nailer that you can attach the dormer sheathing to. Cut the dormer headers as shown below. Notce where they are located in this example. You should have something similar. The top of the header should just sit right in the corner where the sheathing turns. Again, copies after they fit correctly!

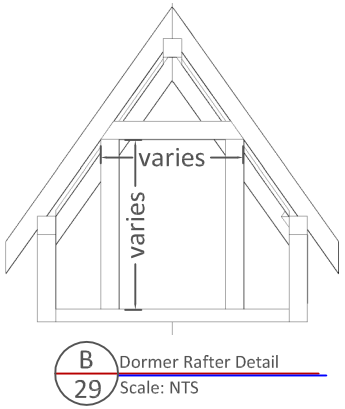


C/28 Rear Sheathing Diagram
Scale: NTS

4) Cut your dormer rafters something like below. Your rafters may be shorter or longer depending on your preferences, but the general idea is the same. Measure carefully, layout your cuts and don't forget to cut the rafter ends to match the pitch if they contact the roof. **NOTE* DO NOT ATTACH THE FRONT SET OF RAFTERS COMPLETELY! THE FRONT SHEATHING WILL "SLIDE" OVER THE HEADER AND GIRDER TO SIT FLUSH AGAINST THE STRUCTURE. Make sure the rafters fit and make copies for any other dormers!**



5) The window structure is really up to the builder. One could argue that at this point, you have a great opening for a custom window. Again, it is up to the builder as to the window dimensions, BUT, remember, with the pitch, as the window gets taller, it also has to get thinner. Make copies for any other dormers you may have.

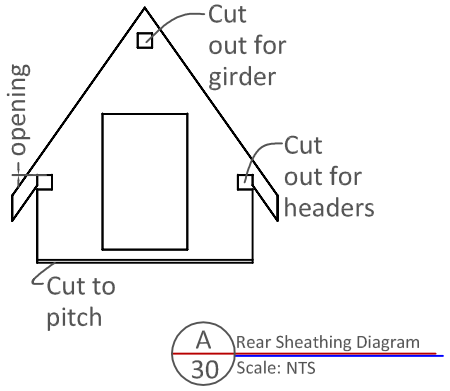


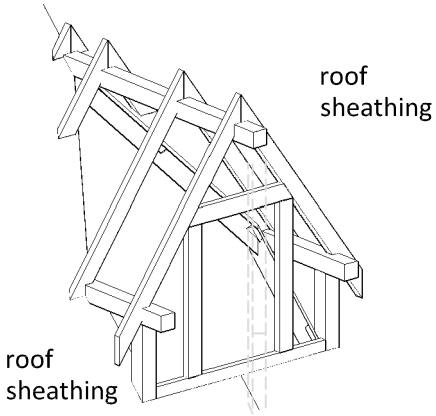
6) Alright, get rid of the temporary brace, as the window header and the rafters should hold the girder just fine. Now, if you haven't attached the very front set of rafters, very good, you've been reading the notes. If you have them tacked, go ahead and take them off as well.

7) You will need to carefully measure the perimeter of the dormer front face. What you should come up with is something that kind of looks like a house (see the diagram). Cut this pattern out and don't forget to include the holes for the girder and headers.

8) We cannot stress enough, the importance of laying out your cuts!

Also, you did make copies of every piece, after fitting of course, for any other dormers?

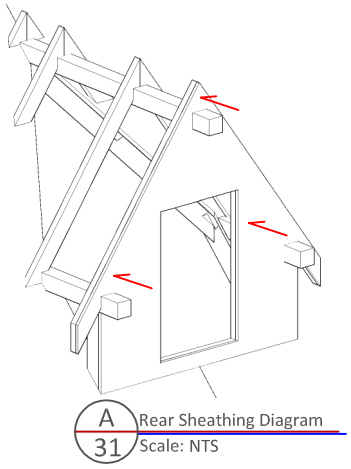




Materials

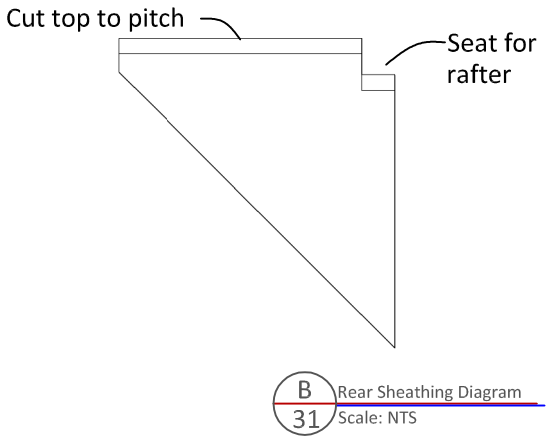
Description:	Qty:
4x4 Girder Header and Posts	builder
2x4 Nailer, Window timbers	builder
2x4 Rafters	builder
4x8' Plywood Sheet	1

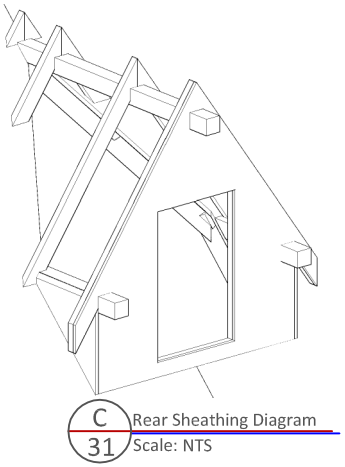
9) If you laid out your cuts carefully and measured twice, cut once, you should be able to "slide" the front sheathing over the girder and headers and it should butt up against the window and dormer frames.
Does it fit? GREAT! Make two more copies (or for however many false dormers you are going to have). Attach solidly to framework.



If you did not miter the bottom to match the roof pitch, no biggie, just run a bead of epoxy or silicone sealant across the bottom to prevent water intrusion.

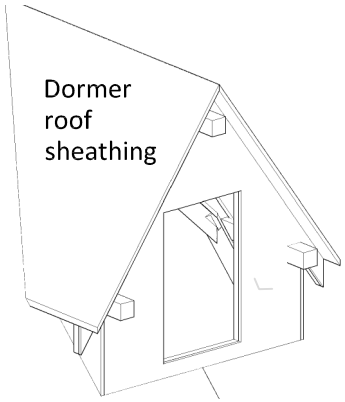
10) Once the front sheathing is on, go ahead and measure up the side sheathing. The size will ultimately depend on how large your dormer is, but the sheathing should look something like the diagram below. **Note: We recommend the sheathing run up beside the rafters, so you will have to cut notches for the rafters. If you do not, you are left with a "floating corner" and that will allow for settling differences and water and insect intrusion.**

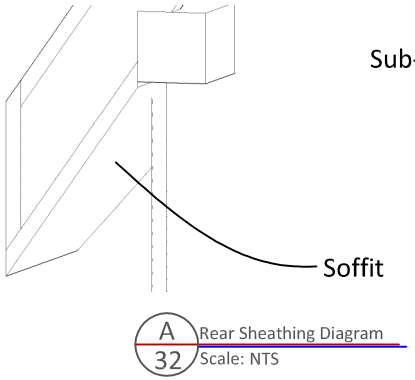


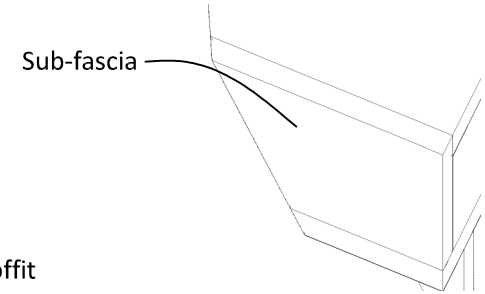


11) Does it slide into place with a push or at the most a hard "whack" with the hammer, but not too much force? Great! Now pull it off and make an exact copy, but miter the slope in the opposite direction for the other side. OH, don't forget the copies for any other dormers! It will save you a BUNCH of time.

