

An Inexpensive Free Standing Bike Rack

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Introduction

I designed and built an inexpensive, free-standing 19-bike rack for my shop. My main goal was to minimize the amount of floor space needed to store that many bikes, in a space where it isn't possible to put bike hooks on the walls or ceiling. I also wanted to be able to get to any bike in the rack with a minimum of difficulty.

The design is straightforward. Bikes hang vertically from hooks, alternating by front and rear wheels, with handlebars facing out. Four vertical posts, four cross members and two struts keep things rigid. Lag screws hold everything together. An optional plywood top provides overhead storage space and shelter from the elements.

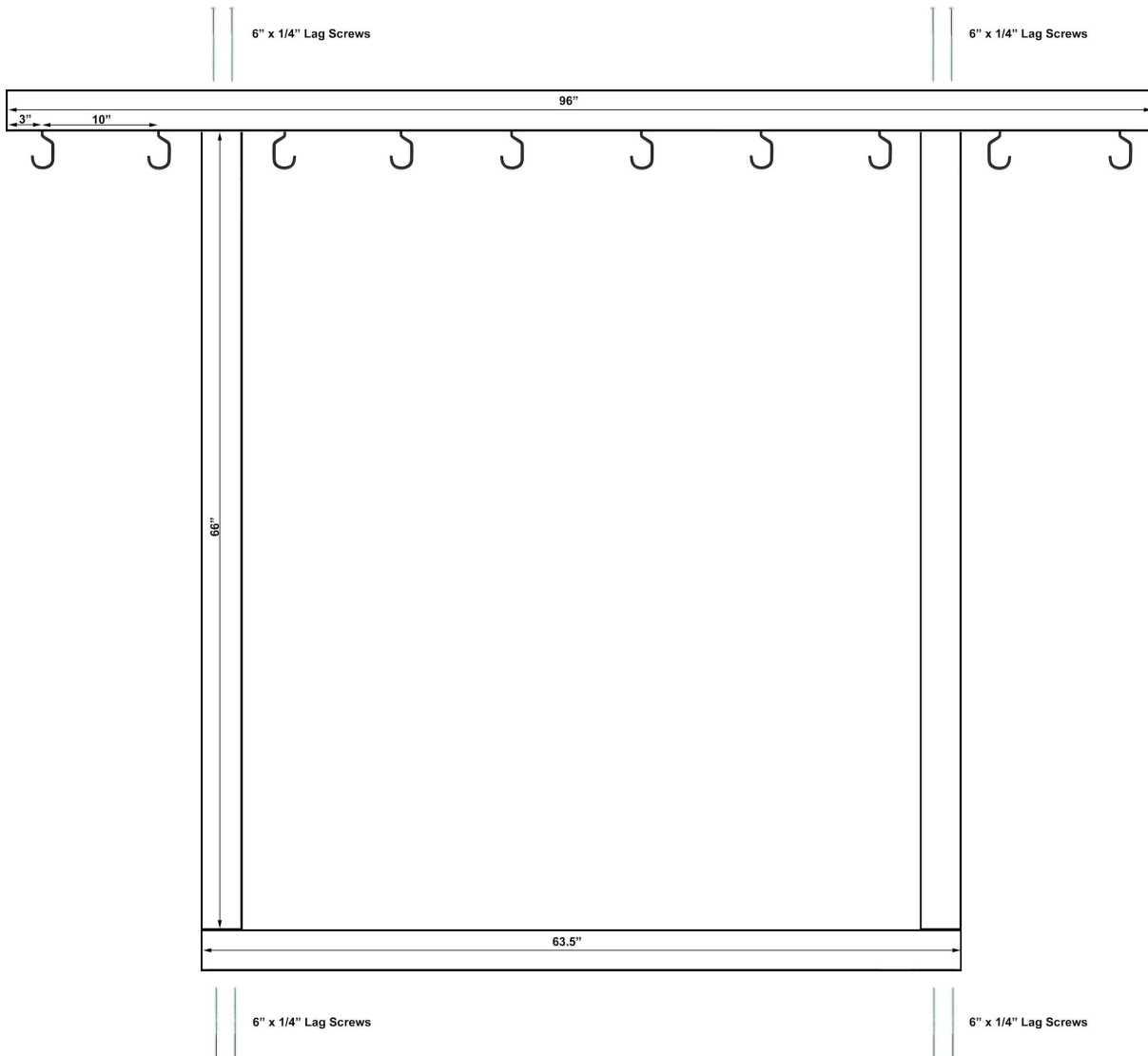
This project is inexpensive. With wood scavenged from friends and neighbors, my total was only \$52.02 for bike hooks, lag screws and washers. Adding four 4-inch casters is convenient for rearranging the bike rack and nearby free space, while raising the cost to \$83.01

