Breakdown Saw Bucks

By Will Myers

About a year and a half ago my wife took a job in eastern North Carolina. My work is still on the western end of the state, so most weeks I travel back and forth from one end of the old north state to the other. I really am not a good traveler and the repetitive long drives get to be terribly monotonous. To help deal with the 4 ½ hour trips up and down I-40 I try to think about something constructive. More often than not this involves a woodworking project of some kind that I am either working on or one that I am planning on. One particular trip I had saw horses on my mind.

There are lots designs out there for different styles of knock down or fold up saw horses; a lot of them are very good and would serve the purpose perfectly. The biggest problems with some of the designs I have seen their construction tends to get complicated and often, heavy. It is just a lowly sawhorse; should it take a month to make a couple of them?

This design was the product of one of these long drives back one morning. What I was on my mind were several traits saw horses I had made in the past lacked. I wanted in a saw horse: relatively light weight (could be moved one handed), could be broken down or assembled simply, quickly and to lay flat for storage or transport, no tools need other than a hammer or mallet and most of all, strong with no wiggle.

When I got back home I made a small nail together version and was blown away by it. The horses described below are a slightly refined version (horsey 2.0?) that I have had a lot of fun building and using.

Materials

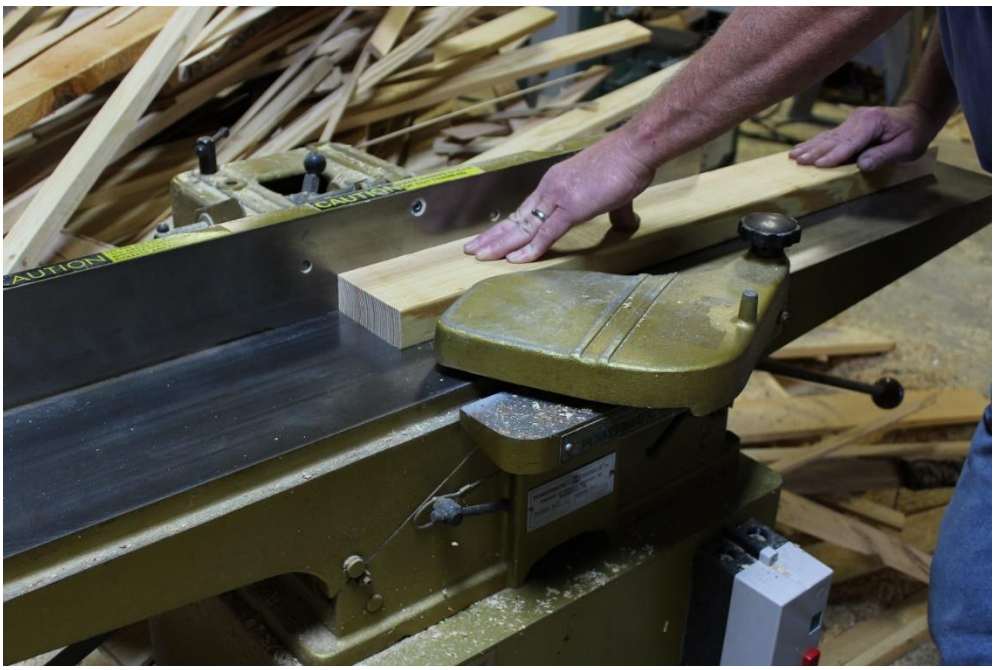
For the saw horses here I am using yellow pine procured from 2x construction lumber. My favorite is quarter sawn stock but flat saw will do just fine too. If yellow pine is unavailable where you are use whatever is cheapest and relatively strong species you can get your hands on. I picked up two 16’ 2x10’s to build these two saw horses and had a good bit of stock left over.


Quarter sawn yellow pine is pretty easy to find and a perfect material for saw horses

One last consideration on to think about is moisture content of construction lumber. It tends to be a bit on the wet side, if so, let it acclimate for a little while and dry out before you use it.

Beam Glue Up

I usually build these in pairs; one saw horse is about as useful as a water hose with no spigot. Mill out the stock for the beams first, you will need four pieces about 3 ¾ x 36, this is slightly larger than final size and will be milled to final specs after glue up.


Powered joiner makes for fast work flattening stock.


A small foam roller works well for spreading the glue evenly and quicky.