12) OK, you have come so far, the end is near (of this dormer). You still need to sheath the roof. Of course, it goes without saying that you also need a soffit and possibly sub-fascia. Look at the diagrams below and you will see what we are talking about. As always, plan every cut, layout your cuts, measure twice and make sure the items fit in place BEFORE making copies!







13) Alright! Now to just install a window! We recommend purchasing windows, but we have included some basic sliding window drawings.

Note: You MAY want to finish any veneer or paint or siding BEFORE installing any windows. Simply cover the opening with plastic sheeting and staple to hold.

We are not even going to pretend to know how big or how many dormers you want this playhouse to have. With a little planning you will be able to see about how many sheets of plywood you went through with the first dormer. Then simply multiply that many sheets by how many dormers you want and you will have how many sheets of plywood you will need to finish the job! You can do it!

Materials

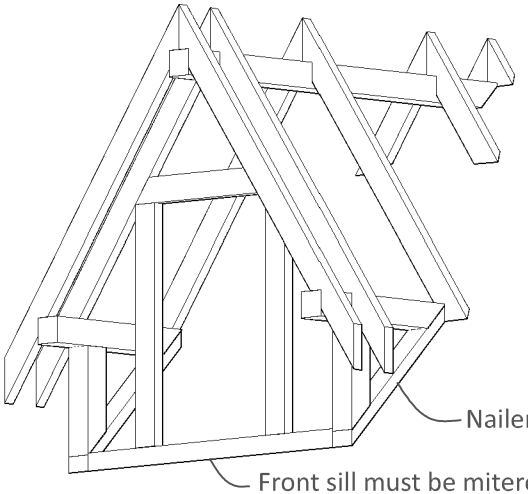
Description:	Qty:
4x8' Plywood Sheet	3

14) Congratulations! You finished the primary dormer! If you have any more dormers to construct, simply follow the same procedures as outlined before.

We sincerely hope that IF all of your dormers were going to be true dormers, you cut out the rafters and have the holes in the roof sheathing already laid out so all you have to do is assemble the dormer pieces (you DID make any copies you need, right?).

Anyway, getting back, the false dormers are EXACTLY the same construction method. You cannot deviate too much from the original plans or they will not look the same. False dormers do have some nailers on the bottoms. So you will have to trim your post copies to account for the thickness of the nailers.

False dormers are nice because they can technically be constructed on the ground and hoisted into place (if you have the equipment available, lucky you).



A/33 Rear Sheathing Diagram
Scale: NTS

15) If you made copies of the sheathing simply attach them as before with the primary dormer and....

YOU ARE DONE WITH THE MAIN HOUSE STRUCTURE. Sure, there are things to be taken care of like sealing any seams, roofing, siding, etc. But the house as it is, is functional.

A few notes:

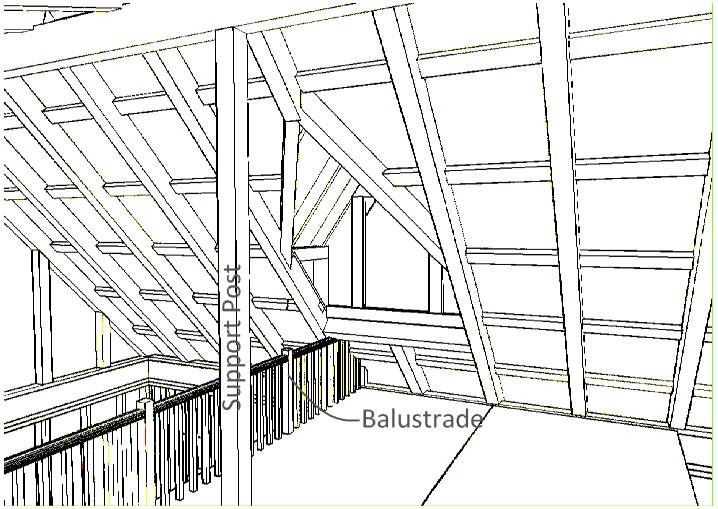
1. Do NOT overlook handrails for the stairs and you will definitely want balustrades for the loft. No one wants your kids to get hurt, so make it a safe place for kids to play!

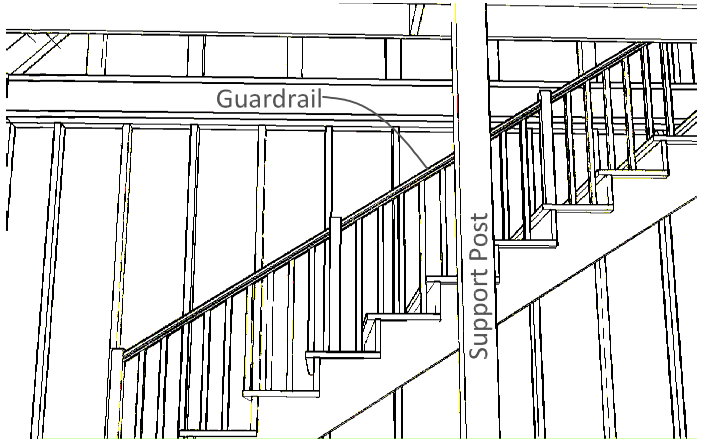
2. Seal any and all seams in plywood, add insulation to the interior, gypsum board, etc, if you prefer. Generally, the exterior is more important for a playhouse.

3. You will want to go through the structure inside and make sure there are no nails or screws protruding IF you are not intending on finishing the inside.

4. Above all, be safe. It is a playhouse and it is meant for fun. Connect any handrails and balustrades tightly and make sure the balusters on both are no more than 4" apart.

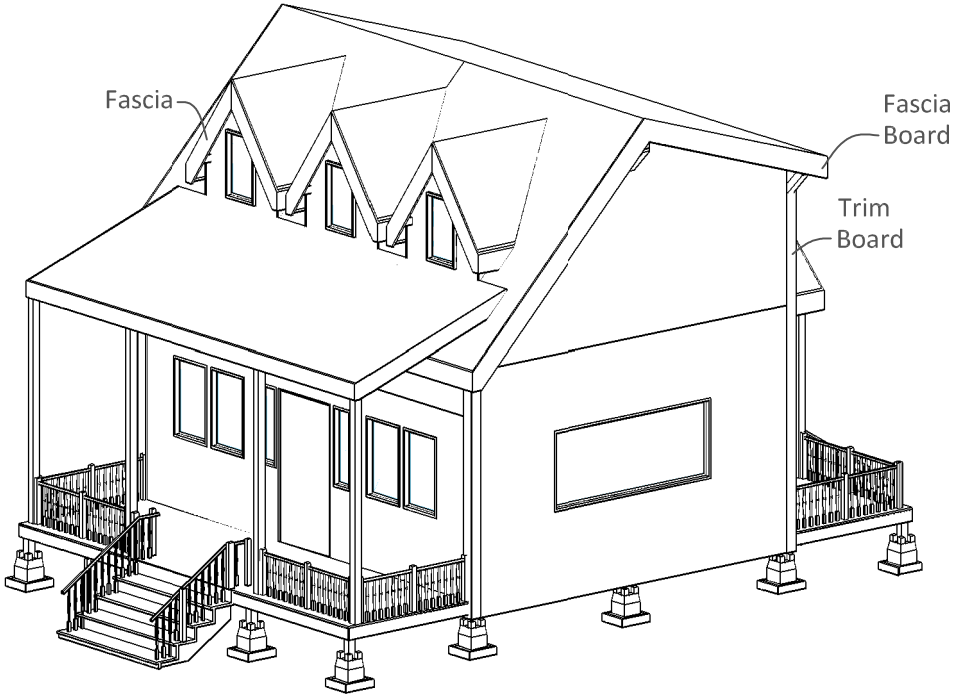
5. Any following pages are simply suggestions to make the playhouse look and feel more like a real house. None of the following pages are IMPERATIVE, but they are nice and it makes the house nice to look at.





