

# Foldable Kayak Building Class

Please also watch this video for more information  
“10' Foldable Kayak Design Guide”

<https://youtu.be/CC9X6YVJ3w8>

# Design Criteria

1. Simple to build
2. Stable
3. Light
4. Fast boat
5. Low cost
6. Fast assembly/dis-assembly <10 min.
7. Can fit two boats In my car, with the back seats down
8. Easy to repair
9. Looks good
10. Option to support sail

Don't want trailer



# Design approaches

1. Use Foam - rigid, light, but is still bulky
2. Inflatable – good option
3. Vinyl skin on frame – my next project
4. Use Coroplast
5. Wood, others

# Links to various boat building options

<https://youtu.be/4ARTFItTh8M>

<https://youtu.be/R2SMLueF54k>

<https://youtu.be/dQMCrqSEg7k>

[https://youtu.be/Bc7Z5yqH\\_t8](https://youtu.be/Bc7Z5yqH_t8)

<https://youtu.be/58g8TZPeBm8>

<https://youtu.be/j8yEo30ehVg>

<https://youtu.be/TjsFI0-aNUw>

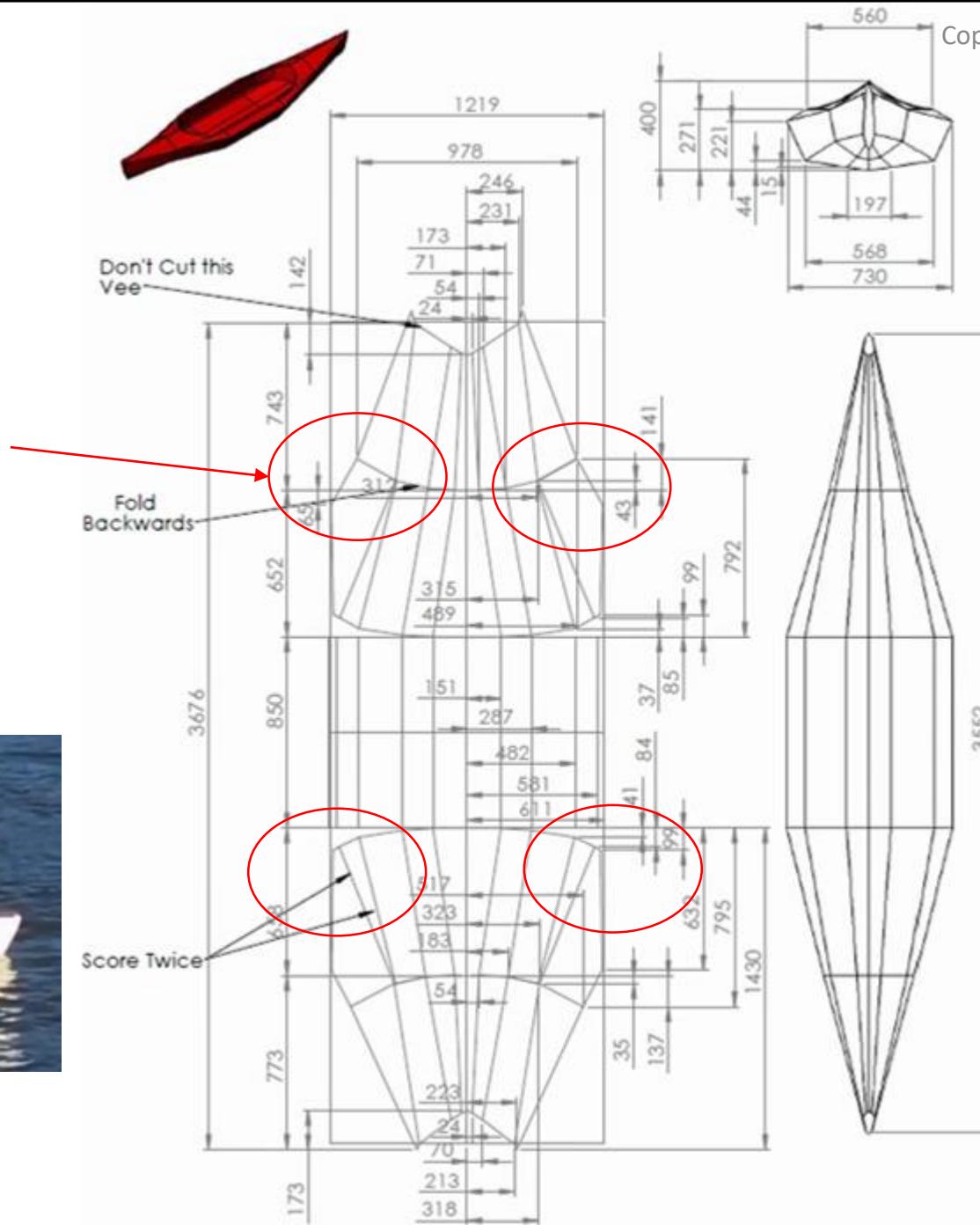
# Design option 1

Great design, but complicated, and also has many folds

Note: Coroplast sheet size 12' x 48" – difficult to find



Credits: Frank McFires  
DIY Folding Sit-on-Top Kayak V3  
<https://youtu.be/7bhL-8A4il4>



Design option 2 – similar to option 1, also there is a commercial product “ORU Kayak” \$1200

Many folds

Note: Coroplast sheet size approx. 12' x 5' (difficult to find)