To keep the beams as thick as possible, since we are starting with 1 ½” thick stock, just joint one side of each of the four pieces that will meet when glued taking just enough material off to get a flat surface. Align the pieces the way you want them, draw a triangle on one pair and two triangles on the second so as you are gluing you will know how they go. Apply glue to the meeting faces of each pair, assemble and clamp the two beam assemblies as one. While the glue sets you can get the legs started.

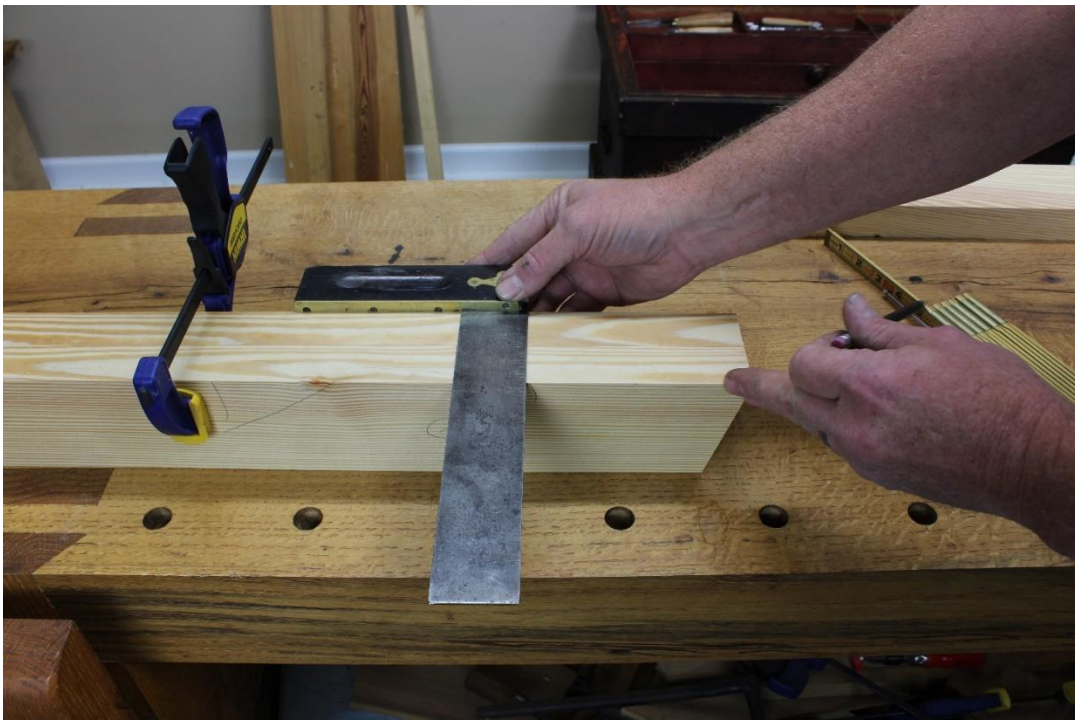

Clamp both beams at once. I also have a scrap piece on the outside of the stack to prevent the camps from damaging the beam surfaces

Legs Assemblies

The saw horses I am building here will have a total height of 30”, you can of course make them taller or shorter to suite your needs. You will need eight legs for two saw horses, these are jointed and planed to 1 3/8” x 3 ¼” x 32” (32” length is slightly over long). Arrange the legs in pairs and mark the faces, it is a good idea to number the pairs as well. Start by cutting the tops of the legs at a 15 degree angle.


A miter box saw is not essential but when making many angled cuts it is hard to beat.