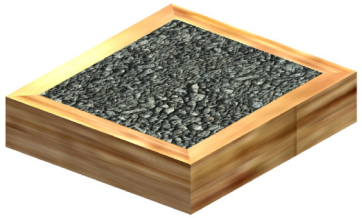
These images may or may not match your particular project depending upon additions, dormer size, etc. But you should always have a sturdy guardrail on the stairs and a balustrade to prevent falling from the loft.

1) For the trim, we generally tend to leave it to the owner. There are simply too many types and styles of trim. But we will cover where trim should be applied. Basically, any seam that is not covered with veneer or siding needs to be covered. This includes, roof ends and corners.



Congratulations! The hard part is over, you have a fully functional playhouse which could even be converted into a shed or guest house in the future. But for now, enjoy the fruits of your labor!

1) The first thing you want when you make any addition to anything, be it a house, shed, playhouse, garage, etc, is a solid foundation. For these purposes, we are going to use a concrete pier foundation, as the concrete footings can be found at most home development stores for a relatively low price.

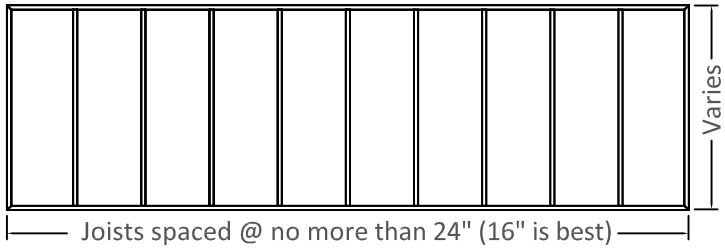


A/35 Pier and Foot Diagram
Scale: NTS

These concrete slabs will take the weight of your new porch and evenly distribute the weight over a larger area. However, in some moist climates, you will need to allow for water drainage.

2) Make yourself a box out of 2x4 material It needs to be at least 1-2" larger than the concrete pier footing itself We recommend 3".

3) OK, now you are ready to go, start by building your deck sub floor. It should look something like the diagram below. Yours may be larger or smaller, depending on your needs.



B/35 Front Deck Joist Layout
Scale: NTS

As a good rule-of-thumb, your joists should be able to support the span of your deck. Generally:
4-6 ft - 2x4
6-10 ft - 2x6
10-12 ft - 2x8
12-14 ft - 2x10
14-16 ft - 2x12

So, purchase your joists depending upon your expected span. Now, these can be increased with the use of posts or columns, but for this example, we are looking as free-spanning. Another alternative would be 1-joists. Check manufacturer standards for span information.

4) Have an assistant help you locate where your deck is going to be located. If you are looking to match center to center, we recommend drawing a line at the center of your deck and making a mark on the center of the structure you are attaching to. Then line up the marks.

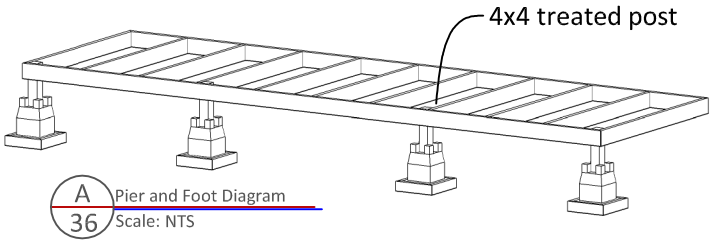
5) Have a couple of assistants hold the deck fairly level in place while you attach the sub floor to the structure. Use longer-than-needed posts to act as "supports" until you can get a nice, level surface. This would be the time to grab those boxes you made in step 2.

Once you have the deck supported, it doesn't have to be level yet as you are still going to tamper with the height. Grab your concrete footings and the support boxes. Place a wooden box directly beneath a support post. Fill the box with CLEAN, $\frac{3}{4}$-1" aggregate (available at most home improvement stores or at any quarry). Yes, it has to be CLEAN. If you use dirt, the deck will simply "squish" the dirt from the box and you will have the same settling problem anyway. Clean aggregate acts as a release and lets water filter through.

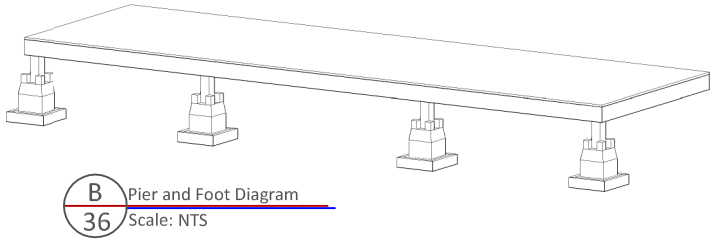
6) Assemble your concrete pier on top of the aggregate. You will have to un-tack the temporary support posts to level the decking. Hint: If you are intending on flashing the front, set your post and footing back about 1 foot.

7) Repeat step 6 for the remaining posts. Have an assistant "slide" the deck up and down while you level the joists. Tack the posts where level.

8) Mark the very top edge of the posts once the deck is level. If you need to cut off any posts, do so one at a time. Attach to the sub-deck with screws.



Go ahead and sheath the deck. We recommend at least $\frac{3}{4}$" cedar or oak plywood sheeting. Oak and Cedar have very high moisture and insect resistance, making them the better options over softer woods such as fir or pine.



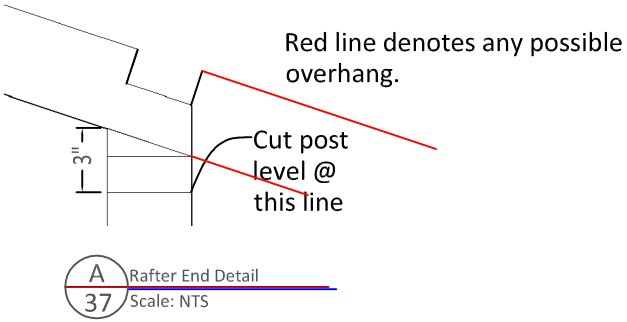
We are not going to offer a material list, as it would be incredibly inaccurate. There is simply no way to be able to tell what kind of spans you personally want, but we will offer some quick calculations so you can figure your own materials:

For joists needed, you will need a front and a rear rim joist (long planks). 2 planks the width of your deck. To calculate the number of joists, take the width of your deck and divide it by the spacing of the joists. I.E. 20'-0" deck / 16" per joist = 15 joists. Now add 1 additional joist for the end rim.

Don't worry about the seat for the purlin right at this time. We are just going for an accurate measurement as to the height of the posts.