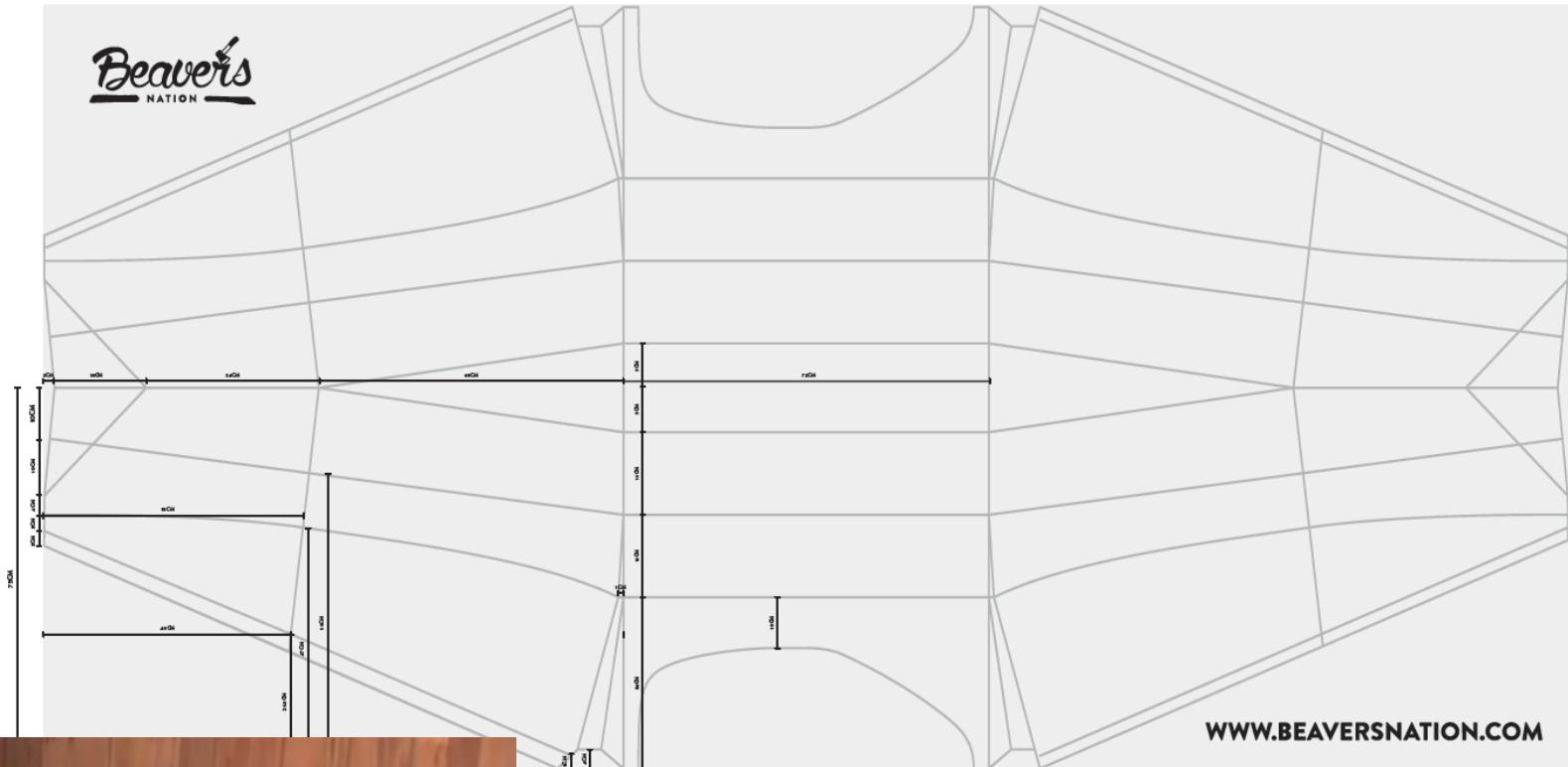
Credits: Beavers NATION

<https://youtu.be/aIE5MUgTFvg>

Credits Oru Kayak

Oru Kayak Assembly 2014

<https://youtu.be/dQMCrqSEg7k>



# Design option 3: 1 sheet design

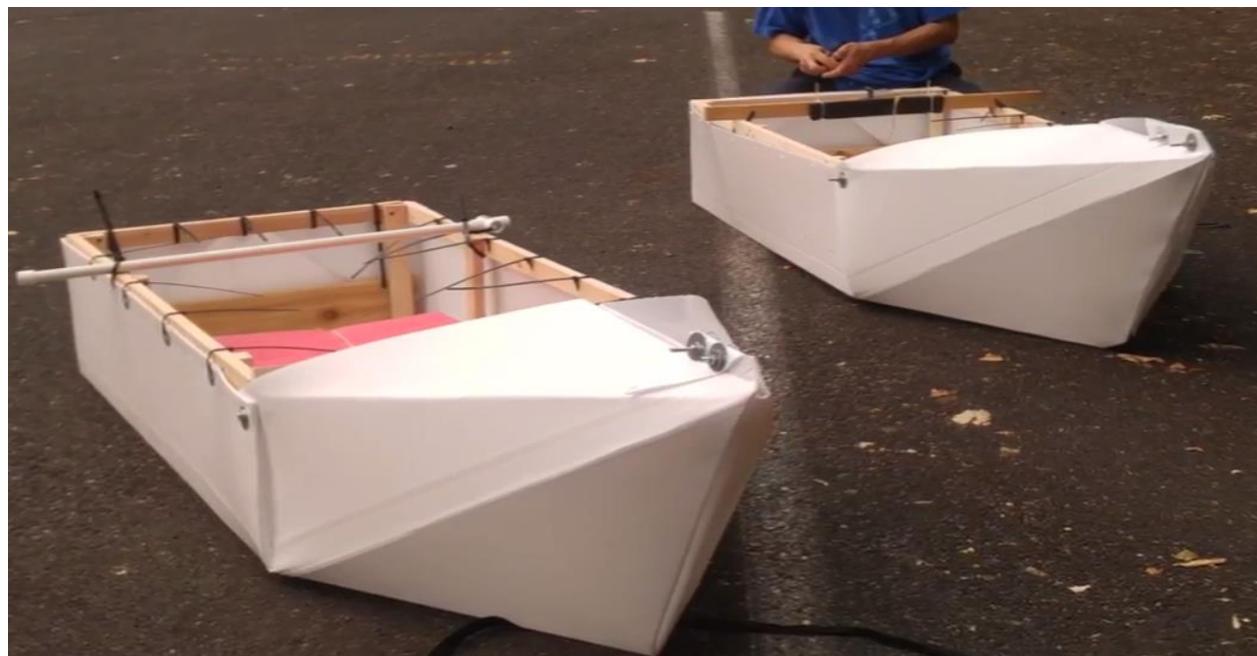
Easy to make

Con: Slow

Note: Coroplast 8x4 1 sheet

Pro: Back-to-back arrangement for a two seater row boat

Can mount a motor



# Design option 4

## 10' Foldable Coroplast Kayak

## Design option 4: Inspired by Hypar Smart boat

Con: The freeboard at the stern is reduced

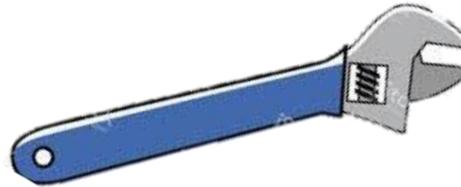
May be slower than the Option 1,2 but much faster than Option 3

Pro: Eliminated many folds, fun to row

Very stable – easier to be converted to a sailboat



# Tools

1. Wrench
2. Clamps, or large paper clips
3. Heat gun  
\$9 at [harborfreight.com](http://harborfreight.com)
4. Sharpie Marking pen
5. Scissor
6. Cutter
7. Electric drill + bits or soldering iron
8. Measuring tape 12-25'
9. Long ruler (3-4') or a 2"x2"x8' wood (pick a straight one)

## 10' Foldable Kayak Rev 0.95

This  $1\frac{1}{2}$ " is a reference dimension. It depends on how you want to fold the top together. Suggest adjust and cut in the final stage of the design.

This is a reference radius, should adjust/cut in the final stage.

This is a reference cut line. It depends on how you want to fold this corner. Suggest adjust and cut in the final stage of the design

1'-0" 1 1/2" R 8 1/2"

1'-0"

1 1/2

8'-0"

12'-0"

2'-0

11

12"

-

12

101

1

- 1 -

9

-

1

1

1

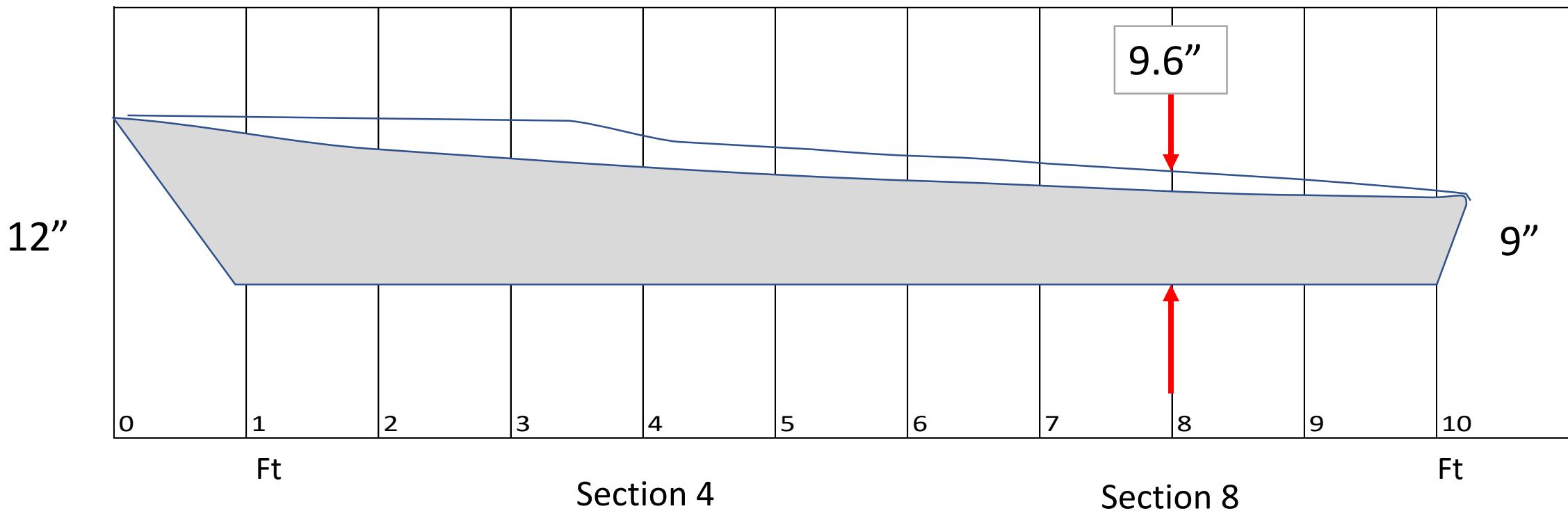
1

This bottom half is a mirror image of the top half  
**Except here**

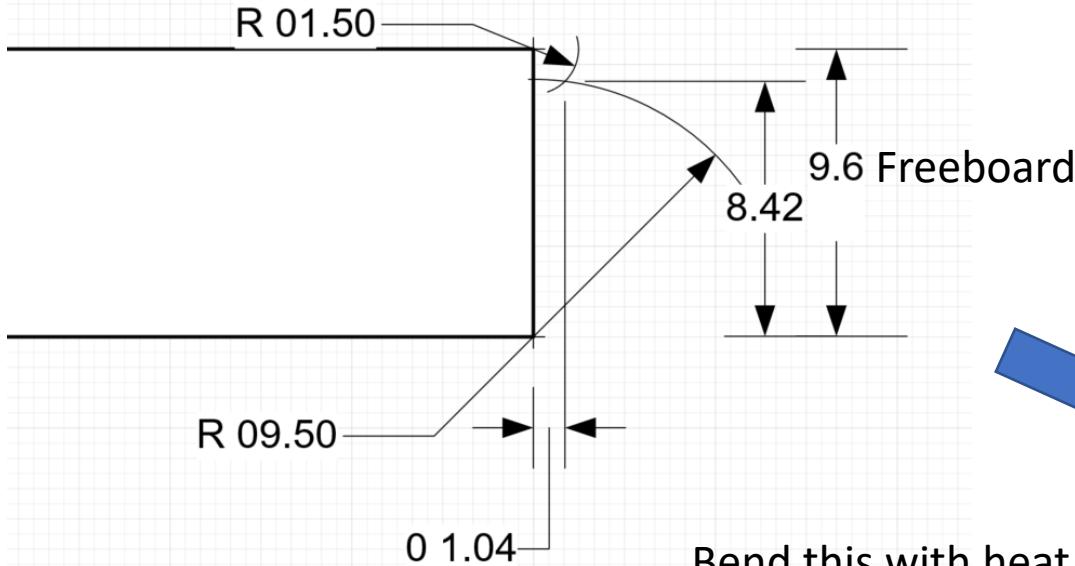
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Use tape to join a 8'x4' sheet with a 4'x4' sheet to extend the length to 12'

