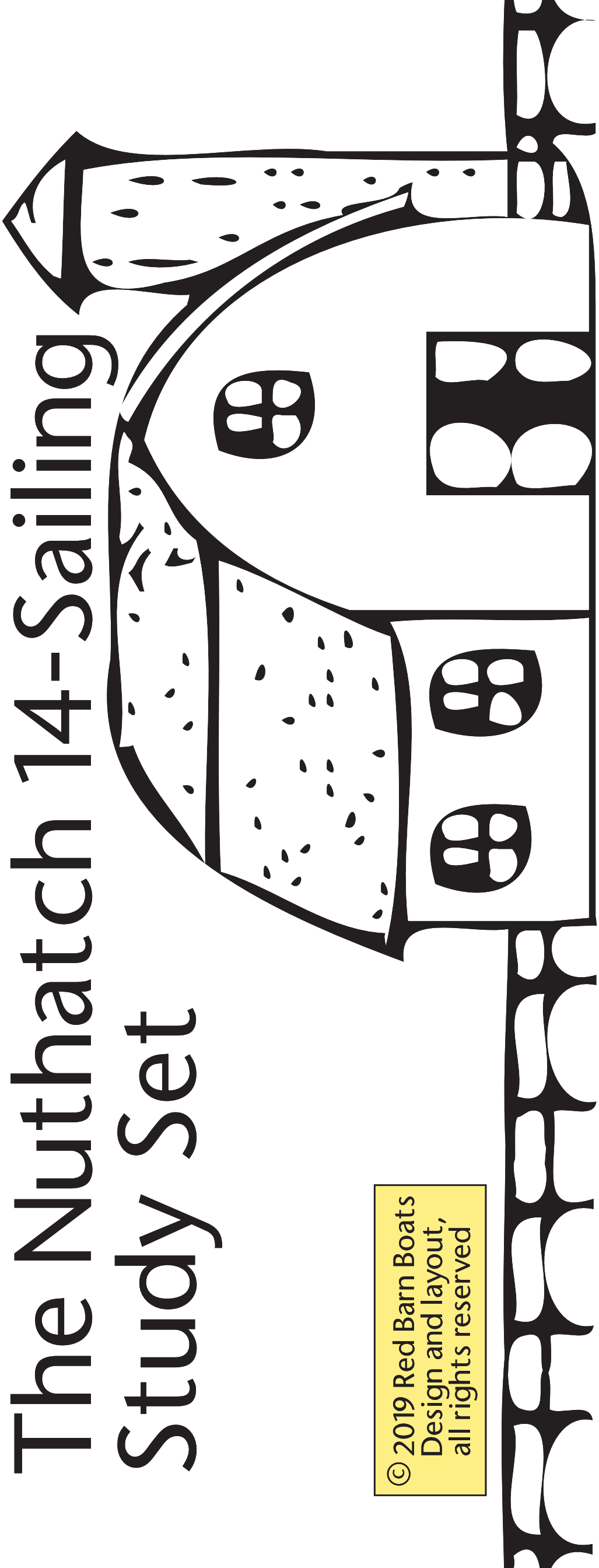


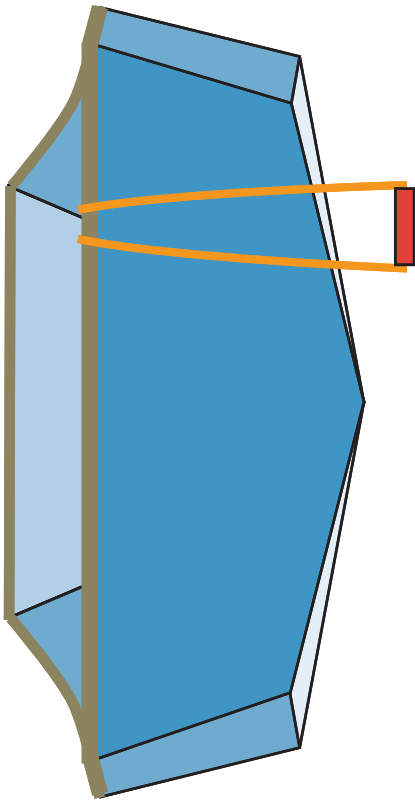
# RED BARN BOATS

## The Nuthatch 14-Sailing Study Set