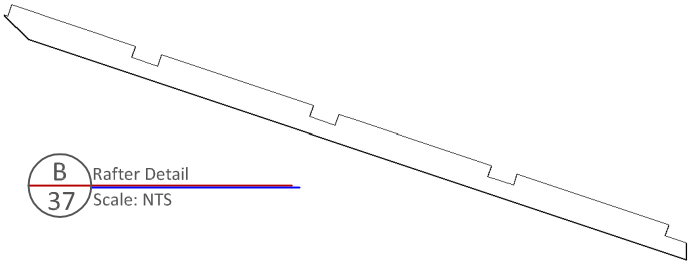
9) Once you have the rafter end cut, take it up to the roof and tack it into place. Have an assistant hold the other end against a post and mark where the two intersect.

10) Take the rafter down (safety first). From the highest point on the marking where the rafter and post intersect, deduct 3" (the width of two 2x4 headers) and cut the post flat at the line.



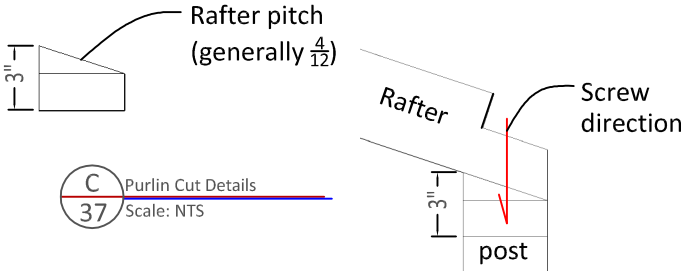
11) Cut your posts and secure in the post brackets. Use a level to ensure the posts are straight vertically. Make sure the posts are also aligned properly.

12) OK, time to cut the rafters. Your rafters may be sorter or longer depending on your preferences, but the idea is the same. Also, don't forget to cut the purlin seats.



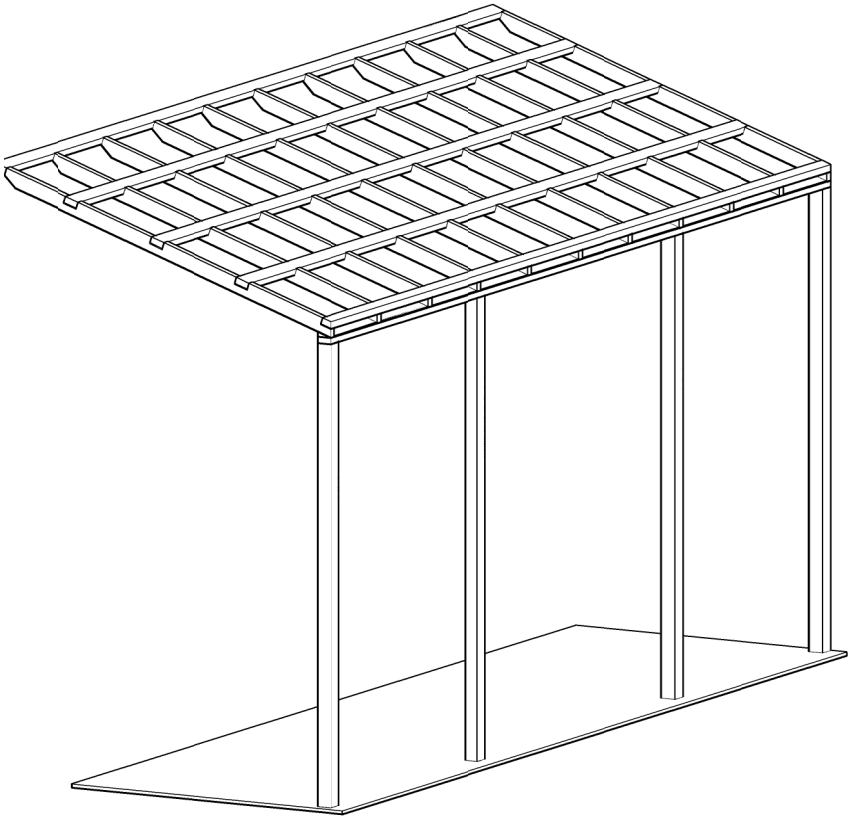
13) To calculate how many rafters you need, take the span of your roof and divide by the span of rafters. Add one for the very end and you are good to go.

14) Cut the 2x4 headers as shown. Note: You may substitute a 4x4 header, just make sure to deduct the width of the 4x4 post (3 $\frac{1}{2}$") instead of the original 3" from your cuts on the posts. The rafters will "lay" right on top of the header and screw through the rafter down, into the header.

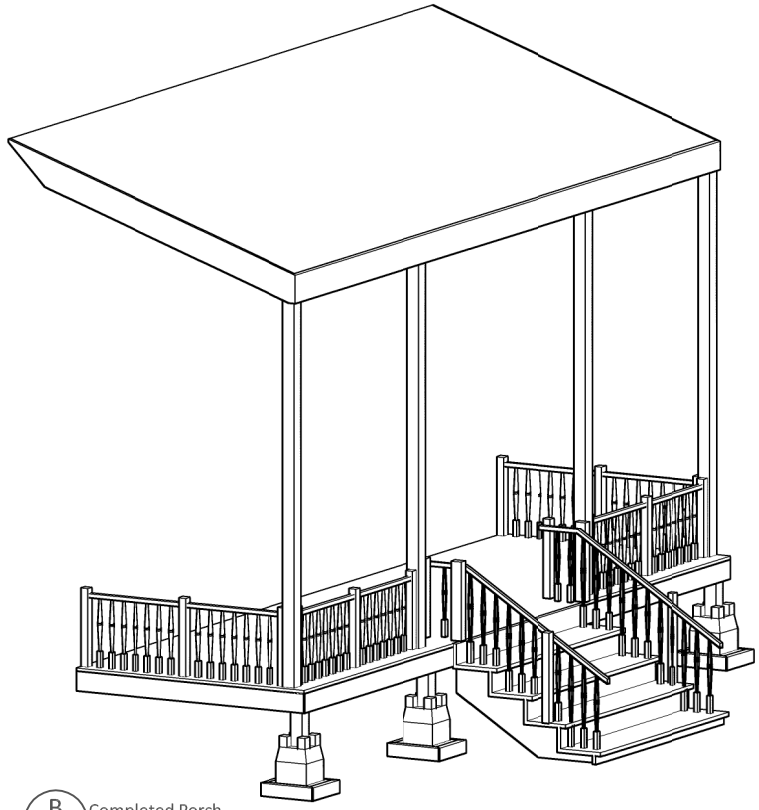


15) After you lay out your rafters and have them secure, go ahead and attach the purlins. You will have to cut the top purlin to match the roof slope.

16) Sheath and trim. We recommend adding balustrades to prevent falling. See Appendix 3 for general information on laying out stairs.



A
38
Purlin Layout
Scale: NTS



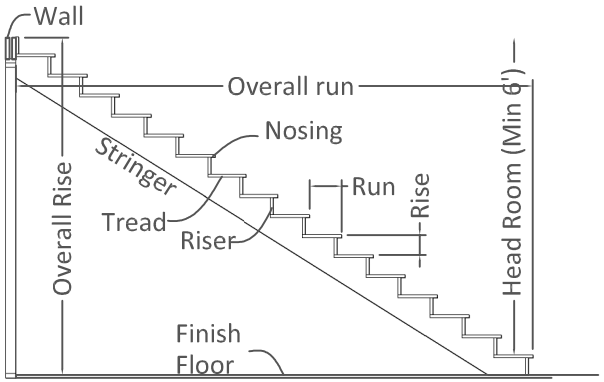
B
38
Completed Porch
Scale: NTS

Congratulations! You have completed the playhouse!

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 $10\frac{1}{2}$".