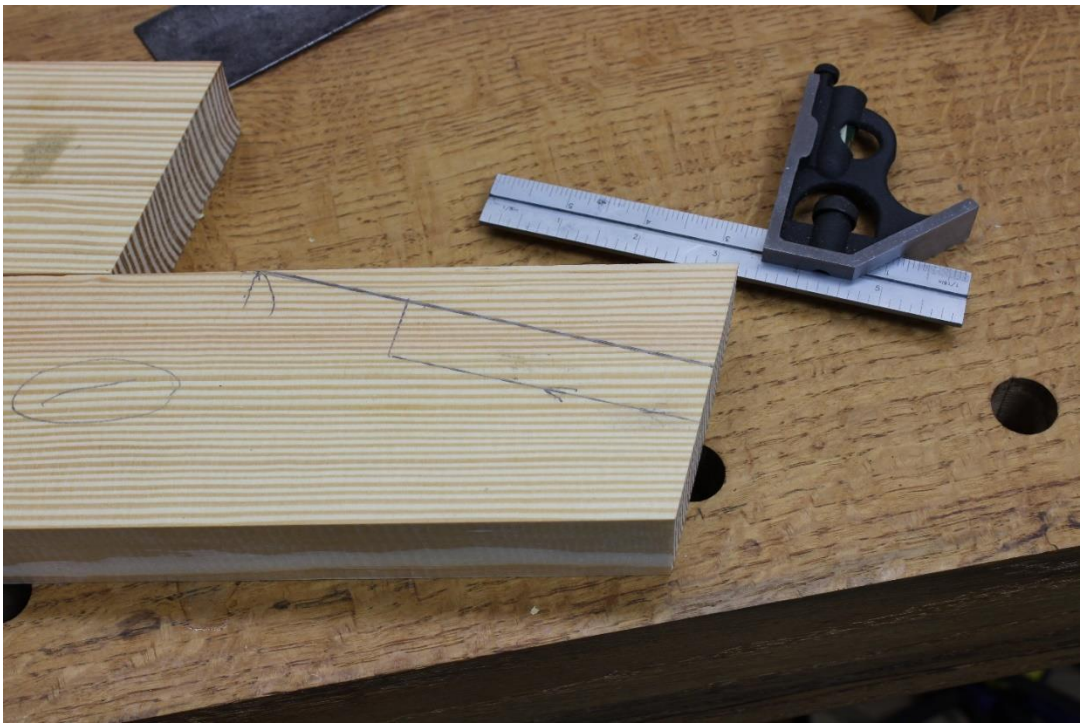
Clamp a pair of legs together with the inside edges up them measure down from the top 5 ½" and square a line across both legs.


Laying out the legs in pairs insures perfect alignment.

Unclamp the legs, on the face side of the leg palace a try square on the angled top of the leg, line up the beam of the square to the line you just made on the side and pencil a mark to the top of the leg. This will be the meeting face between the legs.


Square off of the 15 degree cut at the top of the leg

Now, measure over from the line on the face ¾” towards the outside of the leg and make a tick mark. Use a machinist square with the rule set to project 3 ½” from the fence. Line the square up to the tick mark, pencil a mark down the rule and around the end. This notch will become the saddle that the top beam will rest in.


Using a machinist square you can lay out the side and bottom of the saddle notch at once.

With the layout on the ends of the legs complete it's time to rip! Start by ripping the 3 ½" line first down to the baseline then make a crosscut at the baseline of the saddle to remove the waste.

A full size ripsaw makes it fast!

There is one last short rip cut to create the meeting face of the legs.

This short rip cut need to be accurate, the top of the legs attach to one another here.

With the saw cuts complete check for square, if the notch needs any tuning a chisel will make quick work of it. The lower angle needs to be flat and square; a block plane works well here.

Plane it smooth and flat.

Stretcher Mortise and Tenons

For the stretcher that runs between the legs you will need four 7/8” x 2” x 18” pieces of stock. These keep the bottoms of the legs from spreading when under heavy load. To lay out the mortise and tenons, start by clamping the pair of legs to be joined in the vise with the outside edge up and the top angles aligned with one another. Measure down 22 ½” from the top of the leg and square a line across the two. Remove the legs from the vise and lay them out flat on the bench with the face side up. Align the top meeting surfaces of the legs and use a clamp to hold them in alignment.