## Freeboard estimation



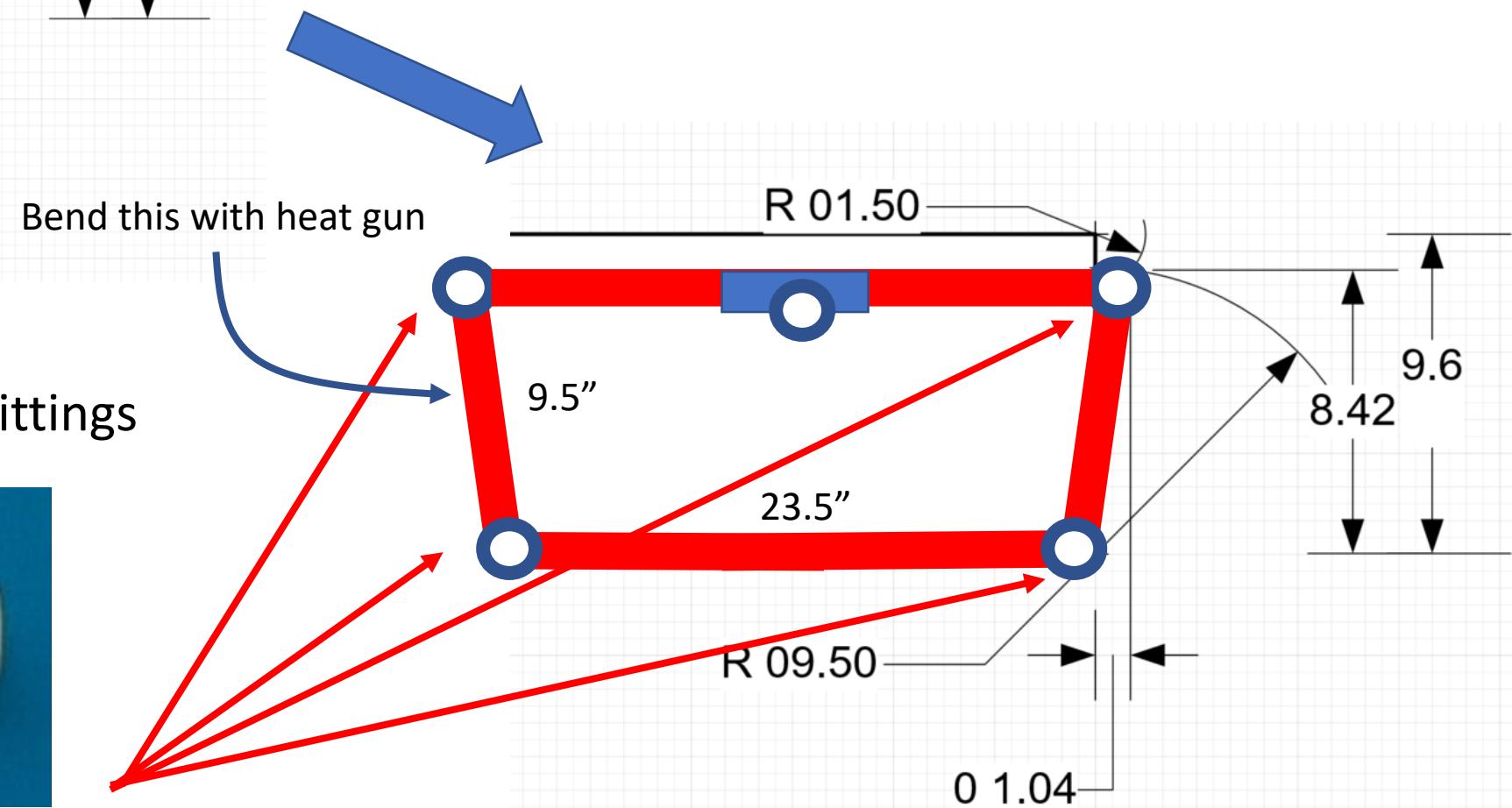
## Calculation – design the frame at 8' position (section 8)



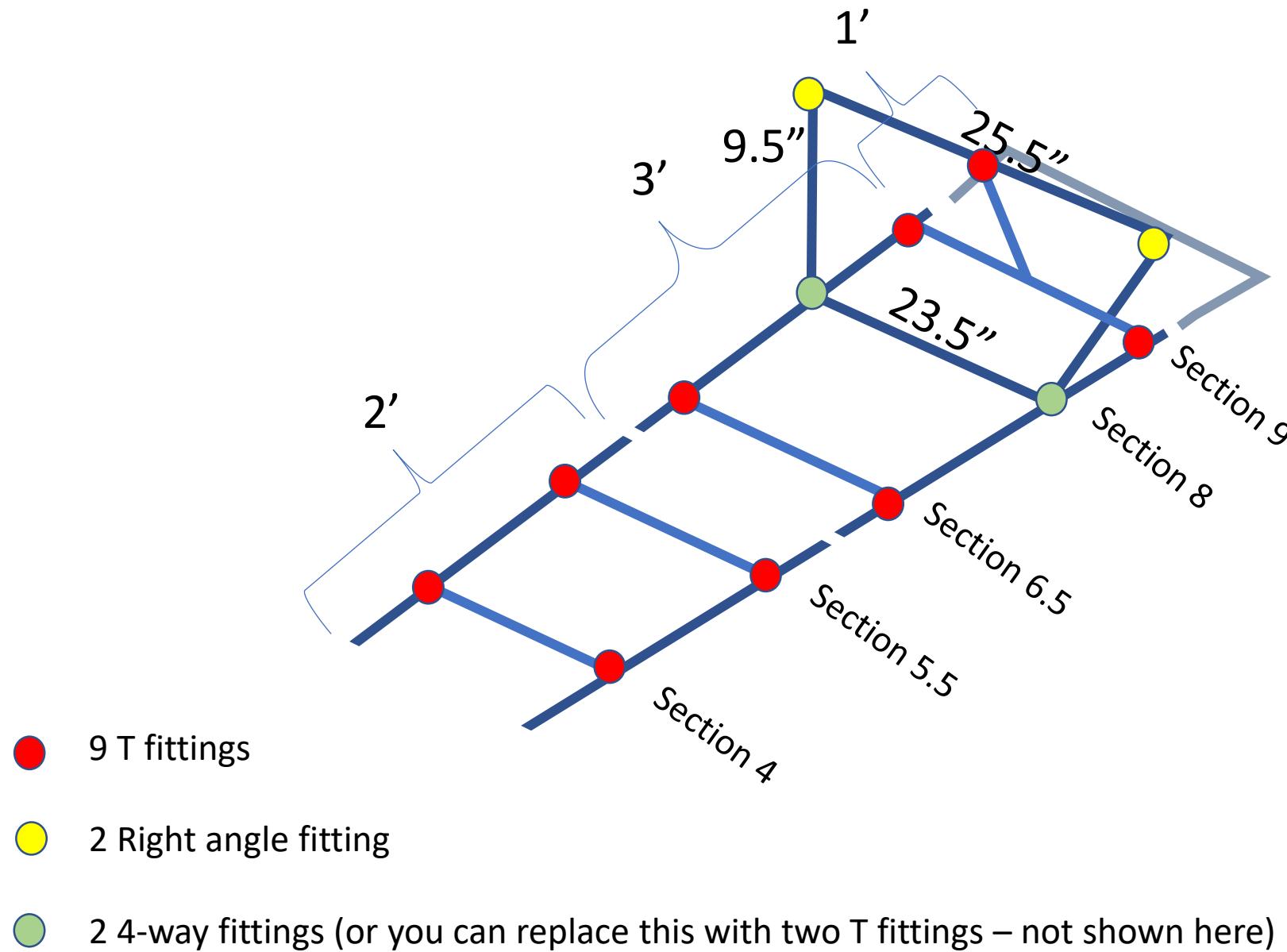
## PVC Frame at Section 8

Note: it is not the same as shown in the photos because of this updated design (rev 0.95)