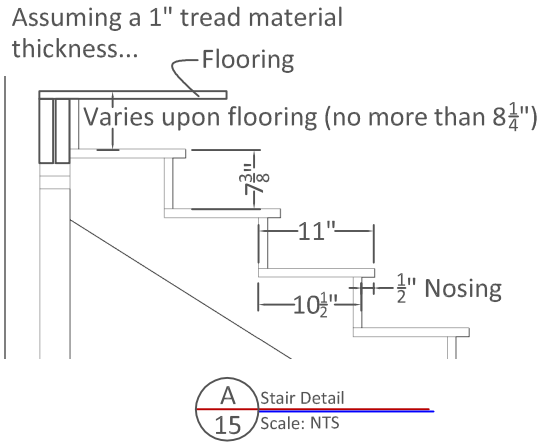
3) Using the first "rule of thumb" from above (rise x run = 75), a good rise for a $10\frac{1}{2}$" run (from step 2), is 75 divided by $10\frac{1}{2}$" = 7.14. As long as the number is never greater than $8\frac{1}{4}$, you will be fine.

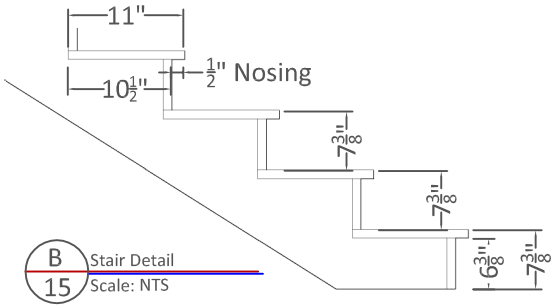
4) Measure the overall rise for the proposed stair. We will use 8' or 96" for this purpose.

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 $7\frac{3}{8}$".

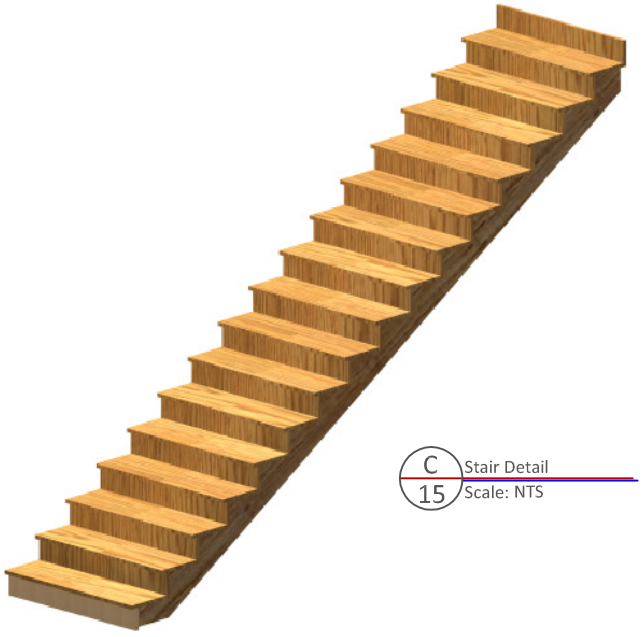
7) Layout a 2x10 or 2x12 pattern stringer. Make the first cuts with a circular saw and finish them with a jigsaw, hand saw or reciprocating saw (saws-all) to prevent over-cutting. Try the pattern in place to see how it fits. Use this to cut the other remaining one or two stringers using the pattern.





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.



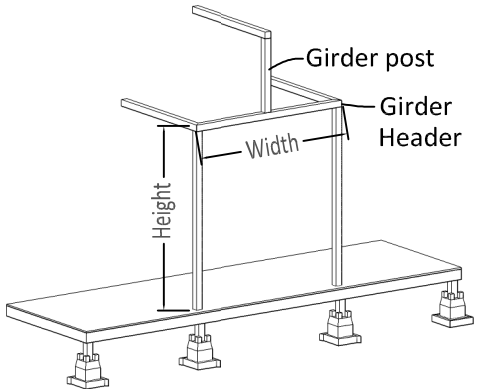
Materials

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

9) Review Appendix 1 for constructing a deck.

10) Using metal post brackets to hold your posts, layout your post location. You will want your posts about 6-8 feet apart for the roof support. If you go further, you will need bigger than 4x4 posts for the span. Try to make sure your posts align with the footings below. They may be slightly off, but please do not put the columns at the outside corners if you offset the footings to account for flashing. The posts are going to carry a lot of weight and if they are not supported properly, the deck may bow, or even, buckle.

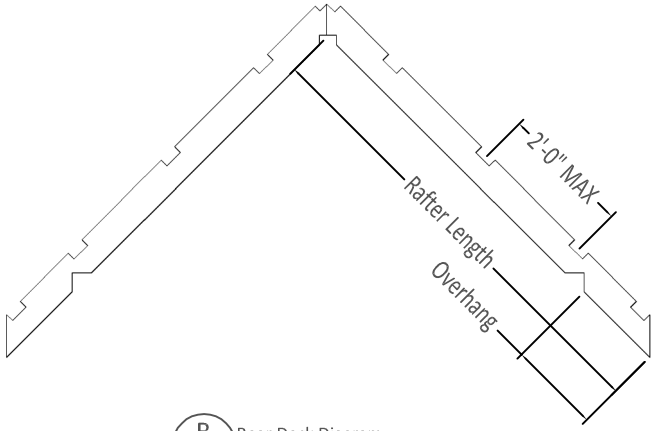
Determine how high you want your roof structure to be. Assemble a frame similar to the detail below. Your frame may be different, but the concept is the same.



A/39 Rear Deck Diagram
Scale: NTS

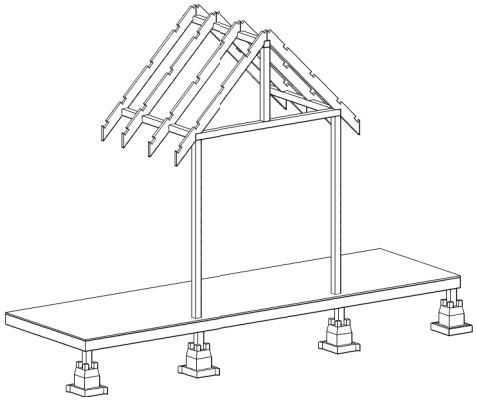
11) Have an assistant hold the headers and girder in place as you level them. Use post brackets to anchor to the flat wall. Make sure there is plenty of clearance above the door frame. Do not cut your headers or girder to length until you have the frame laid out and your cuts marked.

12) Your rafters should look something like the diagram below. Rafter length my vary depending on your personal preferences. Remember to cut the purlin seats and seats for the header and girder. See appendix 1 & 2 for more information on cutting rafters.



B/39 Rear Deck Diagram
Scale: NTS

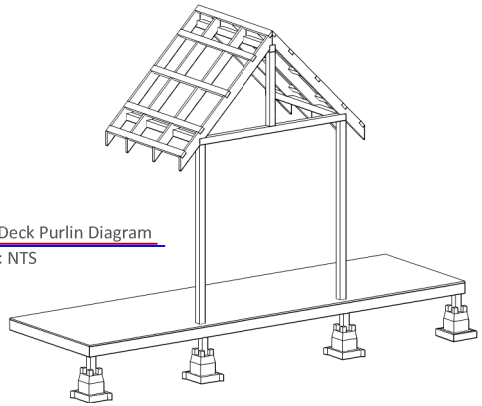
13) Now all that is left is to hang your rafters. Screw or nail the rafter against the wall in multiple places at 12-16" increments.