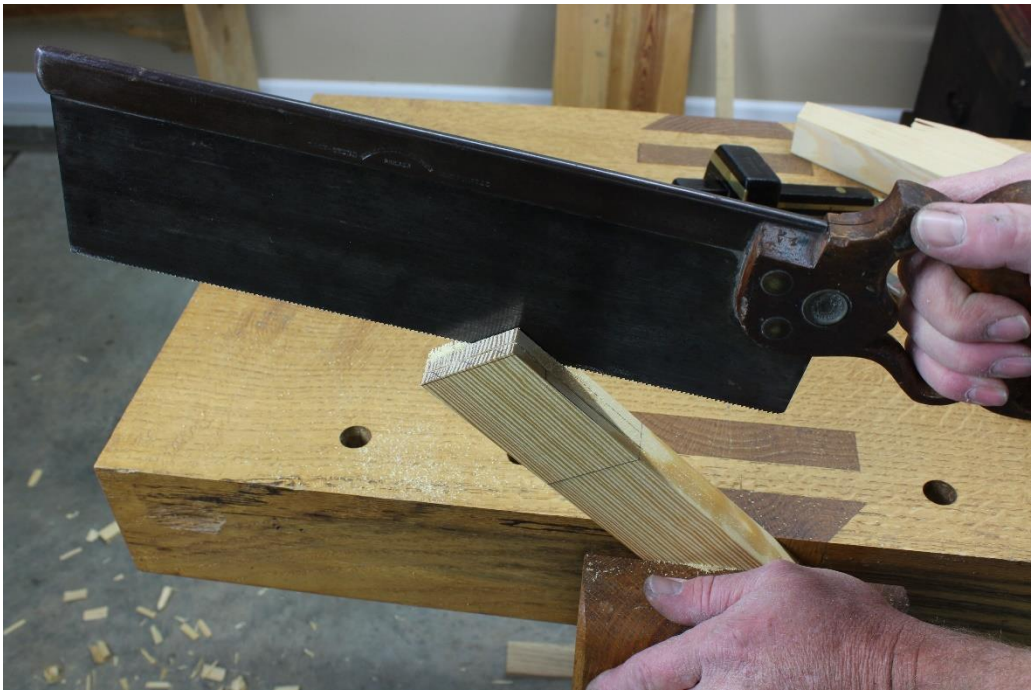
Transferring the stretcher mortise locations to the legs using the stretcher itself is the most accurate method.

Lay the stretcher on top of the legs with the line you just made aligned with the top edge. Hold the stretcher in place and trace with a pencil around the upper and lower side of the stretcher onto the faces of the legs. Before removing the stretcher also trace from the inside of the legs to the underside of the stretcher for the tenon shoulder location. Laying out the mortise locations and tenon shoulders this way assures perfect layout even though both elements of the joints are angled.

I usually cut the tenons first. Line up a bevel to the trace mark on the face of the stretcher and knife the shoulder line in. Use a square to knife the line across the edges, and finish by knifing the shoulder on the opposite face with the bevel. To the lay out the thickness of the tenon use a mortise gauge set to 3/8”.

Set your gauge teeth to the width of the chisel you will be using to chop the mortises.

Center the gauge teeth to the thickness of the stretcher, with fence to the face side, gauge around the sides and end of the tenon.



Saw the cheeks first working diagonally from each side.

A crosscut filed backsaw takes care of the shoulder cuts.

For the mortise layout, transfer the marks made earlier across the edges of the legs with a square. The leg is of course thicker than the stretcher so you will need to re-adjust the fence on the gauge to center the teeth on the leg stock. Gauge the mortise width between the pencil marks on the inside and outside edges of the legs.

The double tooth gage laying out the mortise width on the legs.

I like the English style mortise chisel for narrow mortises such as these.

Chop out the waste, working halfway from either side, meeting in the middle. The ends of the mortise are at an angle, as you are chopping you can eyeball down the back of the chisel to the layout lines down the side of the legs to help get an accurate angle through the mortise.

With the mortises complete, dry fit the assembly. Check the tenon shoulders fit to the insides of the legs, use a chisel or shoulder plane to pare away any offending material. The tenons will need to be cut to length so while assembled trace the length from the side of the legs onto the tenon. Also check the tops of the legs where they meet one another, this area can be tuned with a block plane or sawing between the legs while assembled with a tenon saw to close up the joint.

The area at the top of the legs where they meet will be secured by a single #14 x 4” wood screw (a hex head lag bolt could be substituted here). While dry fitted, use a bevel set at 15 degrees and make a reference line thru the middle of the pad on the face of the legs where they meet and then square the line around the side of the leg. Clamp the legs together to hold them in alignment.


It is easy to control the depth of the hole using a hand brace and bit.

With a ½” auger centered on the leg, bore in to a depth of about 1 1/4” using the bevel line to sight the angle. Next use a ¼” drill to bore thru the center of the auger hole until it just starts into the adjoining leg.