Drawings

Ten Hook Assembly

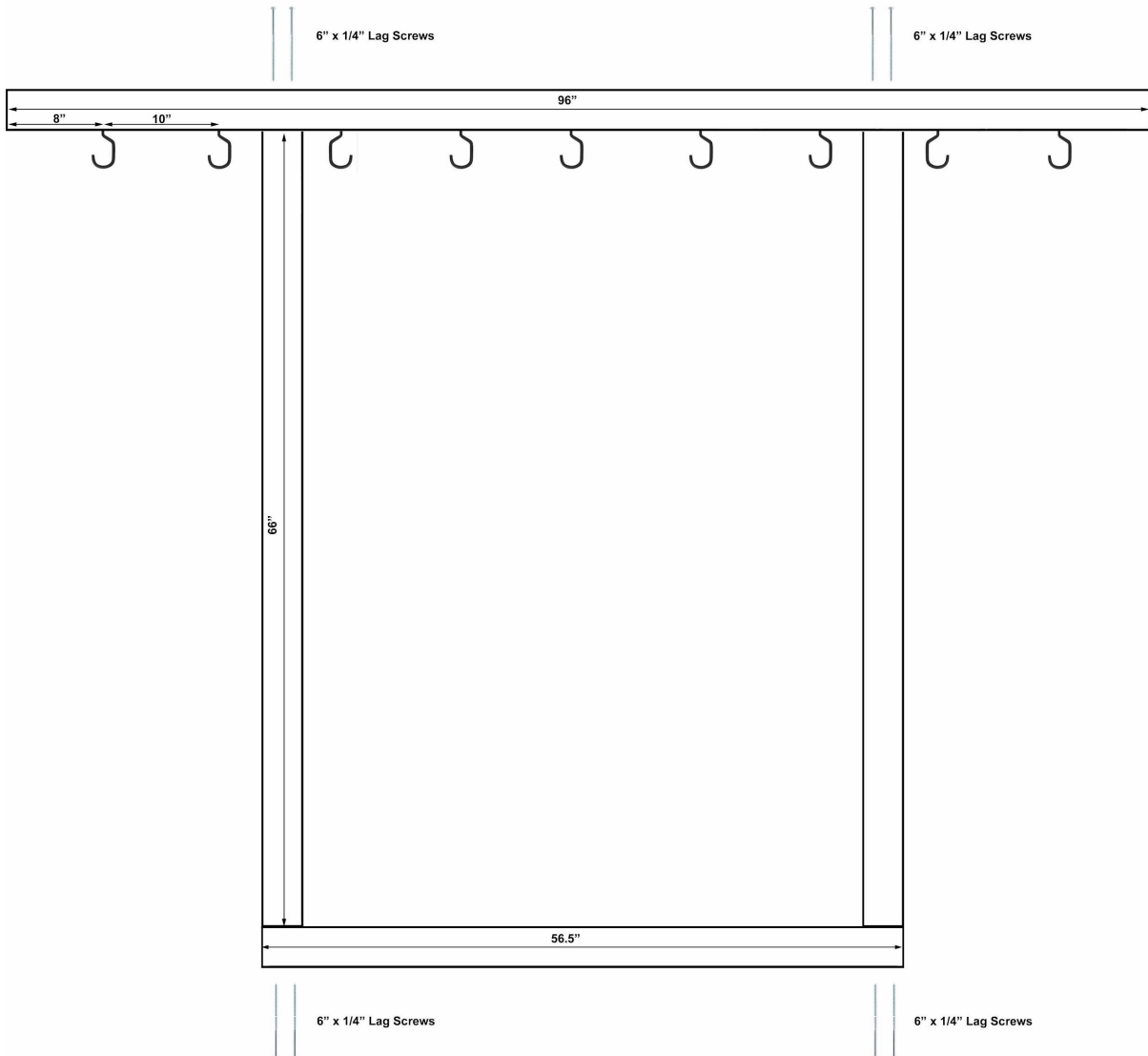
This is the larger side of the bike rack that has 10 bike hooks. The hooks are spaced 10 inches apart, at 3, 13, 23, 33, 43, 53, 63, 73, 83, and 93 inches. All of the wood pieces are 3.5" x 3.5" posts. The vertical posts are centered 18 inches from the ends of the horizontal beam. Eight vertically-oriented 6" x 1/4" lag screws hold the assembly together, two at each corner. The lag screw heads and washers are recessed.