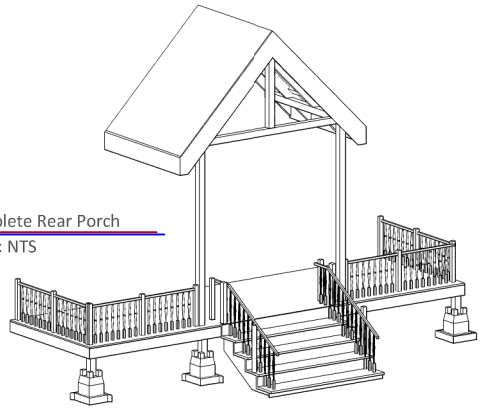
A/40 Rear Deck Rafter Diagram
Scale: NTS

14) To calculate how many rafters you need, take the span of your roof and divide by the span of rafters. Add one for the very end and you are good to go. Do not place your rafters more than 2'-0" apart at any point. We recommend spacing your rafters at 16" O.C. (on center).

15) Solidify the structure with purlins. Make sure your rafters are level vertically!



B/40 Rear Deck Purlin Diagram
Scale: NTS



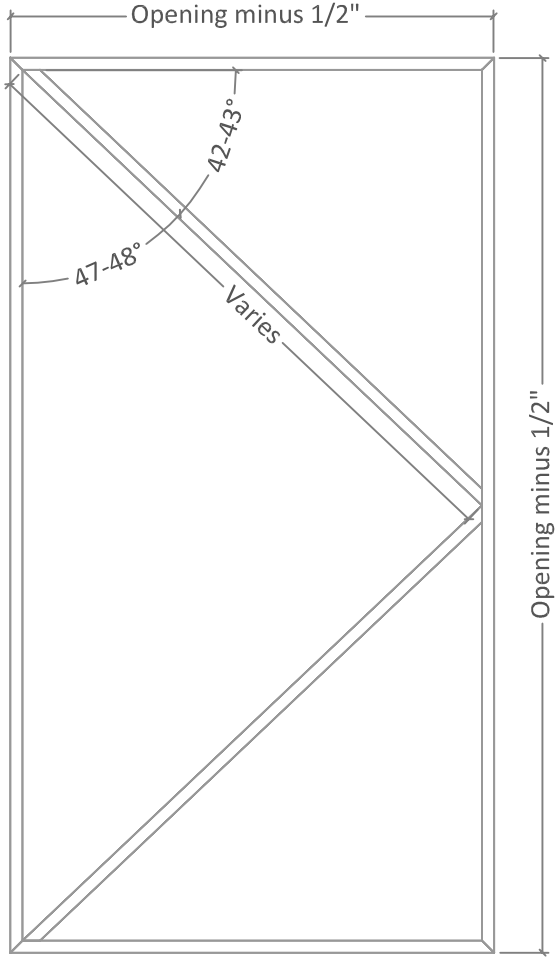
C/40 Complete Rear Porch
Scale: NTS

16) Add the sheathing and trim board. We recommend adding balustrades to prevent falling off the deck. Seepages 14 & 15 for information on constructing stairs.

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

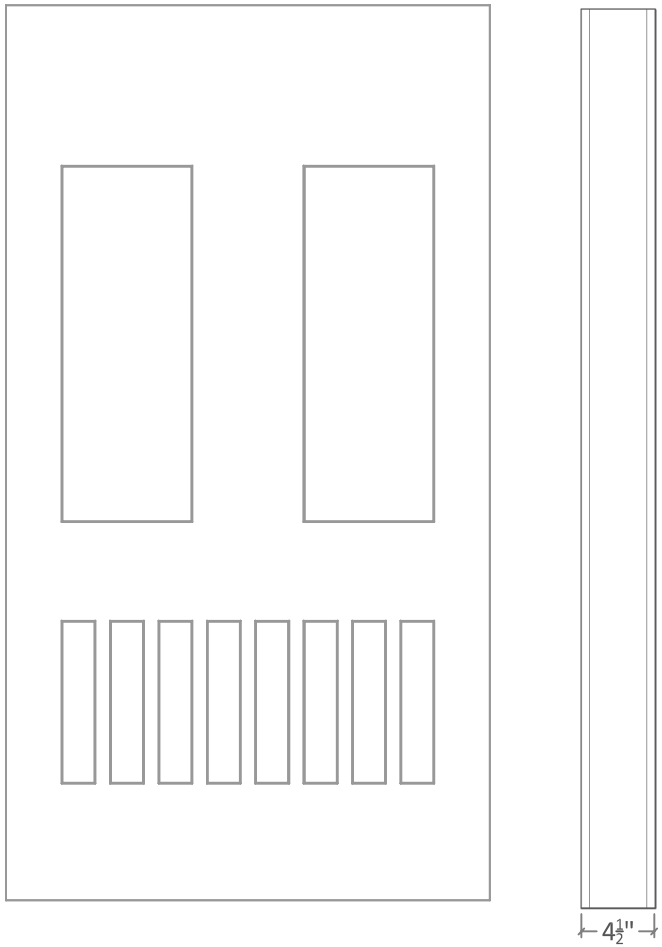
We will show the door in this example with a pattern cut out of the front and back sheeting, but this is not required. It is purely for looks and does not affect the integrity of the door at all.

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.

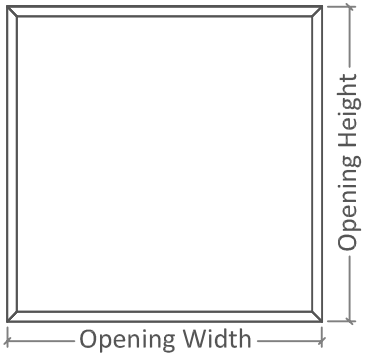
3) Insulate the door with either blow foam or regular R-13 roll insulation will work.

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

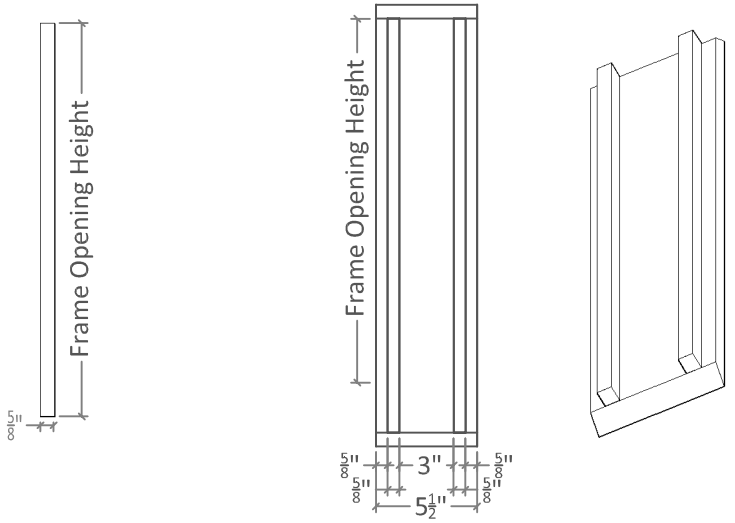
5) A single slide bolt works wonders on the outside and inside to lock the door shut. If you don't want your kids to be able to lock the door, only install the slide bolt on the outside! The slide bolt also offers a grip to pull the door open.

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!

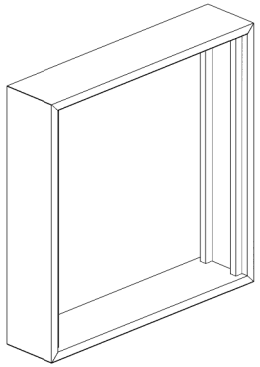


2) Rip a 1x4x8' into strips $\frac{5}{8}$" thick. These will serve many purposes in the future but for now, we just want four of them to match the opening, so either rip and cut one piece or rip an entire board into $\frac{5}{8}$" strips and place the pieces to the side for late.