 Here I am using a ¼ drill centered in the auger hole; stop drilling when it just starts in the opposite leg.

Disassemble and finish by pre-boring the adjoining leg for the threated portion of the screw with a 3/16” drill bit.

Before final assembly of the legs there are a couple of tasks that are better done now than later. Finish plane all four sides of the stretcher. I also chamfer the long edges, this is entirely optional.

 Quick and dirty chamfers with a jack plane before assembly.

These saw horses are meant to be used and not fine furniture so I cut the chamfered edges with a jack plane eyeballing a 45 degree angle. If the bevel is rough make a final pass or two with the block plane. I also hit the inside edges of the legs that cannot be reached once assembled with a smoothing plane and chamfer these edges as well.

A saw kerf a ¼” or so from the top and bottom edges of the tenons will make starting the wedges easy.

The legs also need to be cut to final length by measuring down from the top 30” then use the bevel to lay out the same 15 degree angle as the top. Saw the line; the legs will look like a parallelogram when laid out correctly. If it looks like a trapezoid it won’t work!

Optional Leg Assembly Method

Another version of leg assembly I have used that has worked well involves nails instead of mortise and tenons. This version the legs are made same as described above, the difference

being there is a short upper stretcher attached with nails and glue to the side of the legs at the top, replacing the screw. The lower stretcher is also just nailed in place eliminating the mortise and tenons. While the nailed leg assemblies are not as elegant of a solution to joining the legs together as the mortise and tenoned version, it is much faster to build and plenty strong.

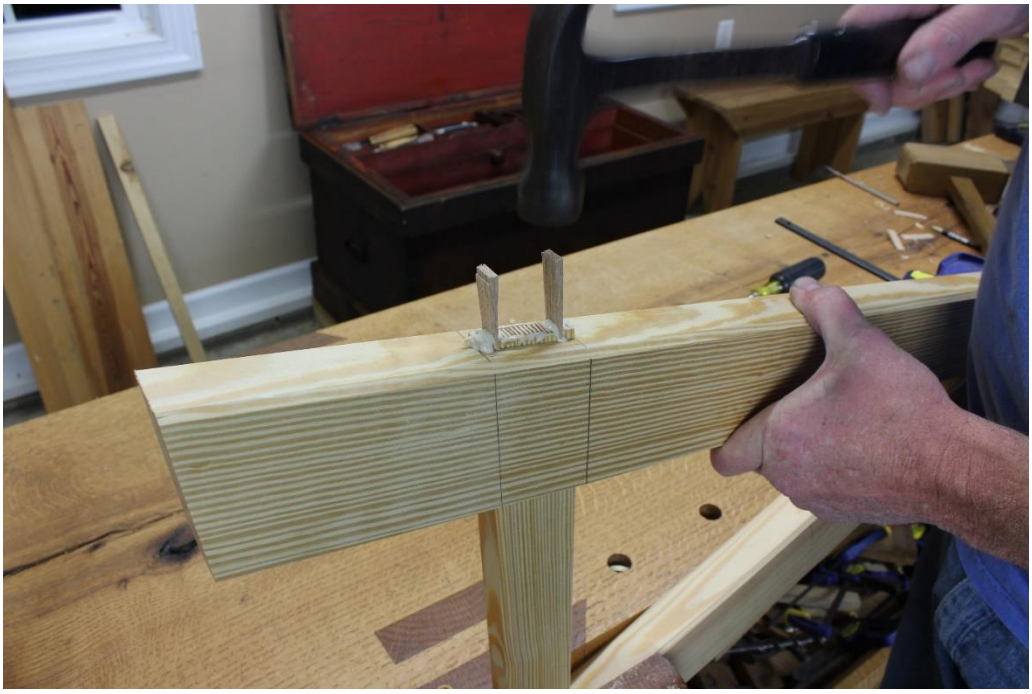
Optional nailed assembly.

Assembly of the legs

Spread a good coat of glue on the tenons, mortises and the area at the top of the legs were they meet as well. Assemble the tenons to their respective mortises.

Just the one screw is all that is need to secure the tops of the legs together.

Align the tops of the legs, place a clamp across to hold the faces flush with one another and install the screw.



Tap the two oak wedges in evenly until they stop.

