

# Cost Effective, 12 Bike Display Rack Building Instructions

(12 bikes ~\$180)



This is a third generation of bike display rack designed and used at the [Corvallis Bicycle Collective](http://www.corvallisbicyclecollective.com).

You need at minimum 9ft ceilings to be able to use this double decker rack.

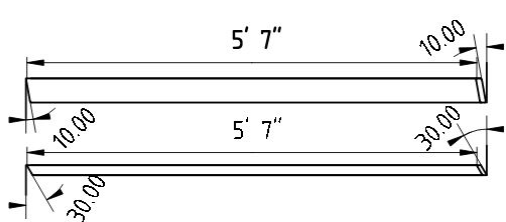
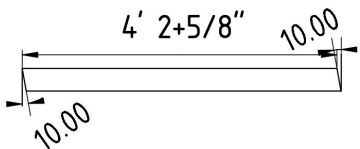
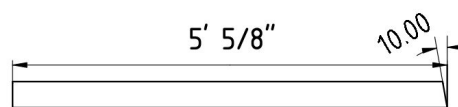
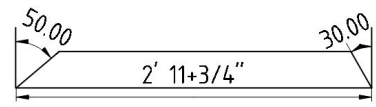
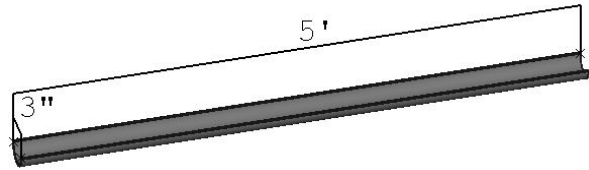
If you have any suggestions for improvements, had issues building, or just wanna say hey please hit me up at [docfoxbikes@gmail.com](mailto:docfoxbikes@gmail.com).

## Tools:

- Hand drill (drill bit for pre-drilling [ $\frac{1}{8}$ " ,  $\frac{5}{16}$ " ] and bits to drive screws)
- Compound miter saw
- Either or: Table saw with rip fence (better!) or a circular saw

## Materials:

Before making any cuts please read the instructions below. There are a few tricks to make some cuts easier but some dimensions can also be changed based on your needs.

Item	#	cost	Total Cost	Cut Notes	Cut List	Cut #
2"x4"x8'	31	~\$2.5	~\$77.5		Full 8'	13
				Angled bike joist Need a compound miter saw		14
				Inside side support The length of this can be changed		2
				Outside side support The length of this can be changed		2
				Mid Support		1
3" x 10' ABS Pipe	3	~\$15	~\$45			12
Heavy Hooks	12	~\$2	~\$25			
#9 x 2-1/2" decking screws 5lbs		1 box ~\$30			May be more screws than you need...	
#9 x 1" decking screws 1lbs		1 box ~\$5				

## Things to Consider:

Before you start you have at least one dimensional decision to make:

1. The height between the upper and lower rack is set at sort of a minimum in this design but increasing it would allow larger bikes to be accommodated. If you have a ceiling height of more than 9 ft consider increasing the length of the side supports and the vertical position of the top rack all by the same amount.
2. Spacing between bikes. If space is at a premium, increasing the space between the bikes from 16" to 19.2" could even further reduce bar interference. You could even use some 10' or 12' for the horizontals (I may add another mid support if you do this).

## Cutting:

### Angled Bike Joist:

Just for reference, here are some photos of setting up your compound miter saw for the angled bike joist:

- You do need to flip the 2x4 and reverse the bottom angle to keep the ends parallel
- **Important!! Check twice!**



## ABS Channel:



- Cutting the ABS requires a bit of a trick.  
First use your compound miter saw to chop them in half (5' sections).
- Then attach them to a 2x4 (This is also how to attach to the bike joist - maybe use 2 screws then though). **Pictured to left.**

- Ideally on a table saw with a rip fence, rip them in half. If you do not have a table saw, the 2x4 can help act as a flat surface for a normal circular saw but it definitely takes some skill to cut straight this way (could double the 2x4 and make a fence to guide the saw?).

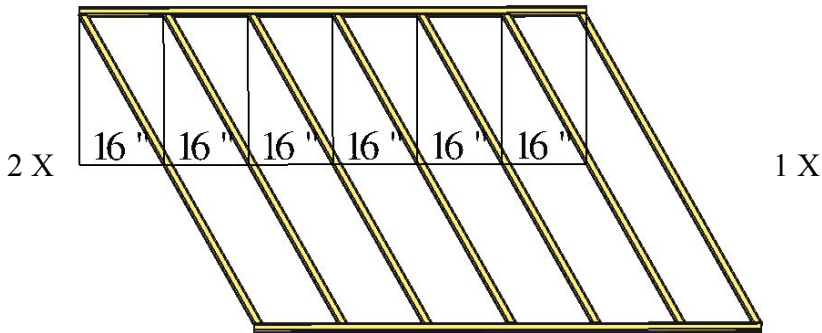


**Note:** There is some residual compressive stress in ABS, so when you get close to the end of the cut it may have a tendency to squeeze your blade enough to stall it (wedges can help a lot - be careful).