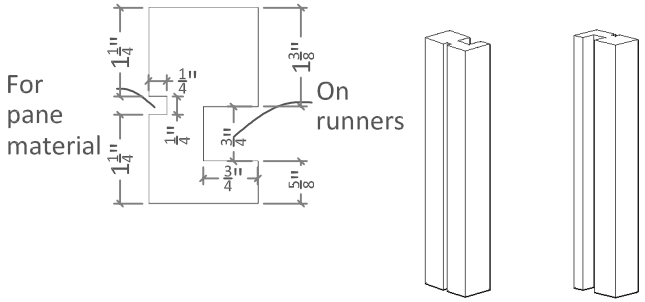
3) Using 1" screws and a level, screw two runners onto one of the exterior frame pieces. Repeat for the second side (see above).

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

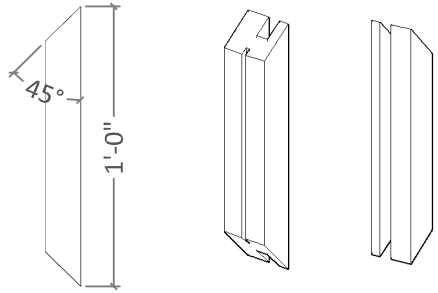


5) Rip a 8'-2x6 down the center lengthwise.

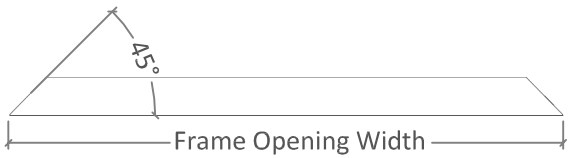
6) Use a router to gouge a $\frac{3}{4}$"x$\frac{3}{4}$" groove down the center of one side. Flip the board over and gouge a $\frac{1}{4}$x$\frac{1}{4}$" groove down the center of the other side (see detail)

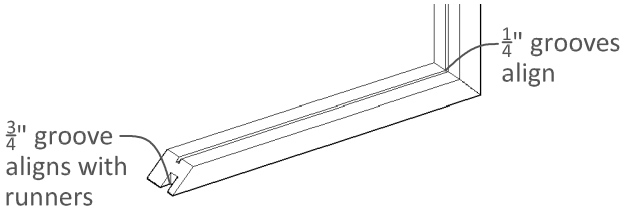


7) Miter the ends. Make sure the narrow ($\frac{1}{4}$x$\frac{1}{4}$") groove is facing inwards! The wide ($\frac{3}{4}$x$\frac{3}{4}$") grooves go out toward the runners, the inside grooves will hold a pane of window material.



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

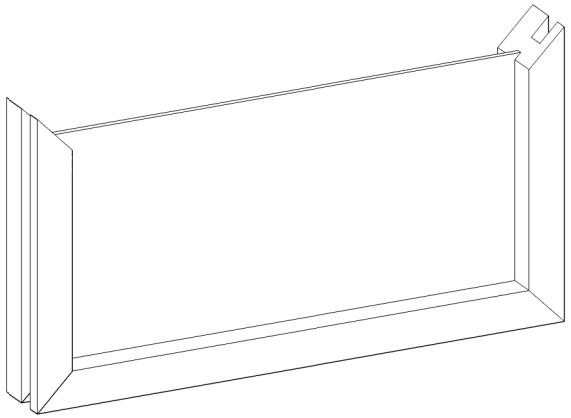
Description:	Qty:
2x6x6' Planks	24
1x6x8' Planks	6
1x4x8' Planks	6

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.

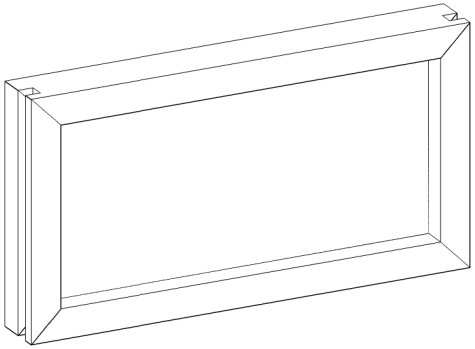
IF YOU DECIDE TO USE GLASS, WE HIGHLY RECOMMEND PURCHASING $\frac{1}{4}$" THICK PROFESSIONALLY CUT PANES. YOU WILL NEED 2 PER WINDOW. ON THIS SET THAT EQUALS 12 PANES OF GLASS TOTAL.

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.

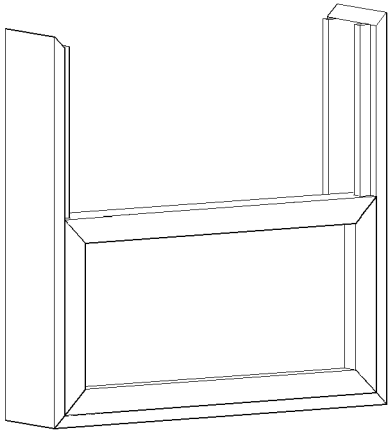


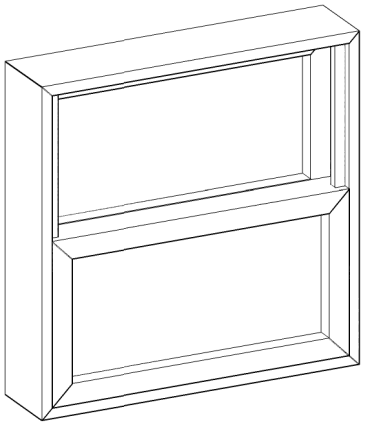
11) Cap off the window with the top piece and connect all pieces with 1" small radius ($\frac{1}{4}$" or smaller) screws. Be sure you don't screw down into the window pane!



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.

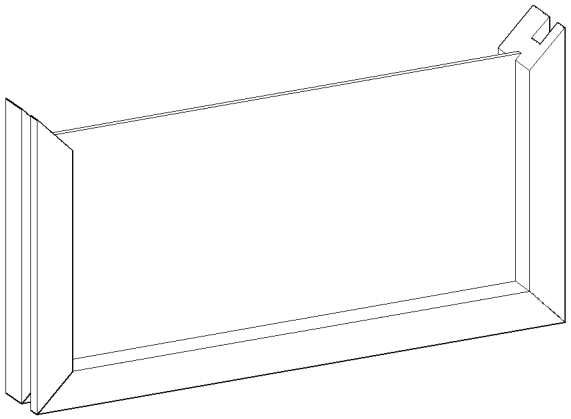
16) How the windows stay up or down is up to the user. We recommend getting a slide bolt and installing at least one on the movable assembly. Which assembly moves or stays stationary is up to the builder.

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.