For soft wood, install 1/4" lag screws into a full length pilot hole with a diameter of 3/32". If lag screws break during tightening, use a slightly larger diameter pilot hole or lubricate the threads prior to insertion.



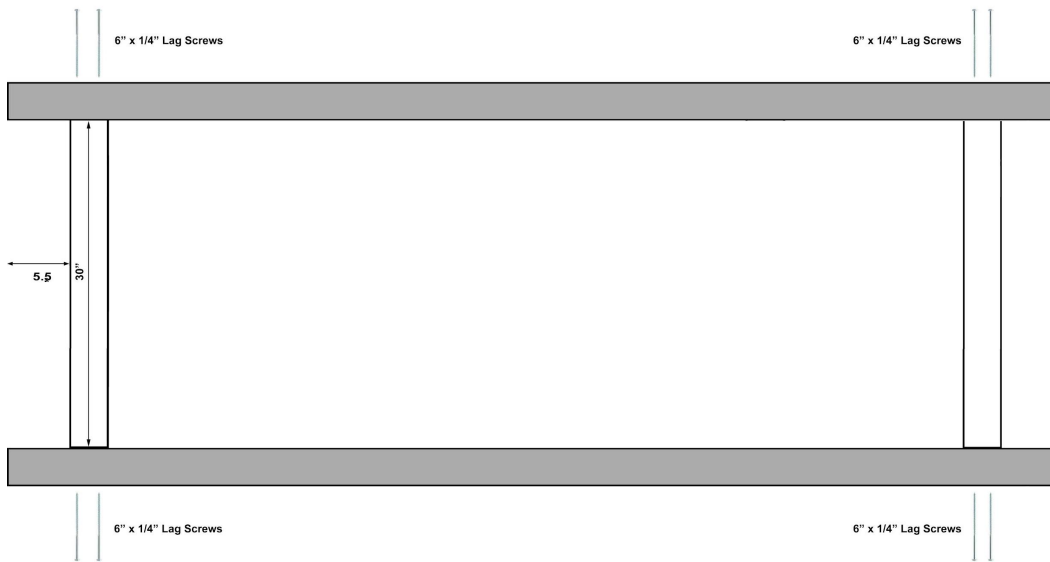
Nine Hook Assembly

This is the smaller side of the bike rack that has 9 bike hooks. The hooks are spaced 10 inches apart, at 8, 18, 28, 38, 48, 58, 68, 78, and 88 inches. All of the wood pieces are 3.5" x 3.5" posts. The vertical posts are centered 23 inches from the ends of the horizontal beam. Eight vertically-oriented 6" x 1/4" lag screws hold the assembly together, two at each corner. The lag screw heads and washers are recessed.