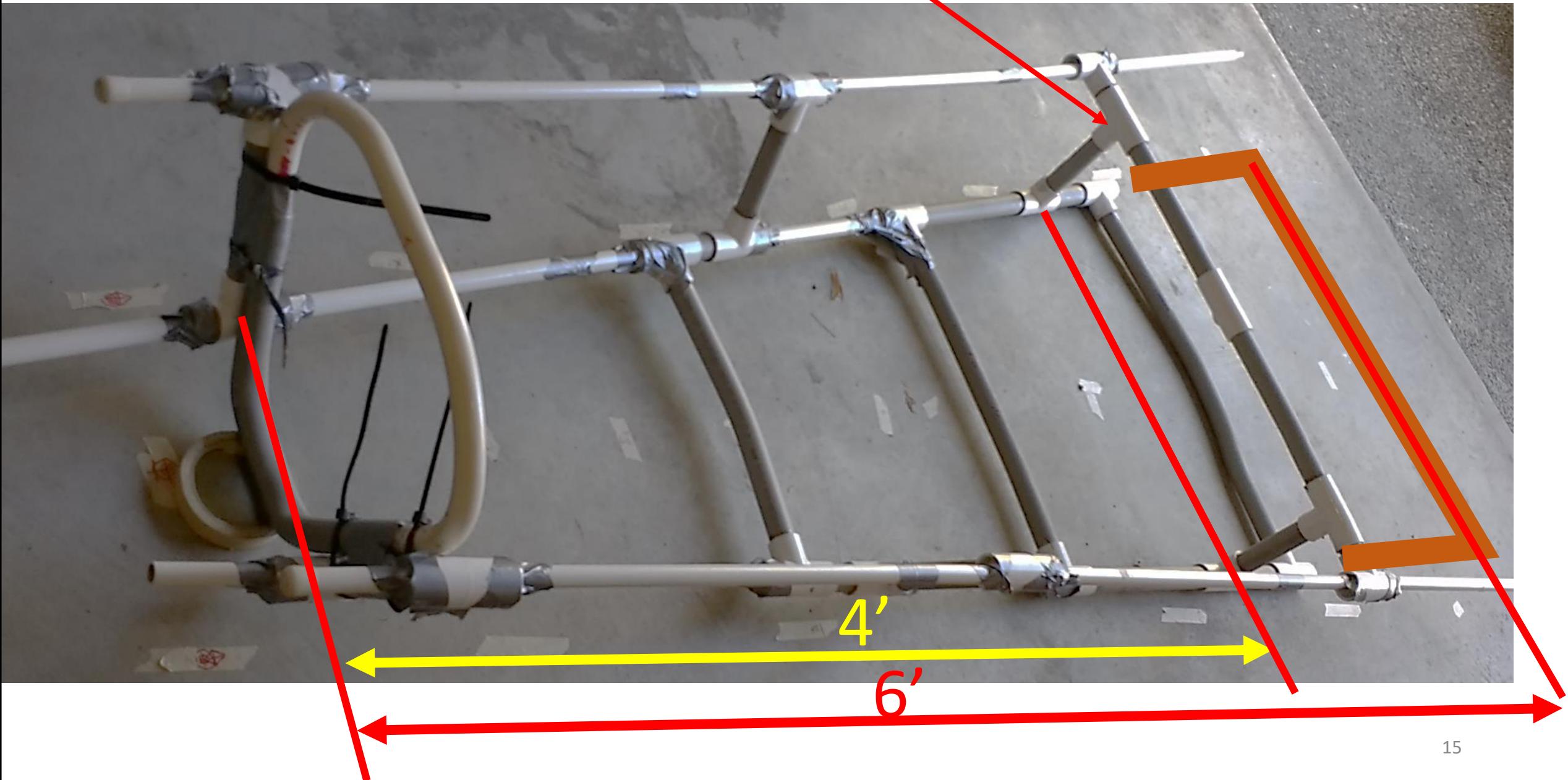
Use furniture grade fittings



# Example of the PVC frame for the updated (rev 0.95) design



## Frame at 8' position (section 8), old design



Partitioned the frame into 3 sections for ease to store

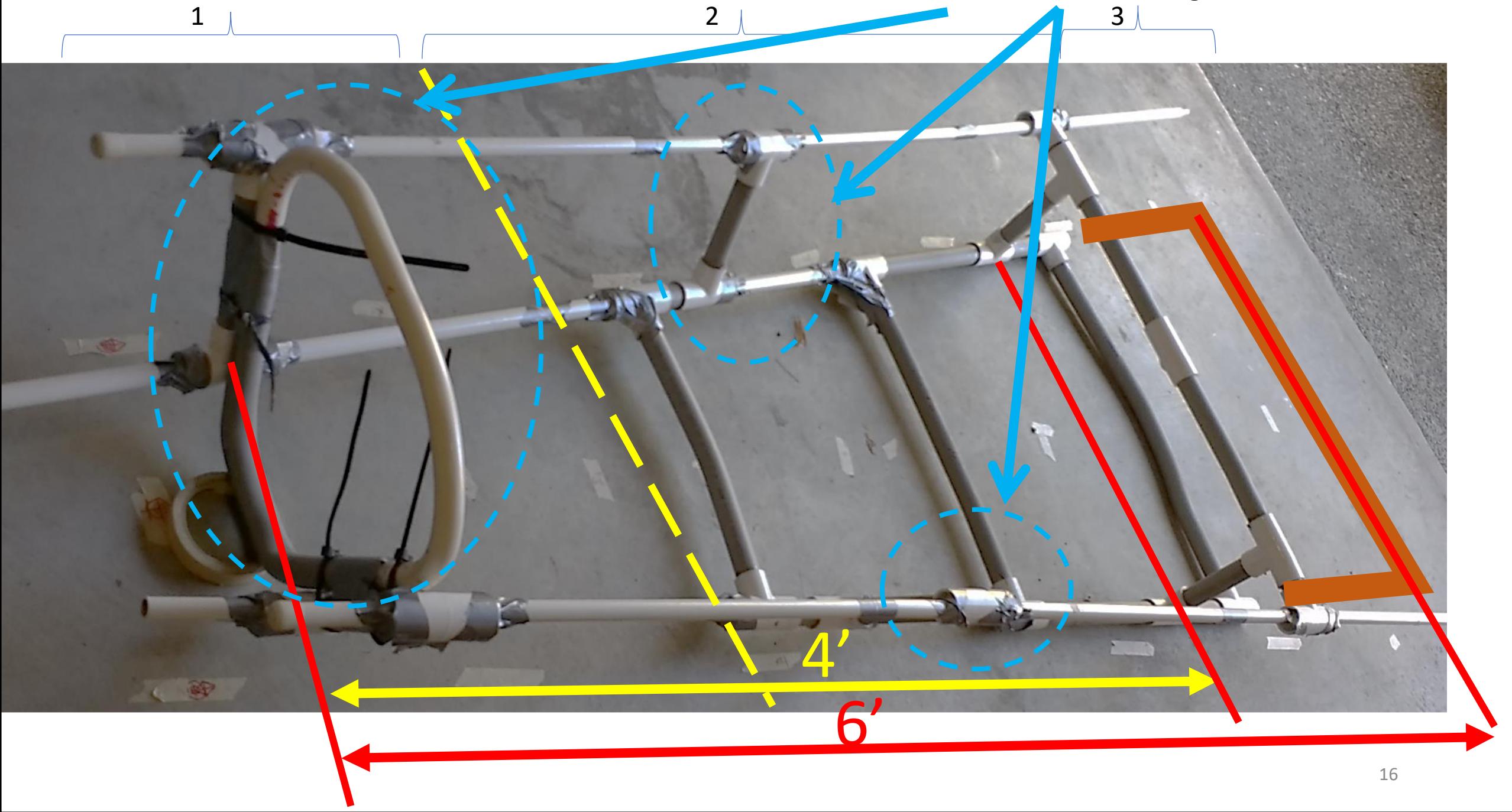
Removed in rev 09.5 design

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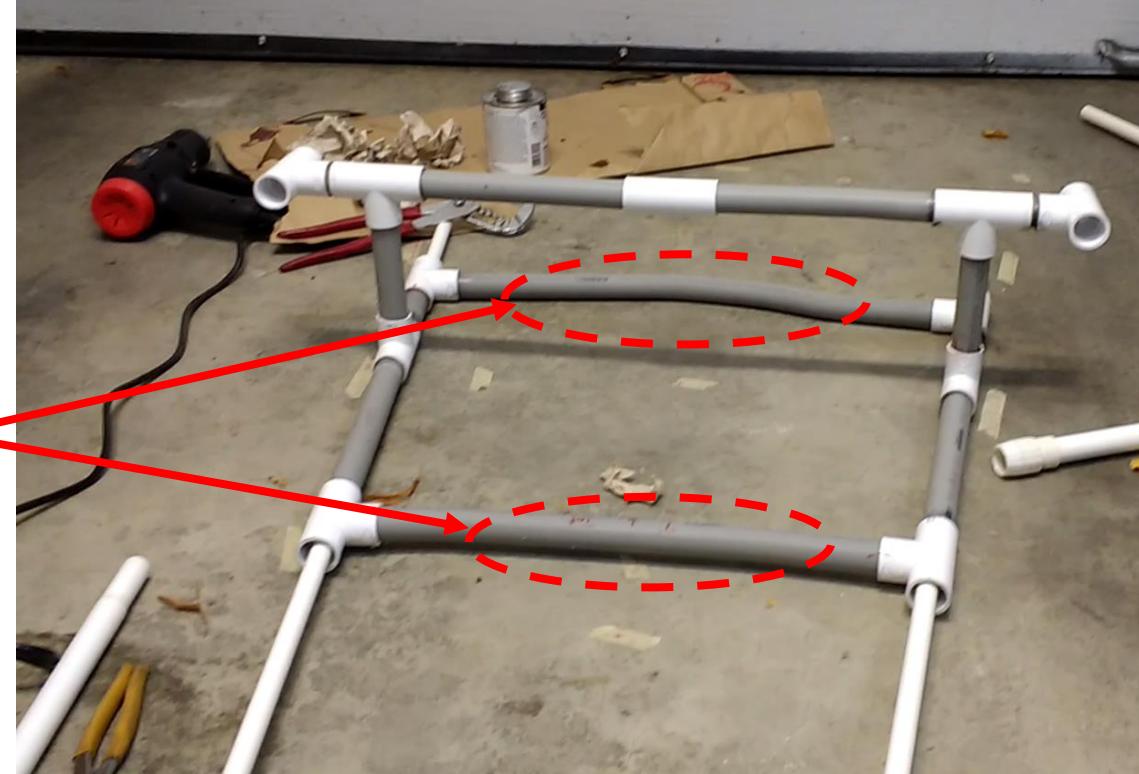