Last, drive the wedges into the stretcher tenons. As you drive the wedges in be sure the leg stays tight against the stretcher shoulders.

After the glue sets saw the wedges off flush, plane the faces and outside edges to smooth and remove any layout and milling marks left behind.

Finish up the Beams

Once the glue is dry on the beams, joint and plane them to their final dimensions of 3 ½” x 35” x 2 ¾”. There are four short dados that need to be cut into the beam that capture the legs. Measure in from both ends 4” and knife a line around all four sides.

It is faster laying out the locations of the dados on both beams at once as I am doing here.

Now measure in 1 3/8” from the first line and square it around all four sides as well. Set a single pin gauge to 5/8” and on the top and bottom of the beam gauge a line between the two knife marks for the depth of the dados.

Saw the sides of the dado first, down to the depth mark.

The waste between the saw marks is quickly chopped out with a chisel. Finish by paring down to the baseline.

Insert the leg assemblies in the dados, these should just slide in, a little loose is better than too tight.

Wedges

Use as hard a wood as you can get your hands on for the wedges; I am using white oak for these shown. To make the wedges start with a piece of wood 6” x ¾” x 1 3/4”. The wedges are a little long at 6”, this gives some leeway for fitting, and they will be shortened later. Measure down on the face of one end wedge stock 5/8” and make a tick mark. Use a straightedge, align it with the tick mark and the arias at the opposite end and mark down the length with a pencil.

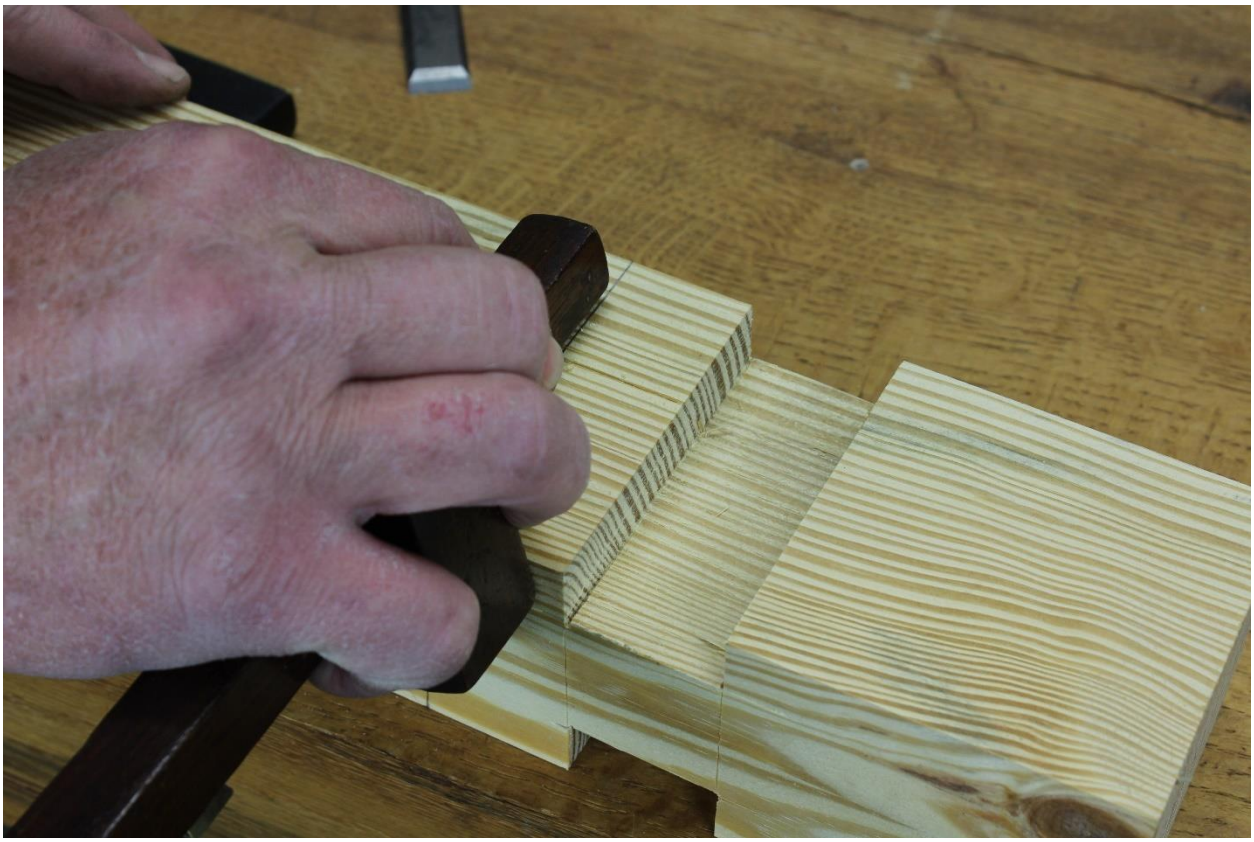
You can saw the angles but I find it is about as quick to chop down close to the line with a chisel and finish up with a jack and jointer plane.