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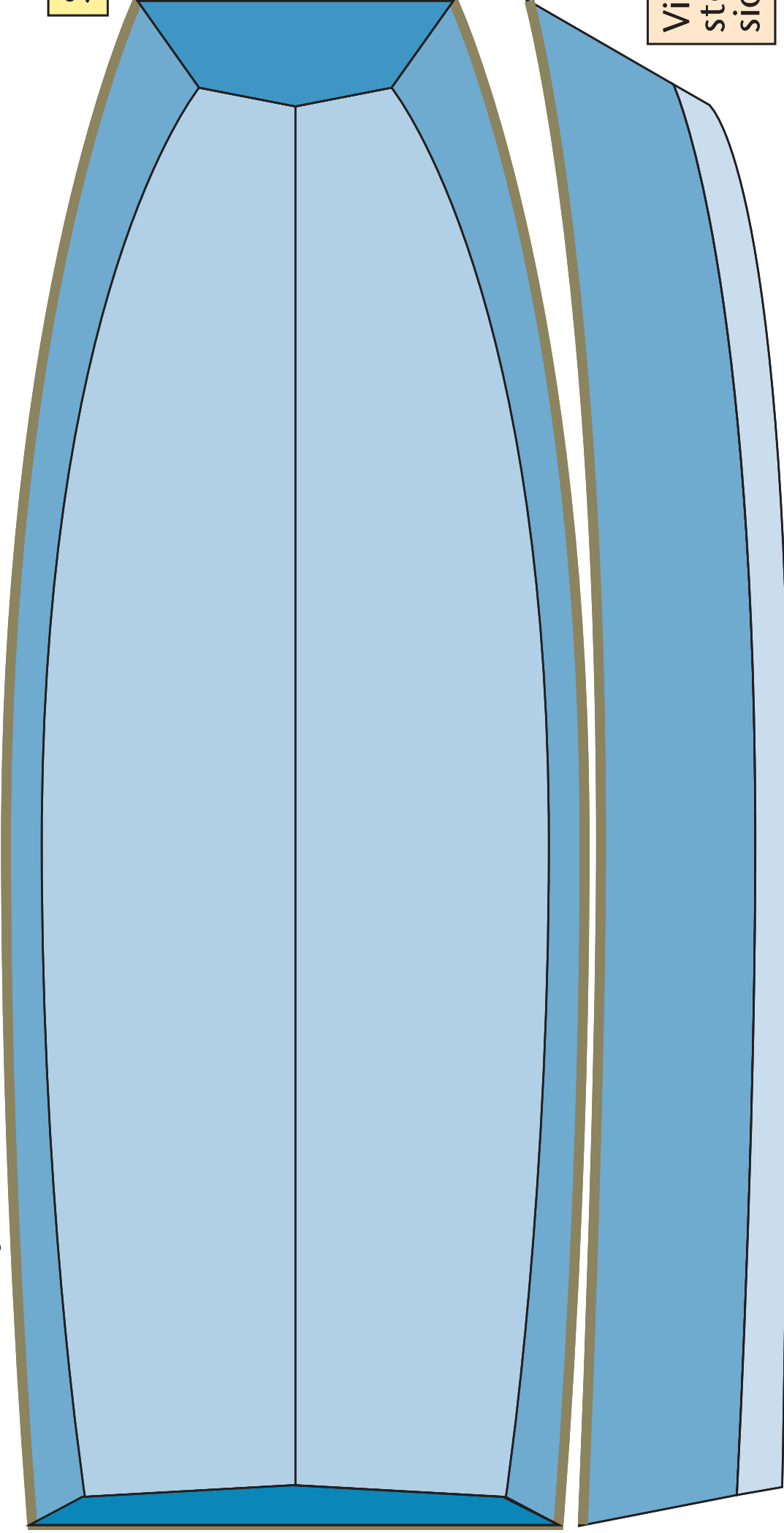
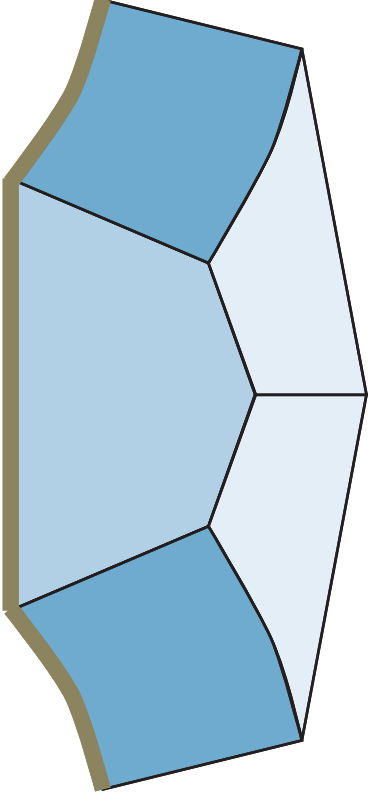
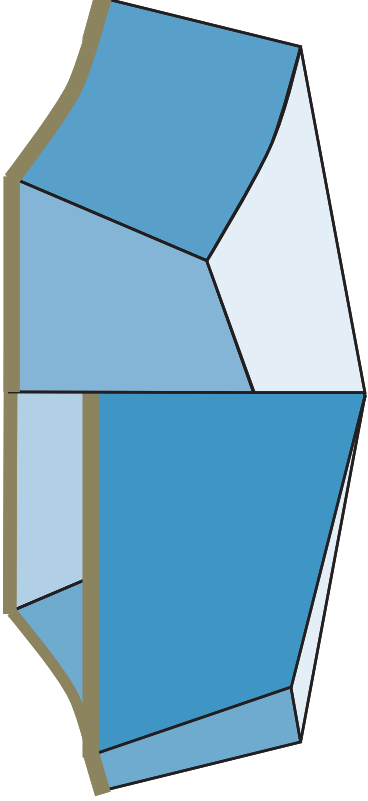