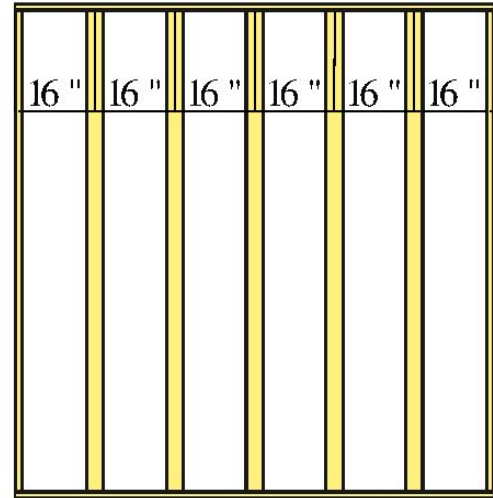
## Assembly:

### Start by assembling the top, bottom, and back

- I suggest 2 screws in each and to pre-drill the ones at the ends
- The spacing can be adjusted as suggested in “things to consider” above (adjust both uniformly)



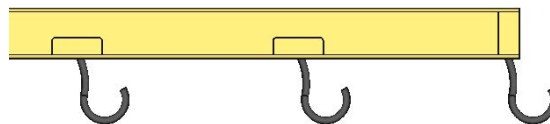
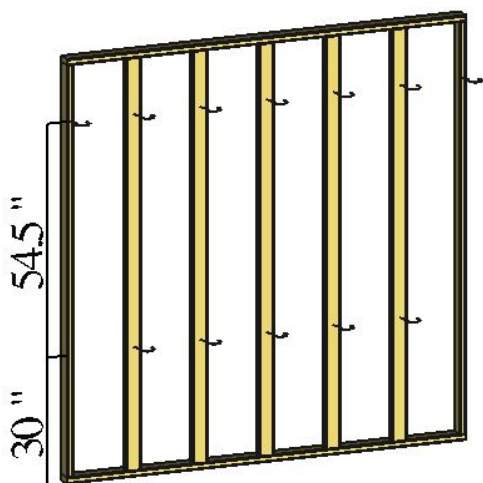
2 full length 2x4's and 7 angled bike joist



9 full length 2x4's

### Predrill (5/16") the hook positions and screw in the hooks:

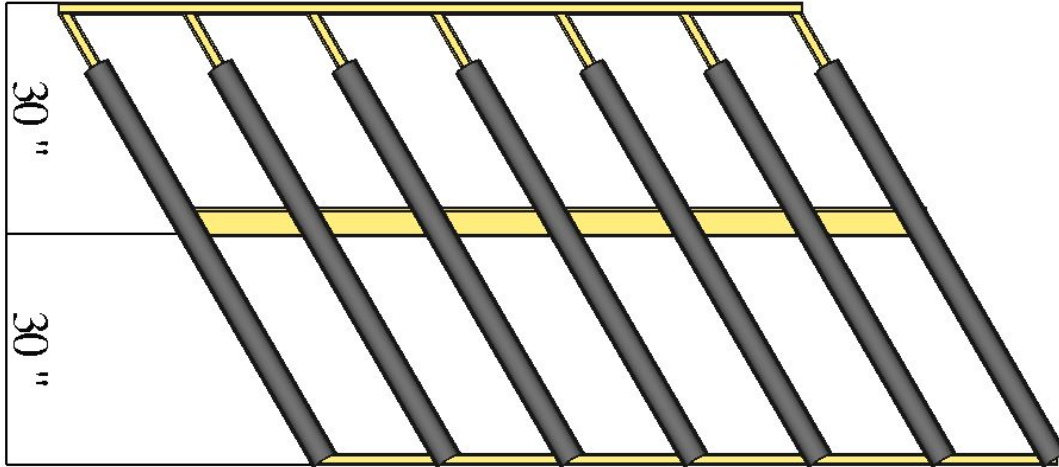
- Predrill at 30° to match the angle of the bikes
- Using a 2' 2x4 makes hook insertion easier (get started by hand first)
- The height of the top hooks must be raised to match any increase in top rack height
- The hook height is set at 15" above the bike joist - this is good for 26" and 700c wheels but may be good to lower to accommodate 24" wheels well. Please let me know if you play with this and find a more ideal height.