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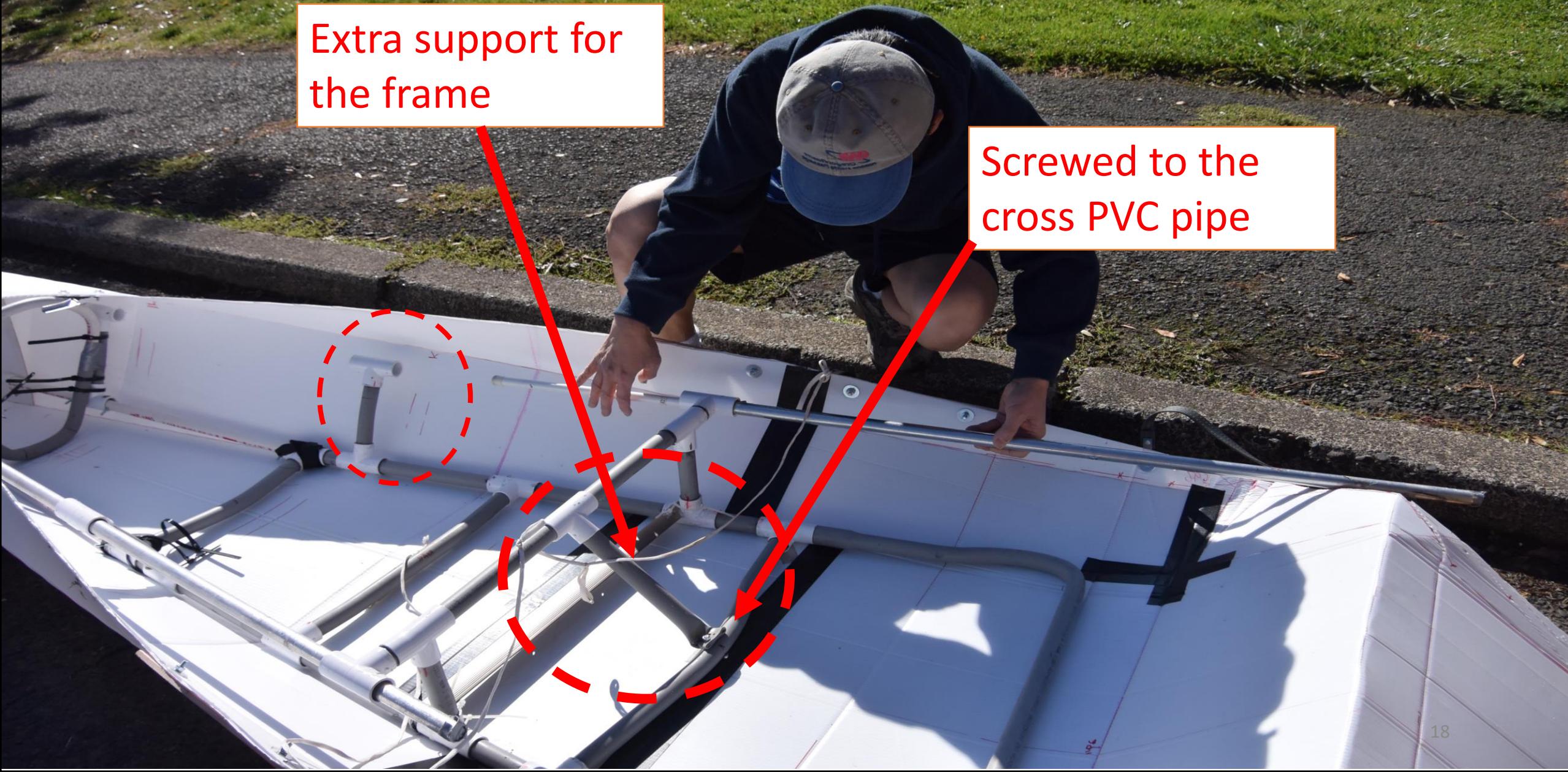
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3



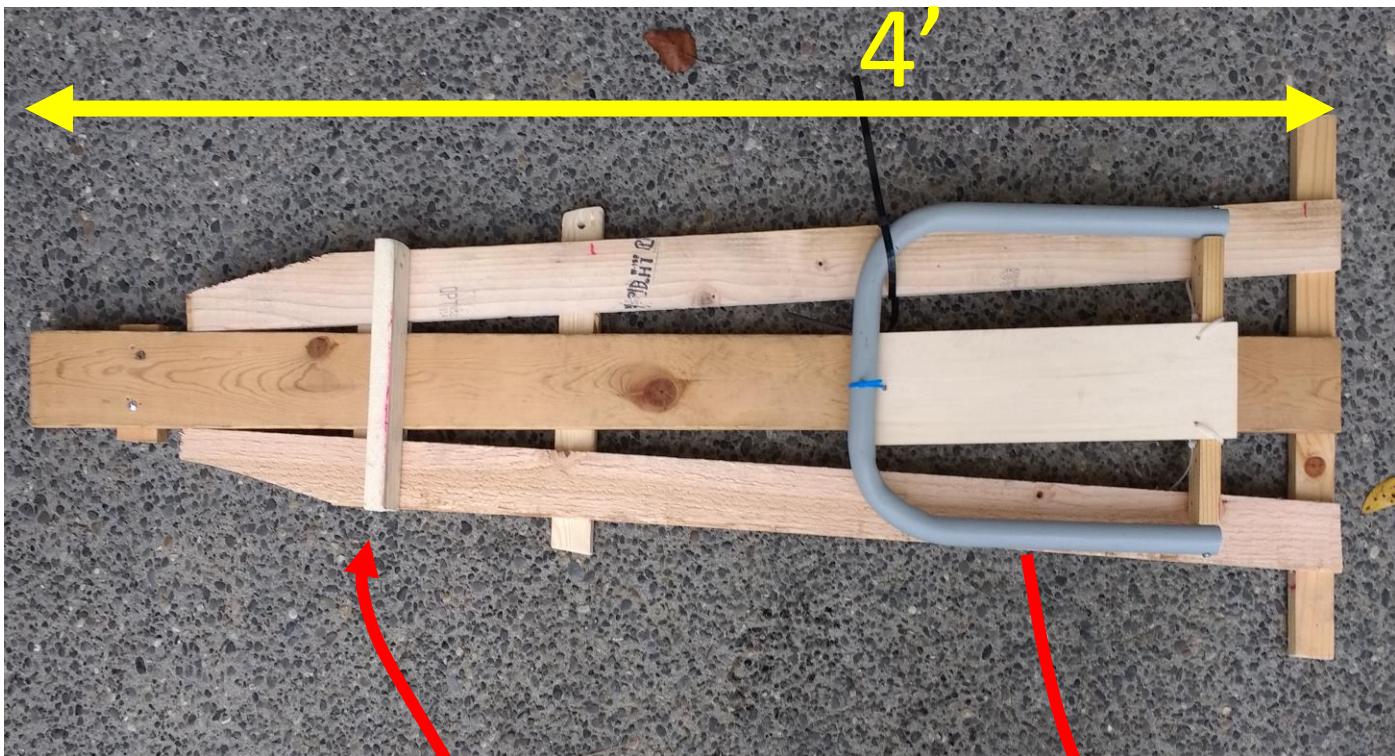
Heat these  
regions and bend  
so as to maintain  
the triangular  
shape





Do not glue this T fitting to the PVC pipes. We need to allow it to rotate for fine adjustment of the frame support.