[www.youtube.com/redbarnboats](http://www.youtube.com/redbarnboats)



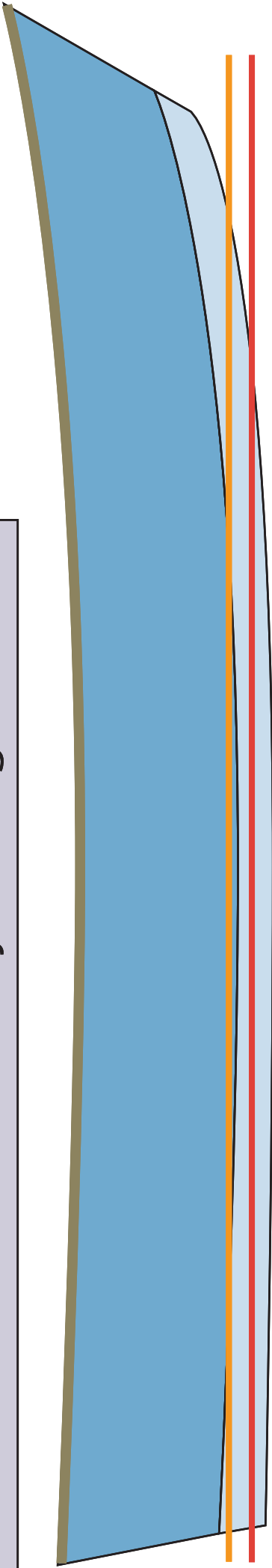
Self rescue sling

Reduced  
Scale!