It is a good idea that the wedges be identical to one another so that any mortise they are placed in they will seat up the same. To accomplish this, make the final passes with the jointer plane while all four wedges aligned to one another, clamped up in the vise.

To layout the mortises for the wedges, assemble the legs to the beam while upside down on the bench. Lay the wedge against the underside of the beam, straight side against the inside face of the legs. Make a pencil mark down the angled side of the wedge onto the beam.

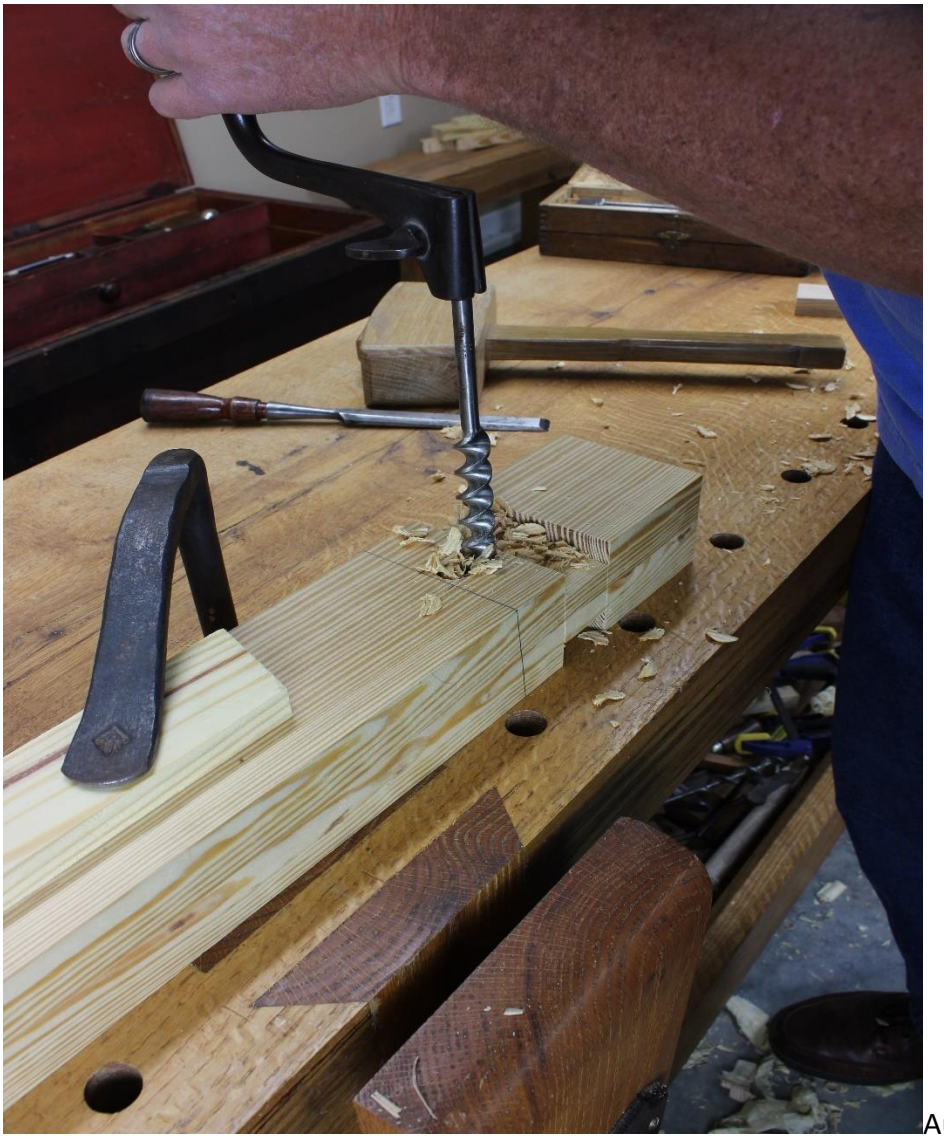
Use the wedge to transfer the angle.