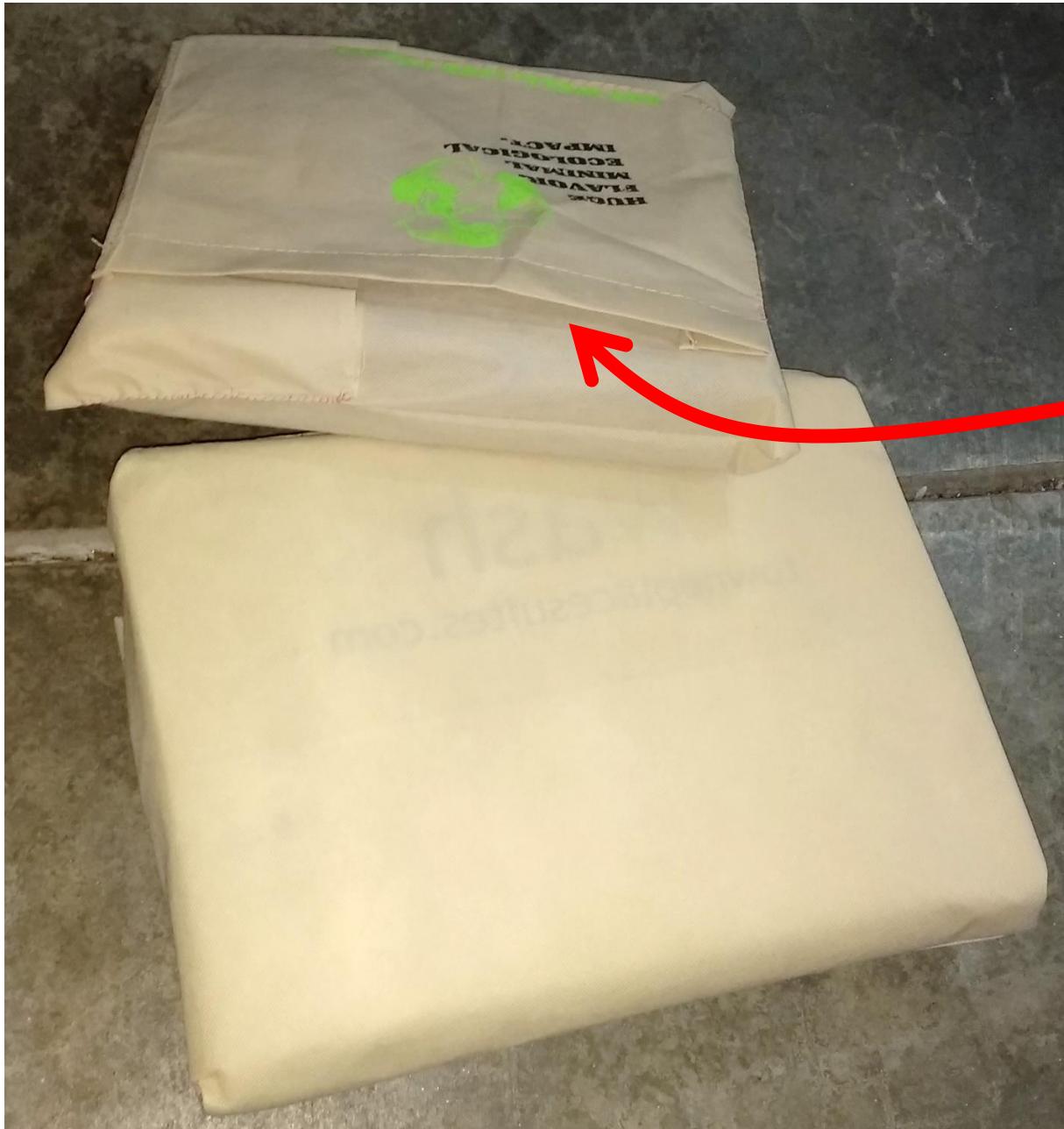


Foot rest

Flip up to form  
the back of the  
seat

Floor board  
- Placed on top of the  
PVC frame





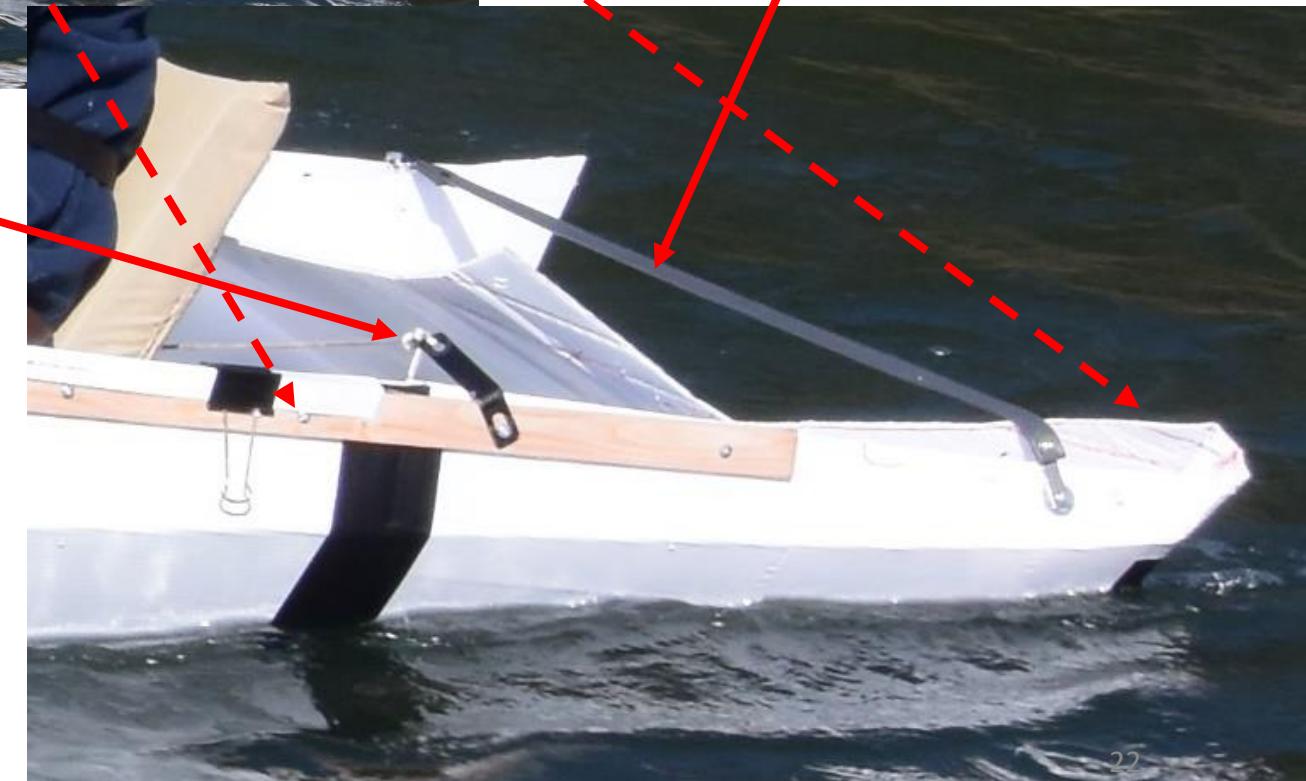
Stuff the packaging material into a shopping bag