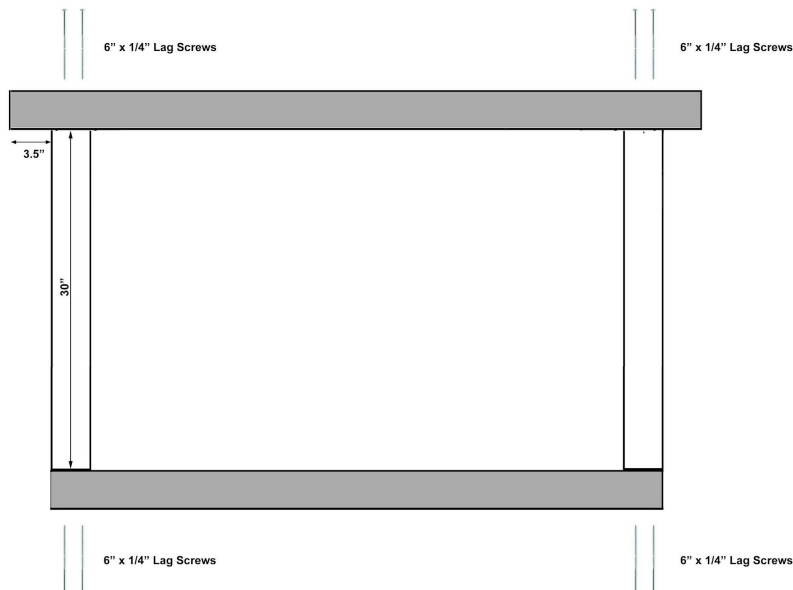


Top and Bottom Cross Pieces

The drawing below is a top view showing the locations of the 3.5" x 3.5" x 30" cross pieces joining the tops of the Ten and Nine Hook Assemblies. All of the cross pieces are 3.5" x 3.5" posts. The cross pieces are held in place by eight recessed 6" x 1/4" lag screws, with washers.

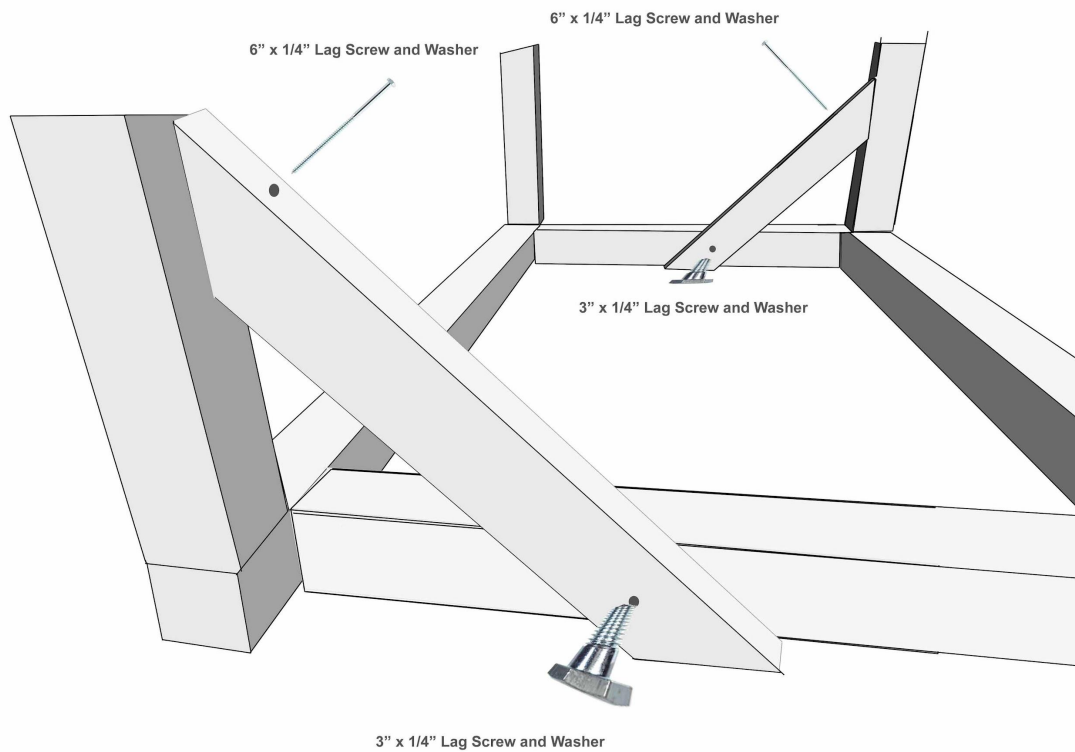


The next drawing shows the locations of the 3.5" x 3.5" x 30" cross pieces joining the bottoms of the Ten and Nine Hook assemblies. The pieces are joined by eight recessed 6" x 1/4" lag screws, with washers.