30° hook  
insertion

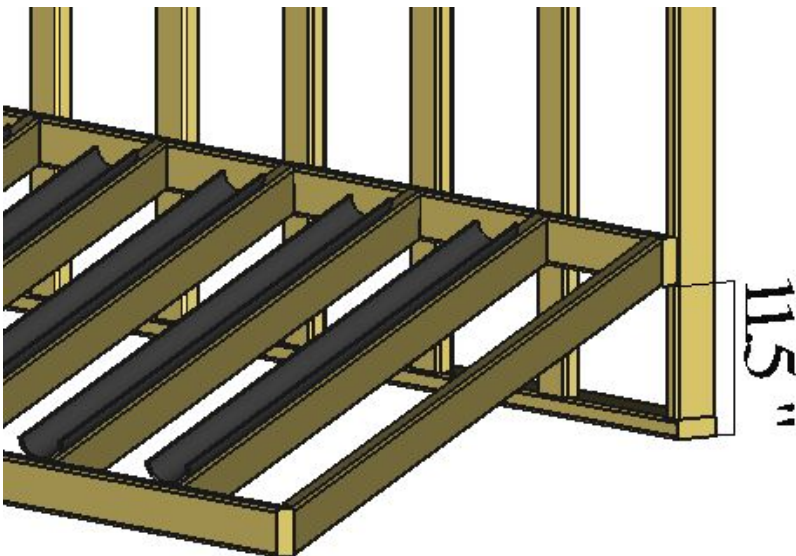
**Attach the cross member to the top and the channels to the top and bottom:**

- The bottom does not get channels on the ends and gets no crossmember
- Use the starter 1" screws - one in each end
- Flush channel to the front (as seen in image)
- Laying flat the front is the fascia face you can see (the other points toward the ground)



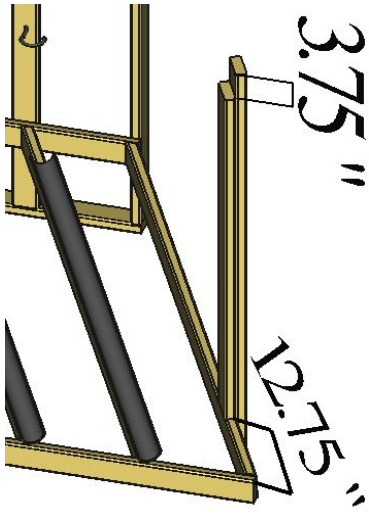
**Next attach the bottom to the back:**

- Starting with a few screws in the back of the back piece before lifting the front makes this easier
- Angle screws in from the front to attach to the outside vertices



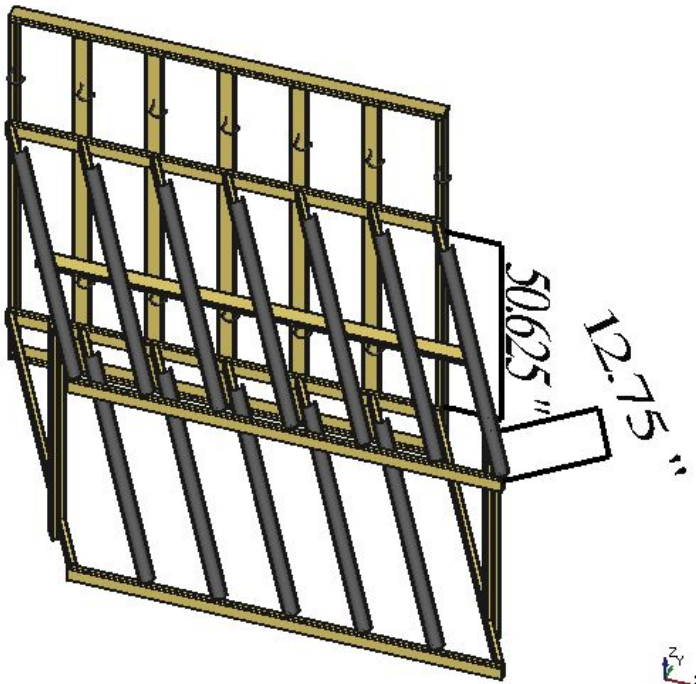
**Assemble the side supports and attach to the bottom:**