Create a pocket and slide it into the seat frame



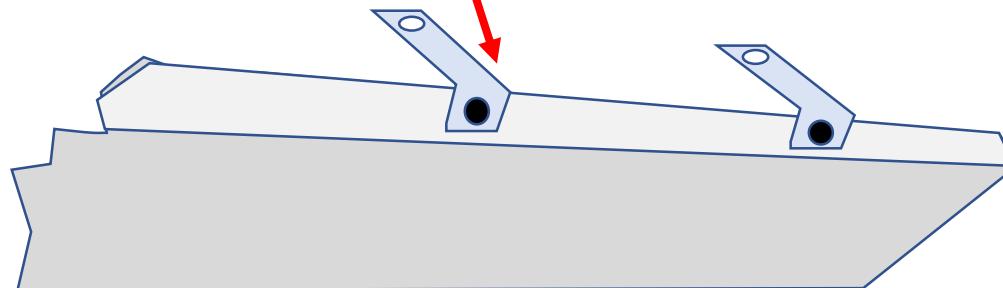


Use a small rope to pull the sides together



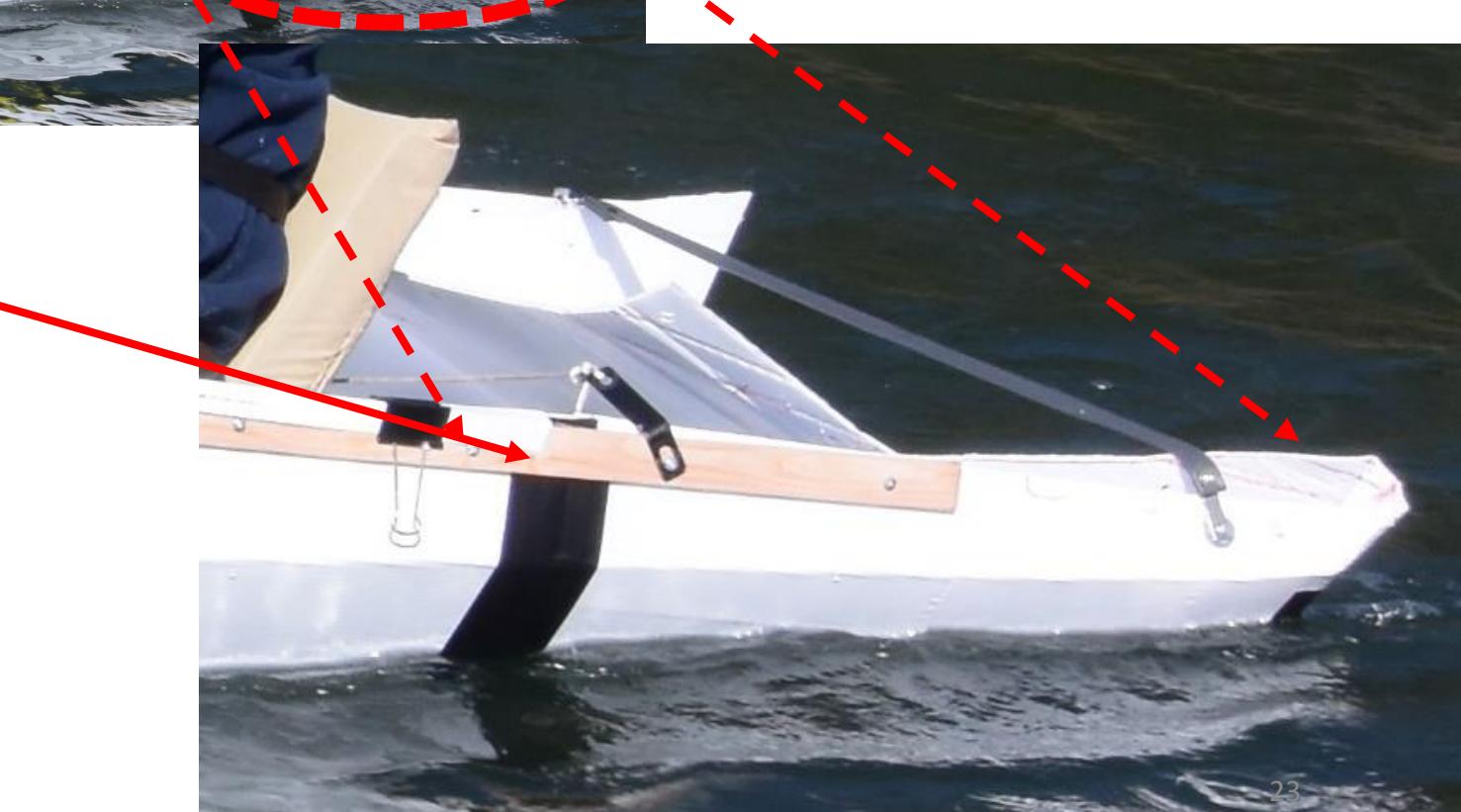
The rope is tied to the PVC frame

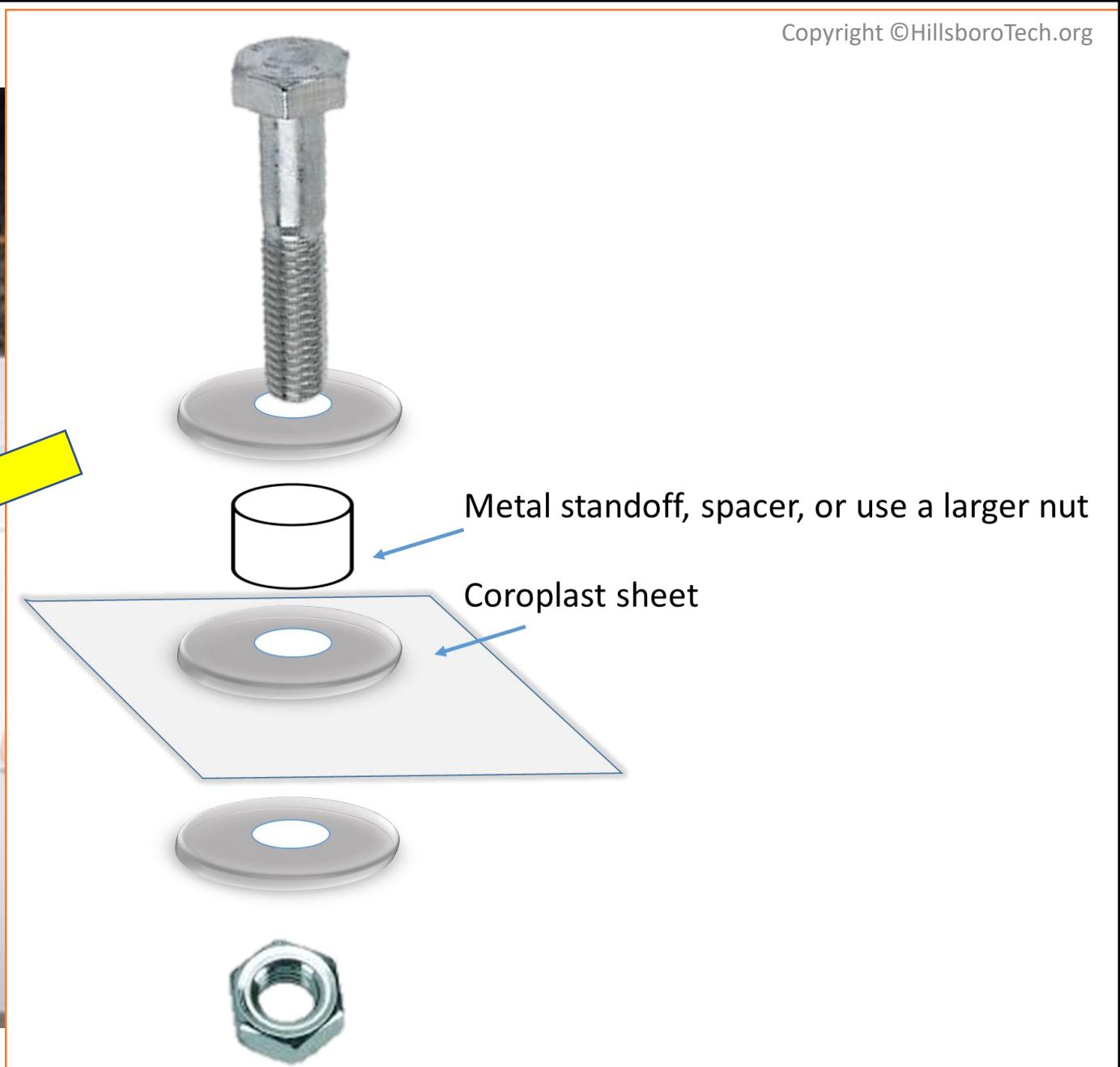
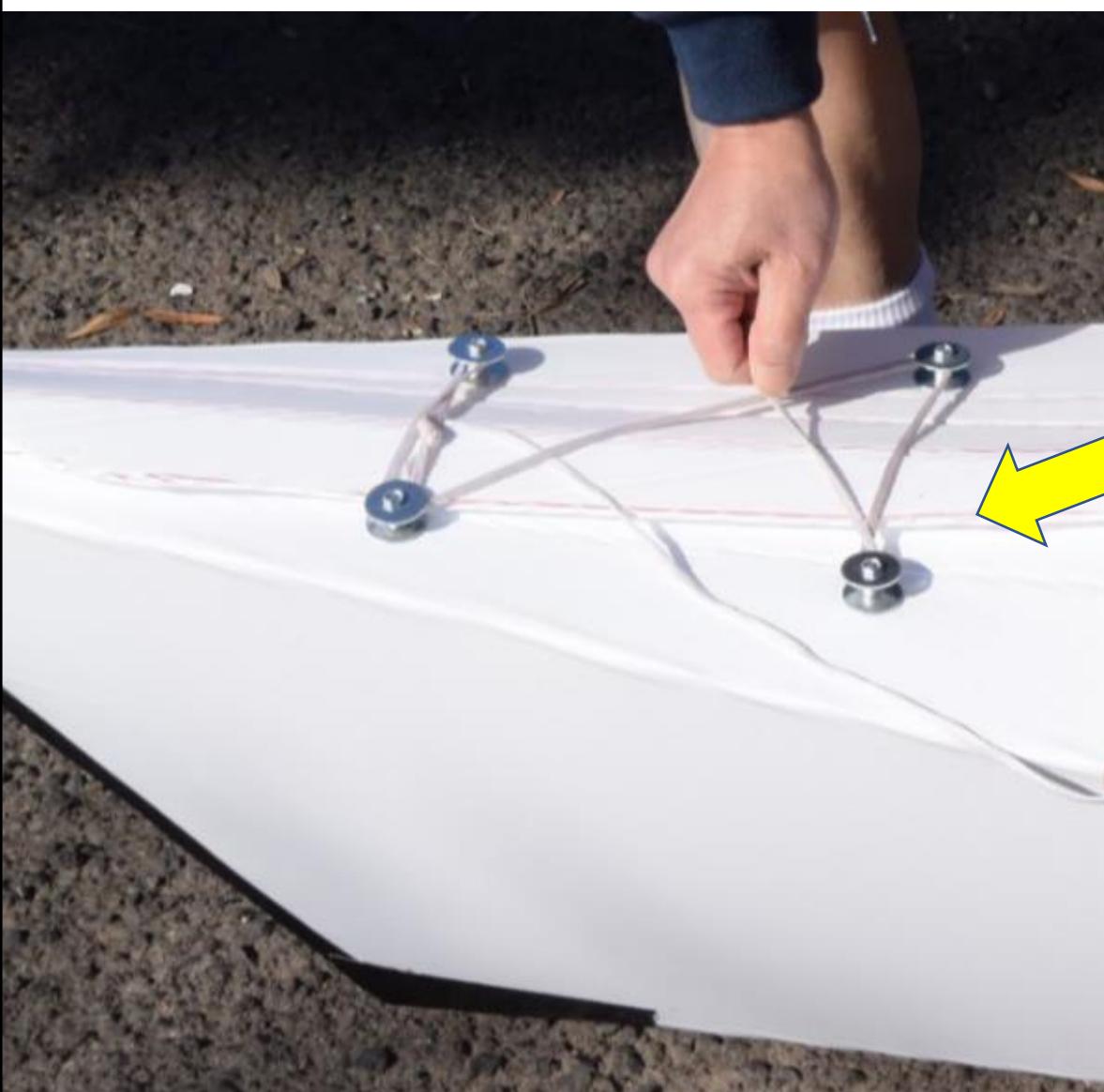
Use screw to secure the L-shape bracket to the coroplast





This wood piece (there is another piece at the right hand side) is to relieve the stress/pull on the tape, where two pieces of coroplasts are joined together. You can shorten the wood piece also.





If a person is sitting at the center of the floating (of the boat), what is the draft relative to the weight of the person?

