University of Tennessee Trail Bench: Construction Guide

The UT Trail Bench was designed with the goal of creating an easily made, inexpensive, comfortable sitting structure which could be placed along trails or in strategic locations on the grounds of the UT Arboretum. Materials for this bench cost approximately $25, and can be constructed using common carpentry tools. Depending on a person's carpentry skills and tools on hand, this bench can be constructed in four to six hours. However, with the skills of our maintenance staff, and benefit of a fully-outfitted shop (table saw, radial arm saw, pneumatic nail gun, air wrenches, cordless drills, etc.), three people built 35 benches in three days.

Materials List:

Lumber (for 6' wide bench):

For the legs…
1 - 2" x 6" x 14'

For the seat…
1 - 2" x 12" x 6'

For the back slats…
1 - 1" x 6" x 18' (ripped in half for 1" x 3")

(Pressure treated pine lumber was used for the UT Arboretum Trail Bench, although other wood (western redcedar, oak, poplar, or even walnut) might be desirable if you wish to have a more "refined" appeal. Most handy-men/women know that construction lumber is described in units of a "full inch", but the actual dimensions are a portion of that measurement - i.e. a "2 by 6" really measures 1 ½" by 5 ½". To confuse the issue further, pressure treated lumber has high moisture content when you pick it up at the lumber yard, so expect it to shrink as it dries, and thus the measurements will change dependently.)

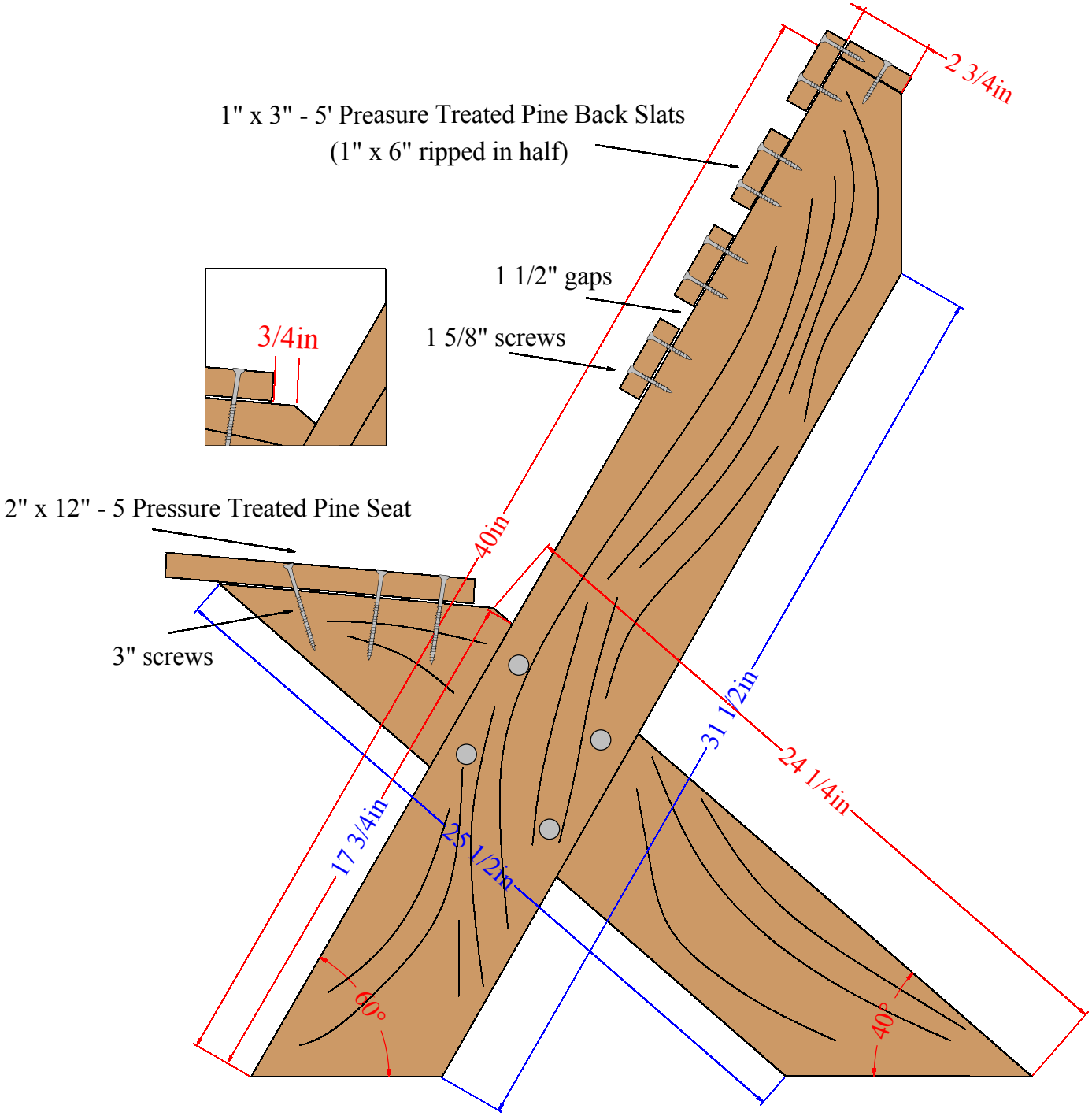
Hardware:

8 - 5/16" x 3" Carriage Head Zinc Coated Bolts w/ Washers and Nuts
23 - 1 5/8" PrimGuard Plus Exterior Screw (for pressure treated wood)
10 - 3" PrimGuard Plus Exterior Screw (for pressure treated wood)

Construction Notes & Tips:

The most critical elements in this design are the lengths and angles associated with the support legs/back. The dimensions give you the critical relationship of seat height, seat slope, back height, and the angle between the seat and back. In the diagram on the following page, these critical measurements are highlighted in "red". For reasons stated above, milled lumber does not come in measurements of full inch increments, however, if these critical measurements and angles are made accordingly, the resulting non-critical measurements can vary independently without affecting the seating design.

University of Tennessee
Institute of Agriculture/Agricultural Experiment Station
Arboretum Trail Bench Design
March 2008



Copyright ©2008 Forest Resources Research and Education Center Oak Ridge, Tennessee

Having some wood clamps (or an extra set of hands) to hold the different pieces together while bolting and screwing will make the job of assembling much easier. Another technique we used was to temporarily "tack" pieces together with small braid nails, using a pneumatic nail gun, before screwing and bolting - clamping works just as well. We also found it convenient to lay the bench legs on the floor and put the bottom "feet" against a wall to get the correct adjustment and alignment before drilling the bolt holes (Photo 1). *(Hint: drill, bolt, and loosely tighten only one bolt, then make final adjustments before drilling the last three holes.)*

Once the two bench legs are assembled, it is time to attach the seat and back slats. Again, you will need extra hands for assembling. The support legs are inset 6" from the edge of the seat-board and back-slats, with allowance for the 1 1/2" difference caused by overlapping the two 2 x 6's which formed the legs and back. We started by spacing and clamping the legs together upright and in position (Photo 2). Next, we fastened the top cap-slat to the back (Photo 3), and then attached the seat board to the leg frame. All screw holes were pre-drilled and counter-sunk. At this point, double-check your measurements and make adjustments to alignment and square. *(Hint: tacking some cross-braces to the legs and seat back to hold everything in place while assembling is a good idea.)*

Your bench is now ready for adding the final back slats and screwing it all together. Before adding the back slats you may want to consider sanding the exposed edges - an electric router with a round-over bit will make this job much easier, but a sanding block will work. When attaching the back slats we used a small 1 1/2" wood spacing block between each of the slats and clamped in place while we drilled and screwed (Photo 4).

Next, look at your scraps pile and find the small right-triangle shaped block of wood that was cut off of the top (backside) of bench-leg back rest. This small block can be fitted and fastened underneath the seat and against the seat support leg to give side-sway rigidity to the whole bench - it can be fastened with two 3" screws drilled at the appropriate angle (Photo 5). Finally, a 3/4" x 1 1/2" brace can be added, on edge, in the middle of the back slats to tie them together and add more strength and rigidity to the whole seat back.

Slight variations in this design can be made to suite individual taste. One refinement we found attractive was to reduce the width of the back slats to 1 3/4", increase the thickness to 1", and narrow the space between each to 1". This change required more slats to cover the same distance, and it requires some advanced shop tools to mill wood to these dimensions.

Copyright ©2008 Forest Resources Research and Education Center Oak Ridge, Tennessee Telephone 865-483-3571

Trail Bench Construction Photos

1. Positioning the base frame leg sections
2. Clamping the frame sections
3. Attaching the top finish board
4. Attaching the back slats
5. Bracing the frame

Finished Bench