Disassemble and using a square bring the line up both sides.



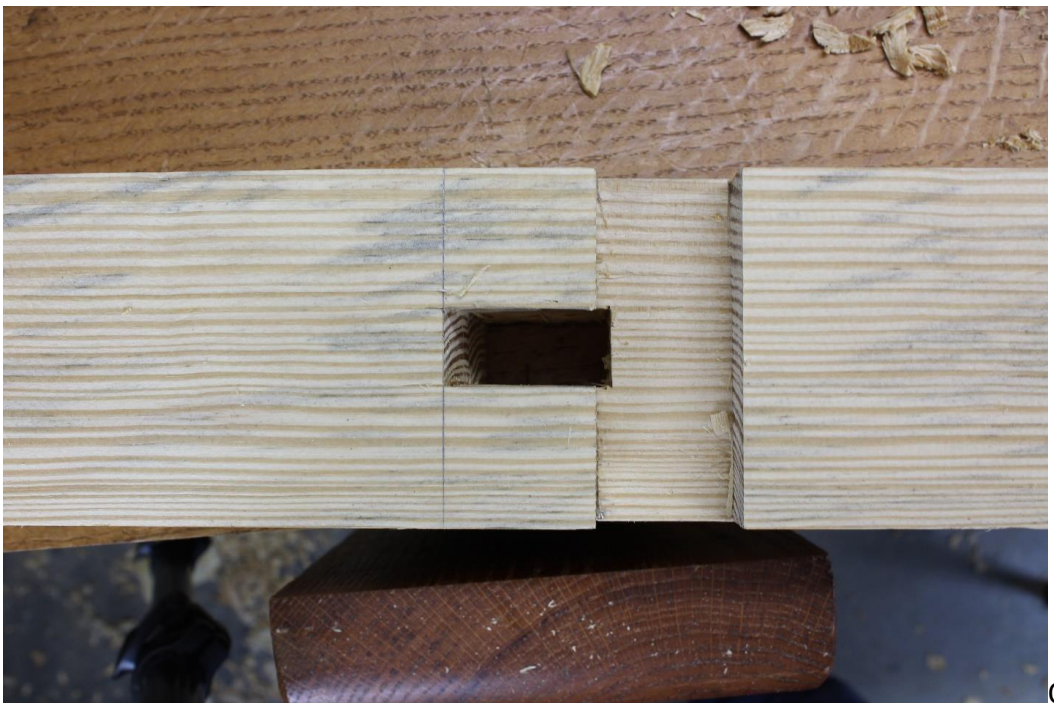
Set your mortise gauge teeth width to the chisel you will be chopping with (3/4” for this one) and set the fence so the teeth are centered on the beam.

Gauge with the fence to the bottom side and mark from the pencil line to the dado.

 Auger out most of the waste.

Using an auger slightly smaller than the width of the mortise bore halfway thru from both sides and then chop out the remaining waste with a ¾” chisel.


The angled side of the mortise needs to be straight and flat.


On the dado side of the mortise chop an extra 3/16” or so into the dado. The wedge should push against the leg face and not bottom out in the mortise.

Finishing Up

Go ahead at this point and finish plane the sides and bottom of the beam. You can also chamfer the lower edges and end to match the legs if you like. Assemble the legs to the base and drive the wedges up tight. The wedges will also be extending past the legs a bit; mark where they meet the legs and saw off the extra length. Chamfering the ends of the wedges will help keep them from mushrooming as they are driven in and out. If the legs are projecting above the top of the beam plane them flush or a shade below. Last but not least, I nail (no glue) a ¾" x 4 ¼" by 36" board to the top of the beam.

The top board is a sacrificial surface so over time if it gets cut up or damaged it can be removed and replaced.

As far as finish, I wiped a coat of oil on these but no finish at all would be just fine too.

-Will Myers 3/28/21