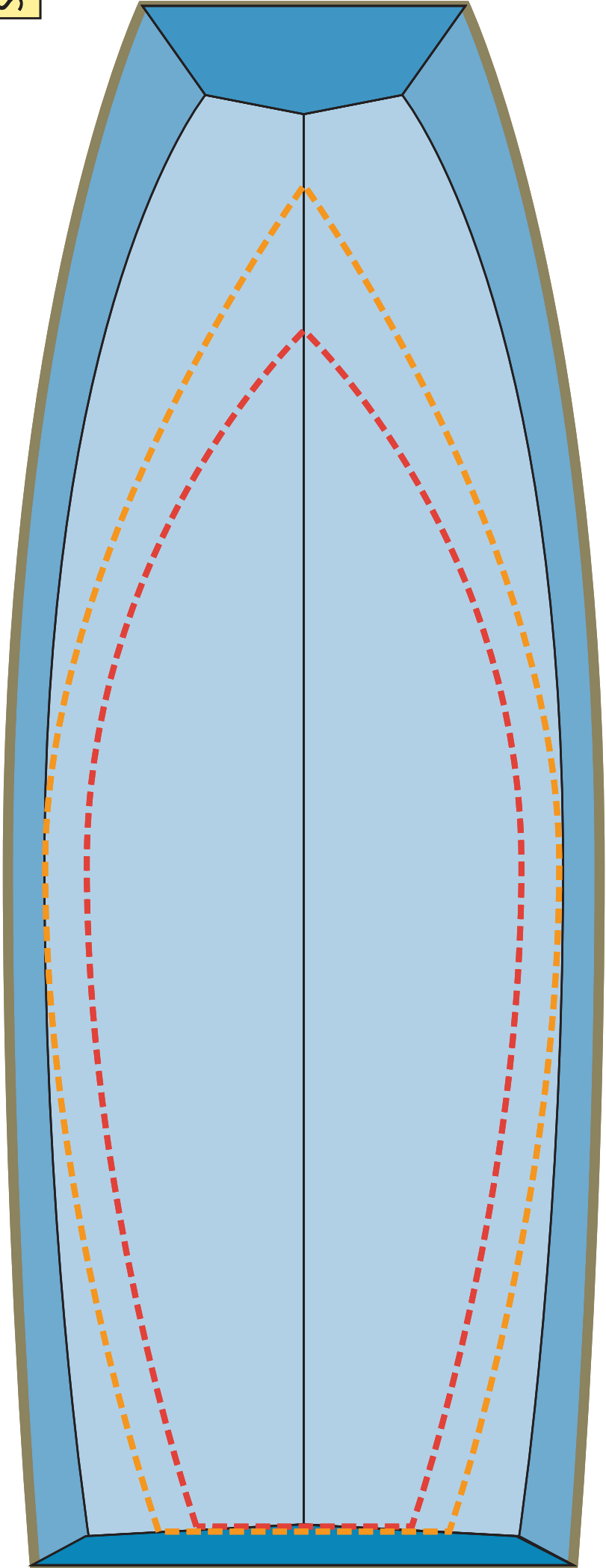


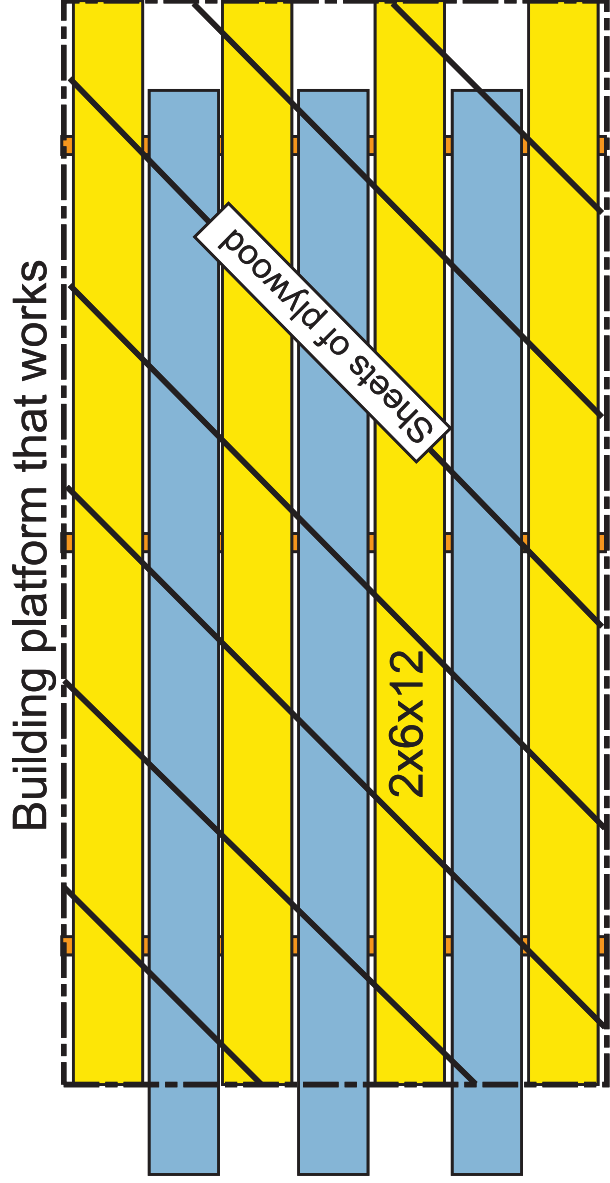