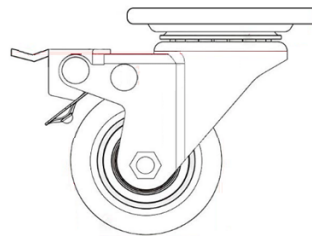
Optional Diagonal Struts

If the rack is not completely solid, add diagonal struts at the corners. Start with two 24" x 2" x 4" pieces. Cut the ends at 45-degree angles. Bolt these to the bike rack using one 3" x 1/4" lag screw and washer, and one 6" x 1/4" lag screw and washer.



Optional Casters

Another useful option is putting the bike rack on wheels. Casters allow you to easily move the rack, creating free space wherever you happen to need it.



Optional Plywood Roof

For an indoor rack, a single plywood sheet can be a useful platform for overhead storage. For an outdoor rack that needs to protect bicycles from the elements, use two plywood sheets, rotated to provide more overhang and slanted to allow water to run off.

Materials



Here is a shopping list. Prices were the best I could find online. Note that a "4x4" is usually 3.5" x 3.5" and a "2x4" is usually 1.5" x 3.5". The bike hooks are rated for only 25-pounds, but seem to work.

By asking friends and neighbors and checking on Freecycle and Nextdoor, it is likely that you will find at least some free scrap lumber to build this project. Watch out for rot, termites, and embedded hardware that can damage your saw. If you can't find 4x4 posts, you can substitute 2x4s fastened together with 3" lag screws.

Description	Count	Price	Total	Bought	Paid	Used	Link
4" x 4" x 8' wood	2	\$15.98	\$31.96	0	\$0.00	3	https://www.homedepot.com/
4" x 4" x 10' wood	2	\$19.72	\$39.44	0	\$0.00	4	https://www.homedepot.com/
4" x 4" x 12' wood	2	\$24.00	\$48.00	0	\$0.00		https://www.homedepot.com/
1/4" x 6" lag screws, bag of 50	1	\$21.30	\$21.30	1	\$21.30	34	https://www.amazon.com/dp/
1/4" x 3" lag screws, box of 100	1	\$8.40	\$8.40	1	\$8.40	18	https://www.amazon.com/dp/
1/4" flat washers, box of 100	1	\$3.70	\$3.70	1	\$3.70	36	https://www.amazon.com/dp/
bike hooks	19	\$0.98	\$18.62	19	18.62	19	https://www.homedepot.com/
Total			\$171.42		\$52.02		

These optional items are nice to have.

Description	Count	Price	Total	Bought	Paid	Used	Link
8' x 4' x 1/2" plywood	1	\$37.23	\$37.23	0	\$0.00	1	https://www.homedepot.com/
1/8" wood screws	1	\$3.27	\$3.27	0	\$0.00	1	https://www.amazon.com/Hill/
4" casters, set of 4	1	\$30.99	\$30.99	1	\$30.99	1	https://www.amazon.com/dp/
2" x 4" x 24" wood	2	\$3.28	\$6.56	0	\$0.00		https://www.homedepot.com/
Total			\$78.05		\$30.99		

Here is a list of the wood pieces needed to build the bike rack, and how to cut them from the purchased lumber listed above. Precision cuts are generally not required; however, it is helpful if all four cross frame members are uniform in length, and all four of the upright frame members are uniform in length.

Description	Count	Dimensions	Cut Instructions
Top frame	2	96 x 3.5 x 3.5	Use an 8-foot post as-is, with no cuts
Bottom frame, long	1	63.5 x 3.5 x 3.5	Cut from a 10-foot post
Bottom frame, short	1	56.5 x 3.5 x 3.5	This is the remainder of the above 10-foot post
Cross frame member	4	30 x 3.5 x 3.5	Cut from a 10-foot post
Upright frame	4	66 x 3.5 x 3.5	Cut from two 12-foot posts
Lateral braces	2	1.5 x 3.5 x 24	Optional
Top plywood sheet	1	96 x 48 x 0.5	Use a full sheet of plywood as-is, with no cuts