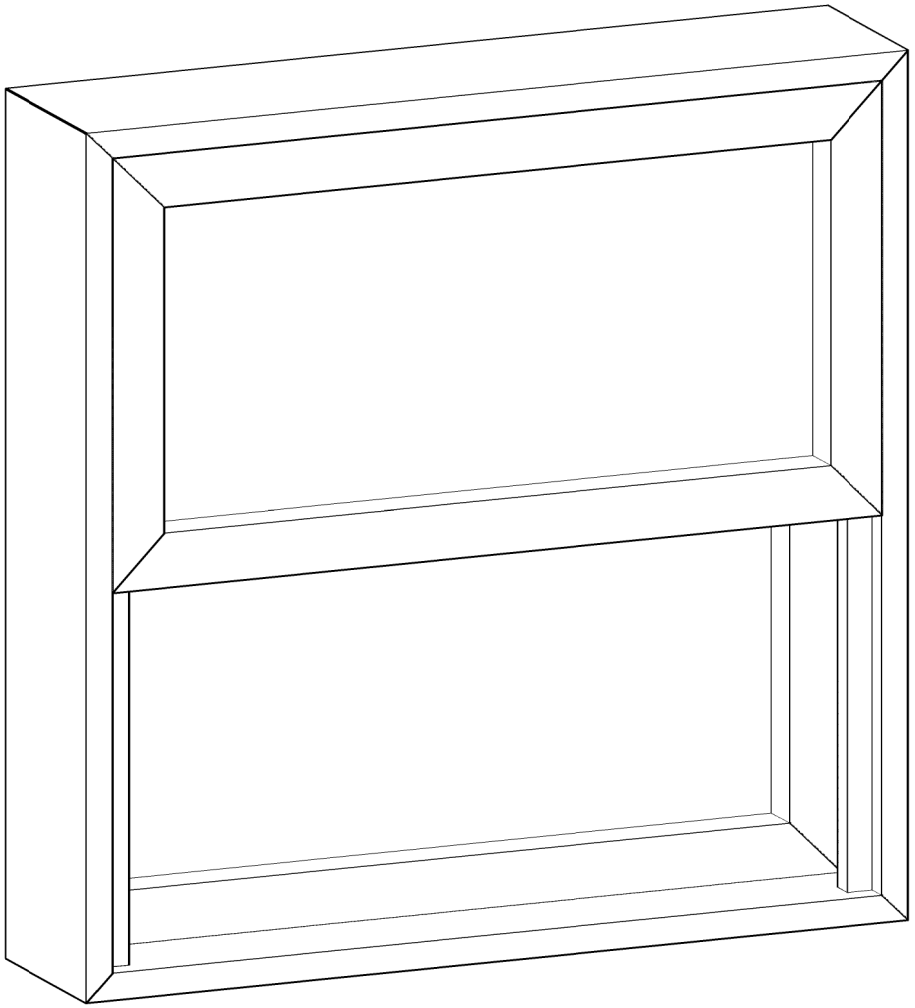
1) Drill a $\frac{1}{4}$" pin hole in the interior, left or right, side of the movable window assembly.

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.

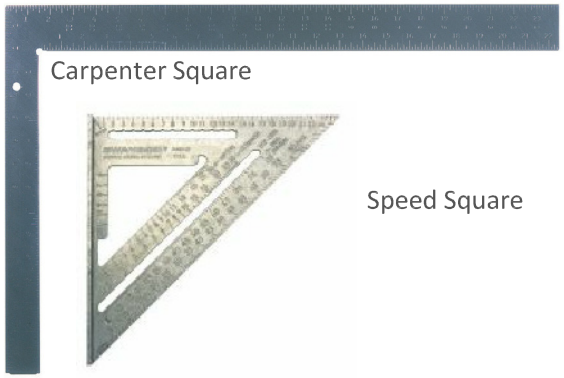
5) For the purpose of this article, the 5/12 roof pitch converts to 1.083 on the rafter conversion chart found on any framing square.Therefore, 11.5 x 1.083 = 12.4545 feet is what the rafter length will be.

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".

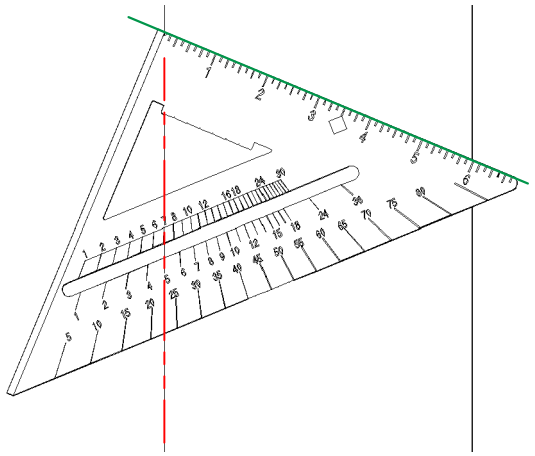
Roof Slope	Factor
Flat	1.0
1:12	1.003
2:12	1.014
3:12	1.031
4:12	1.054
5:12	1.083
6:12	1.118
7:12	1.158
8:12	1.202
9:12	1.250
10:12	1.302
11:12	1.357
12:12	1.414
13:12	1.474
14:12	1.537
15:12	1.601
16:12	1.667
17:12	1.734
18:12	1.803
19:12	1.873
20:12	1.943
21:12	2.015
22:12	2.088
23:12	2.162

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.

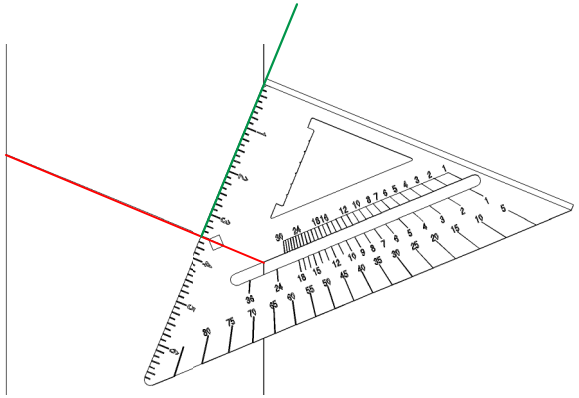


For the speed square, start by lining up your plumb cut by aligning the pivot point on the speed square with the desired pitch. This example is going to use a 5-12 slope but the principle is the same with any slope. See the diagram below.



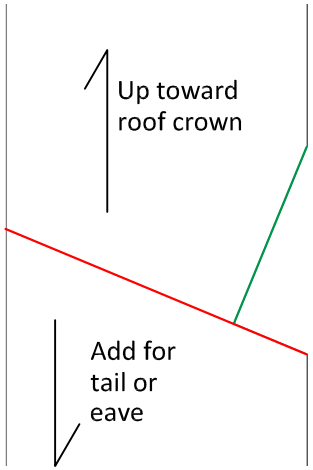
See how the red line lines up with the little notch in the back of the speed square and the number 5 in the "common". The common simply refers to a common rafter. Notice also, how the "HIP/VAL" lines up quite nicely with 7? For a $\frac{5}{12}$ slope, the corresponding hip/valley slope would be 7. Easy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



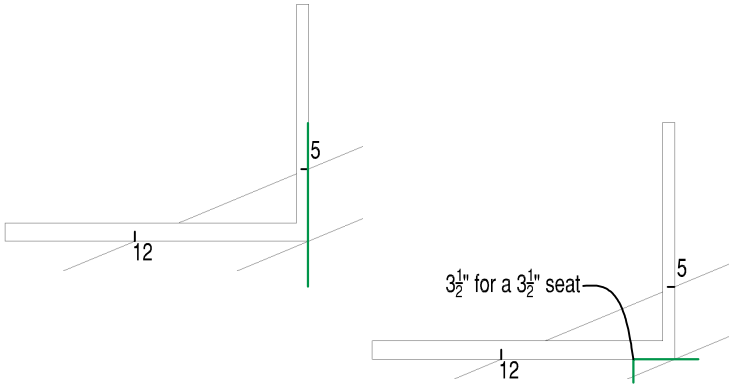
Align the diamond sight so the line cuts the sight down the center and your pivot point is flush against the outside edge of the rafter to be cut.

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.