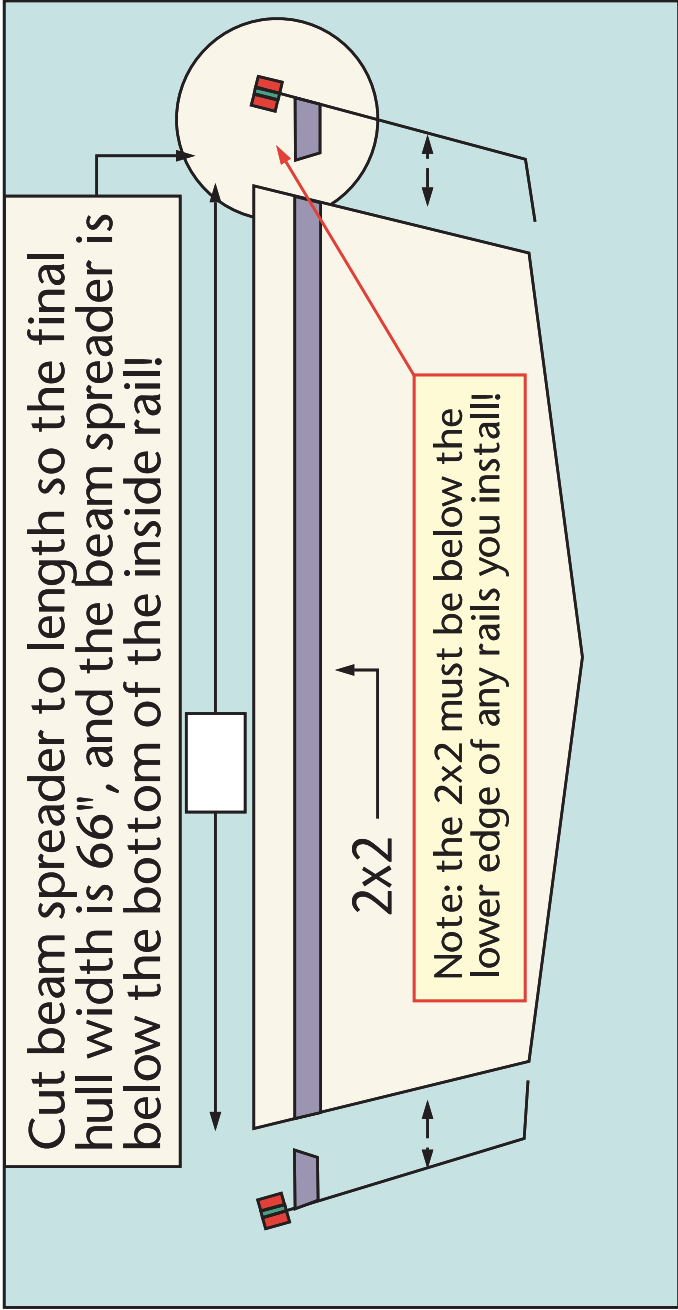
Views: Bow, combo,  
stern, bottom, and  
side