- Put at least 2 screws near the top and 2 near the bottom



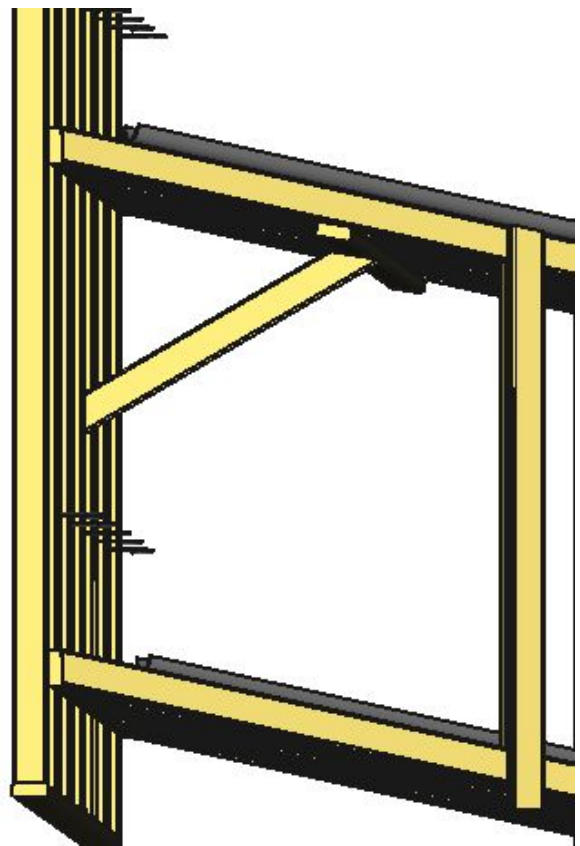
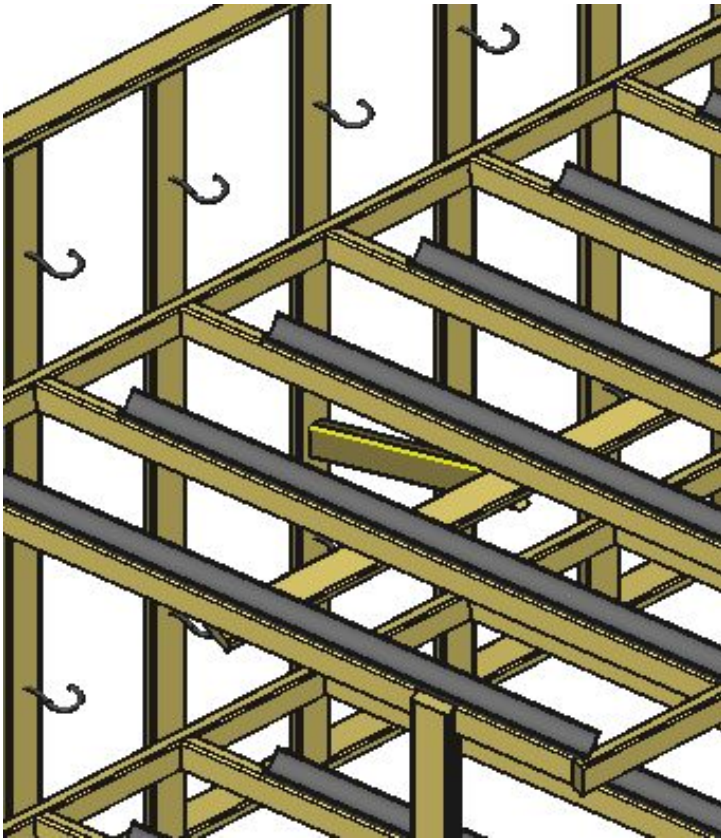
**Attach the top rack - this is a 2 person job (minimum) and can be made easier by:**

- Having screws started in the back and sides
- Attaching a temporary 2x4 on the back to rest the rack assembly on
- Attaching a small 2x4 chunk in the front to set the side position



### Finally attach the mid support:

- Measurements on this should not be necessary as the angles will dictate where it sits
- As I have suggested for everywhere else put two screws in each side
- You should be able to screw from the top of the cross member





## Modifications that have not been tested or designed:

1. **Wheels (rolly rack)** - I like this idea but was not needed for our space.

To do this well I think adding a box frame to the bottom would be needed (basically crossmembers across the bottom to attach the wheels to). We also would need to think about weight (as a rough high end estimate  $12 \text{ [bikes]} \times 30 \text{ lbs} + 30 \text{ [2x4x8]} \times 5 \text{ lbs} \approx 500 \text{ lbs}$ ) so pretty normal casters would work. Finally some fore/aft stability may be needed, so turnbuckles across the sides should be considered. However the addition of the box on the bottom may account for this.

2. **Single high rack** - Not too crazy but may need to add a box frame to the bottom or some other support may be needed to give the back enough rigidity.
3. **Every other bike joist height shifts (-\_-\_-\_-)** - This could completely eliminate the bar overlap issue but would make the build extremely more complex. To be honest, the savings are probably not worth it. Maybe worthwhile with a single high rack??
4. **Aesthetics** - You may have time to paint or alter the look of the rack when construction is completed.

## A Final Word:

Whether you've built the rack or are planning too, I hope you found these directions useful. Please share your experience on our facebook page <https://www.facebook.com/CorvallisBikes/>. You can also reach out to the Corvallis Bike Collective at [CorvallisBikes.org](http://CorvallisBikes.org)

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