	1 cu ft weight in lb	Draft (inch)	Volume	Weight it displaced (lbs)	
			Cu ft	Sea water	Fresh water
Sea water	64	1	0.9375	60	58.6
Fresh water	62.5	2	1.875	120	117.2
		3	2.8125	180	175.8
Base area of the boat		4	3.75	240	234.4
L - in ft	9	5	4.6875	300	293.0
Base (30") - in ft	2.5	6	5.625	360	351.6
Area of the triangle(Sq ft)	11.25	7	6.5625	420	410.2
		8	7.5	480	468.8
		9	8.4375	540	527.3
		10	9.375	600	585.9

Assumption: our body's density is between Sea water and Fresh water

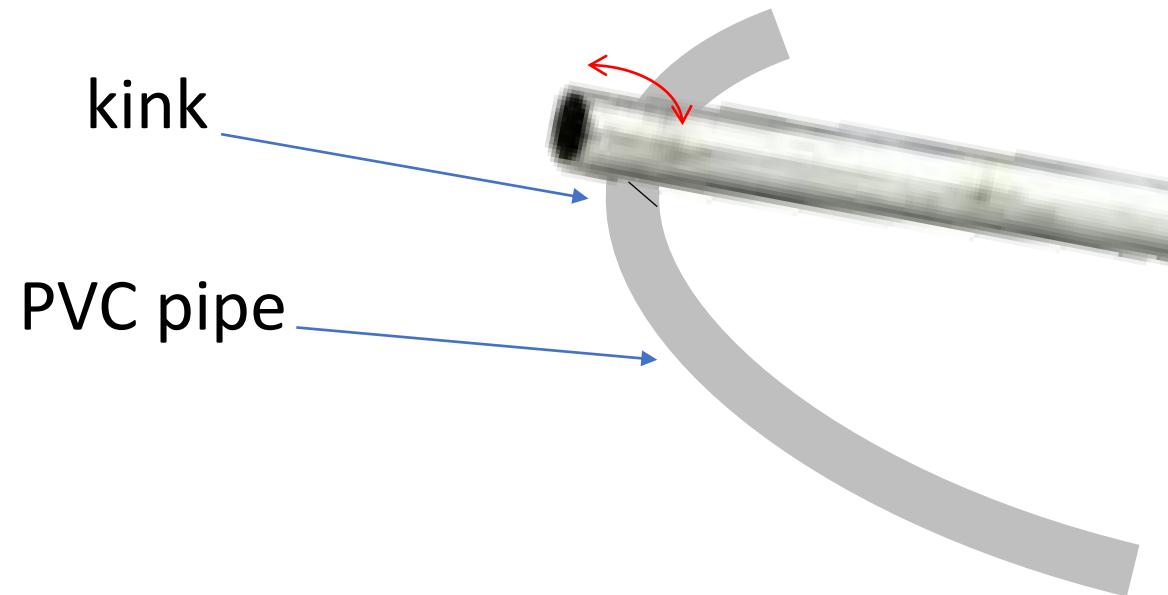
## To create the fold line

- Draw the line with a sharpie pen
- Apply heat to the fold line with the heat gun (careful not to apply too much heat)
- Then using the back of the wrench (check no sharp edges at the contact point), press down on the fold line to create the impression



## Another technique to fix the “kink” during bending

- Heat up the PVC pipe and start bending
- If a kink is about to form, use another PVC pipe, or other round pipe, and roll that pipe (and apply force) back and forth on top of the kink and smooth out the shape while the PVC pipe is still warm



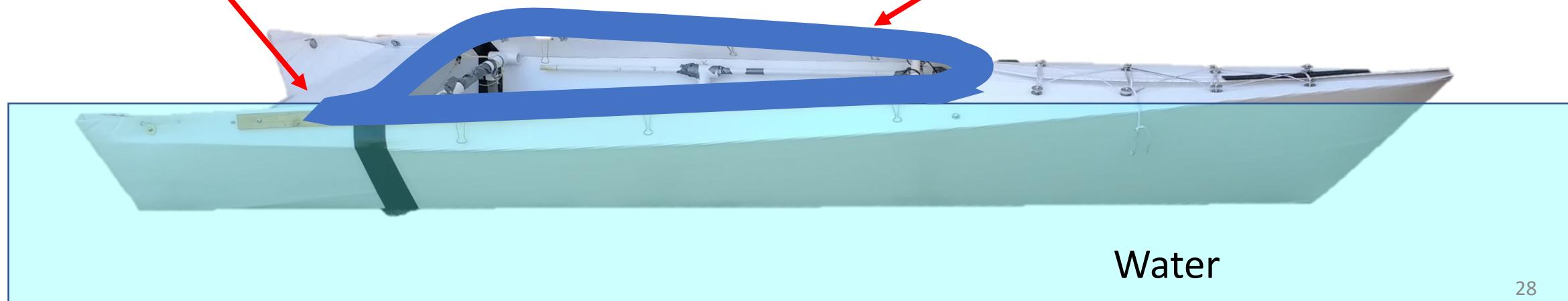
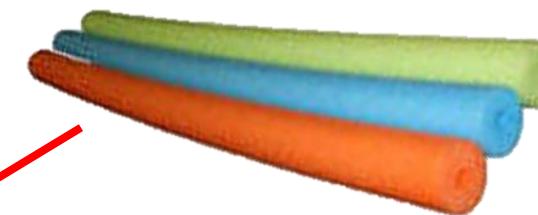
## Safety

We tested that the kayak doesn't sink, but we have to add more floatation to the boat so the top part (gunwale) will stay above the waterline when it is submerged. Then we can scoop the water out and recover the kayak.



Or stuff one emptied milk jug here  
and one at the front and you have  
16 lbs of added floatation

Use Noodles around the gunwale



Water

## OREGON REGULATIONS

Title for a boat \$30 (new)

Registration (every two years)

Cost \$3/foot

If the boat has 10 or more HP, need to go thru a class (not sure how much).

For us, **if we build a sail boat, keep that under 12'**, kayak can be longer, and we don't have to worry about the registration/title, etc.

The screenshot shows a web browser displaying a PDF document from the Oregon State Library's repository. The URL in the address bar is [library.state.or.us/repository/2012/201205221406592/index.pdf](http://library.state.or.us/repository/2012/201205221406592/index.pdf). The page title is "Which Boats Must Be Registered". The main text on the page states: "All motorboats must be titled and registered in Oregon regardless of their size, construction, or type and size of motor. This includes, for example, inflatable rafts with motors and personal watercraft such as Jet Skis. Sailboats 12 feet and longer also must be titled and registered." A red box highlights the sentence "if we build a sail boat, keep that under 12'". The page footer indicates it is page 2 of 12. A watermark for HillsboroTech.org is visible at the bottom right.

library.state.or.us/repository/2012/201205221406592/index.pdf

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### Which Boats Must Be Registered

All motorboats must be titled and registered in Oregon regardless of their size, construction, or type and size of motor. This includes, for example, inflatable rafts with motors and personal watercraft such as Jet Skis. Sailboats 12 feet and longer also must be titled and registered.

# SW for boat design

BearboatSP

<http://www.bearboat.net/>

Freeship

<https://sourceforge.net/projects/freeship/files/Tutorials/Notus%20racing%20and%20cruising%20canoe%20-%20By%20Bryan%20Hansel/>

# Material references

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Supply Ability: 10000 Meter/Meters per Day

Port: TianJin port, Qingdao port

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## PVC Furniture & Plumbing Grade Fittings and UV Protected PVC Plastic Pipe.

The page below tries to give an overview of many of the pvc fittings for plastic pvc pipe we sell. It is by no means comprehensive, but it does highlight the harder to find fittings. It contains both Furniture Grade and Plumbing Grade fittings. All fittings will fit standard PVC plumbing IPS pipe (sch 40/80/120, Class 315, 200, etc.), including our UV protected high glossy pipe on the [pvc pipe page](#). This page gives a general overview of the fittings available, you can use the shopping cart to further refine your search.

If you still don't see what you are looking for, you can try our [Repair and other odd Pvc Pipe Fittings](#) page. Also along the left side of [the shopping cart](#) has thousands more pvc fittings and parts. If after all that you still can't find what you are looking for, just give us a call at the number at the top of every page or [email us](#).



[Three Way \(3-way, aka side outlet 90° fittings for pvc plastic pipe\)](#)  
1/2" to 2"



[Four Way \(4-way, aka side outlet Tees\) fittings for pvc plastic pipe](#) in 1/2" to 3"



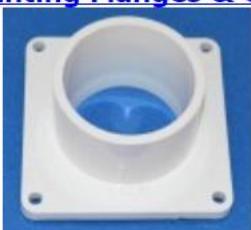
[Five 5 Way \(5-way, aka side outlet crosses\) fittings for pvc plastic pipe](#) in 1/2" to 3"



[Six Way \(6-way\) fittings for pvc plastic pipe](#) in 1/2" to 3"



[Side Outlet Wyes fittings for pvc plastic pipe](#) in 3/4" to 2"



[Mounting Flanges for pvc plastic pipe](#) and [Mounting Caps](#)



[Flat Caps for pvc plastic pipe](#) or [Forney Black Rubber Caps](#) or



[Slip Slide Tees for pvc plastic pipe](#)



[Crosses for pvc plastic pipe](#)



[Tee for pvc plastic pipe](#)  
(Another huge page, scroll all the way down.)