Waterline levels -- Red: hull only - Orange: loaded

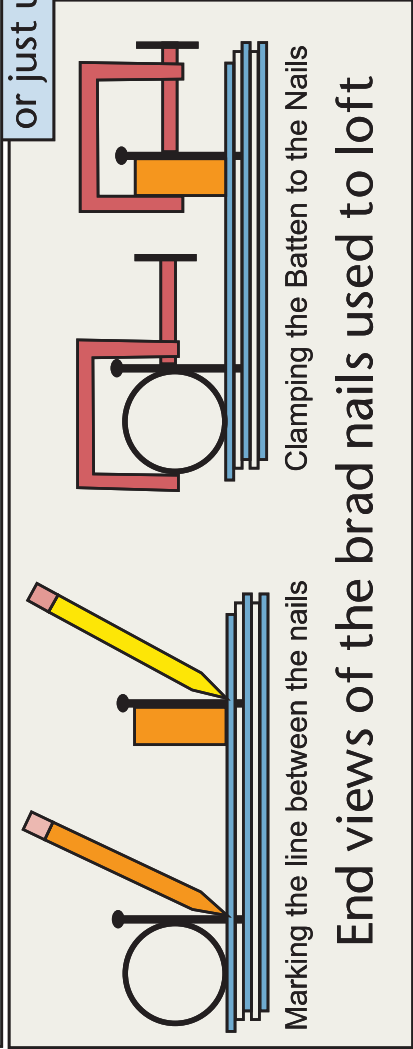


Reduced Scale!

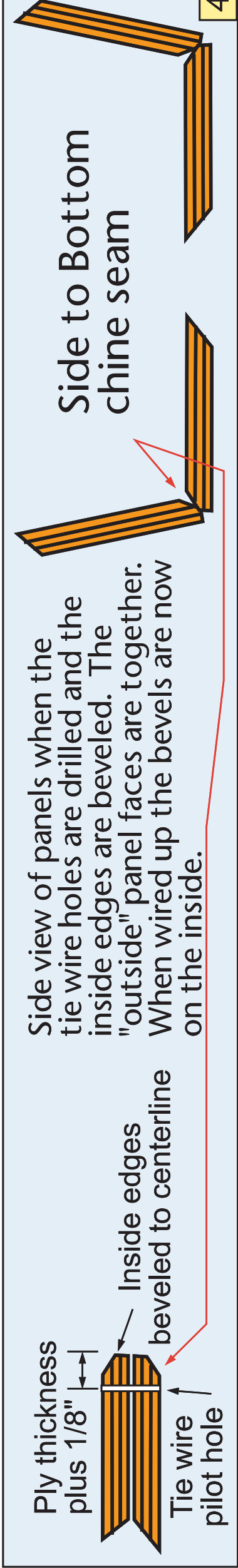
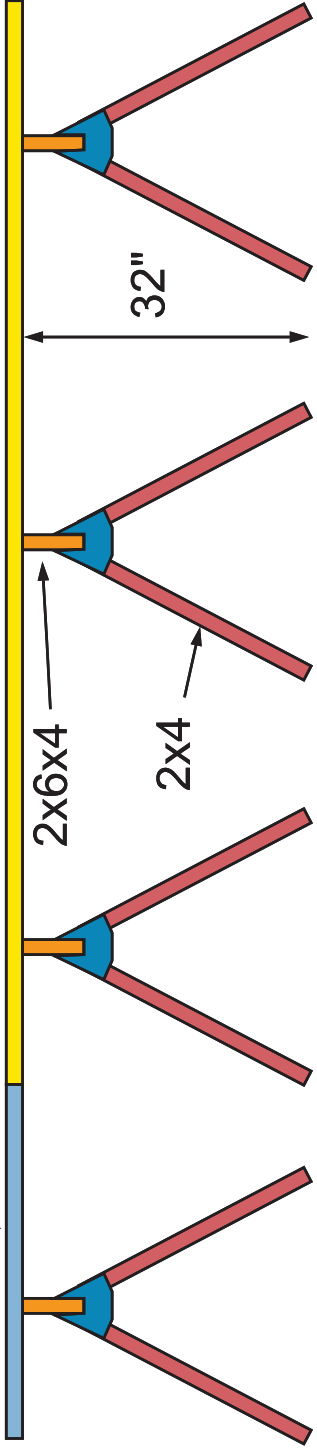




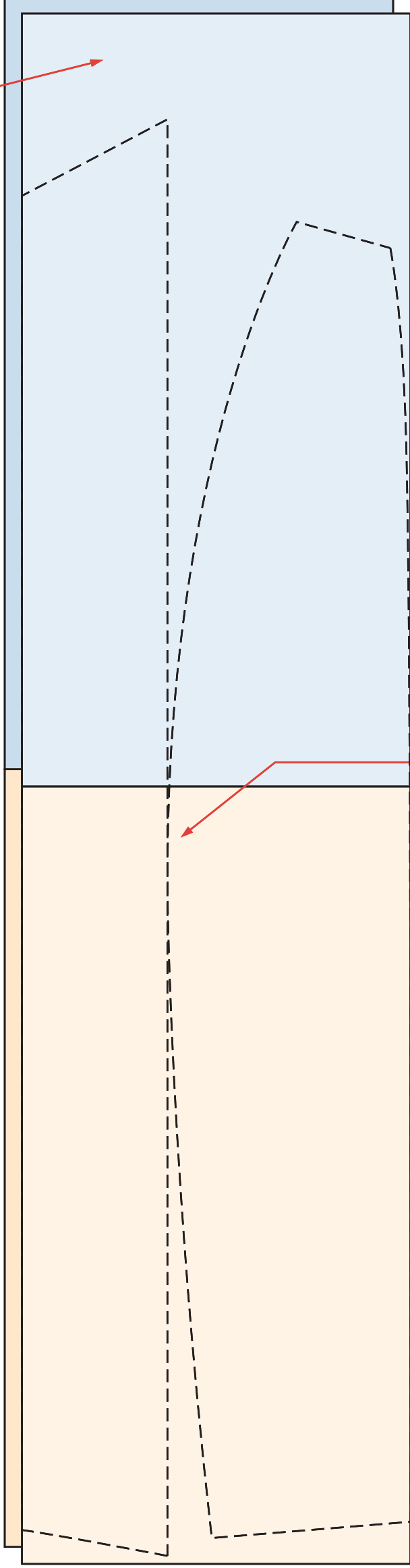
Extra legs and 2x6x12 supports can be used while scarfing and lofting up the long panel sets. The extra legs can be removed and the 2x6x8's shoved back after the panels are cutout and wired up.



or just use 16's

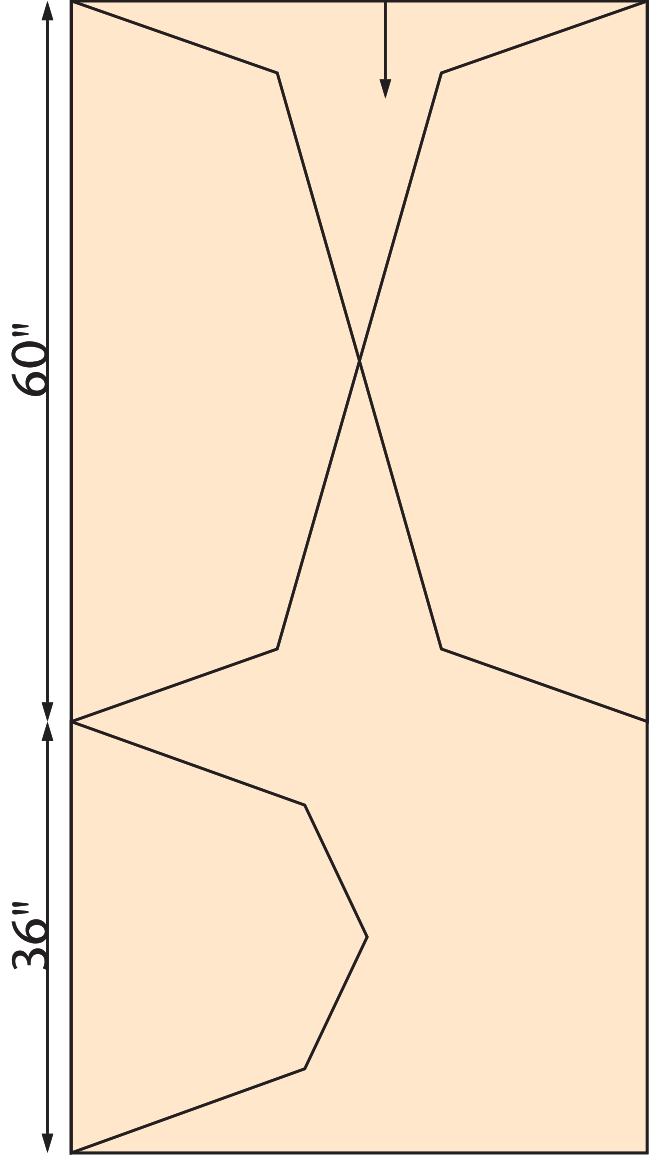


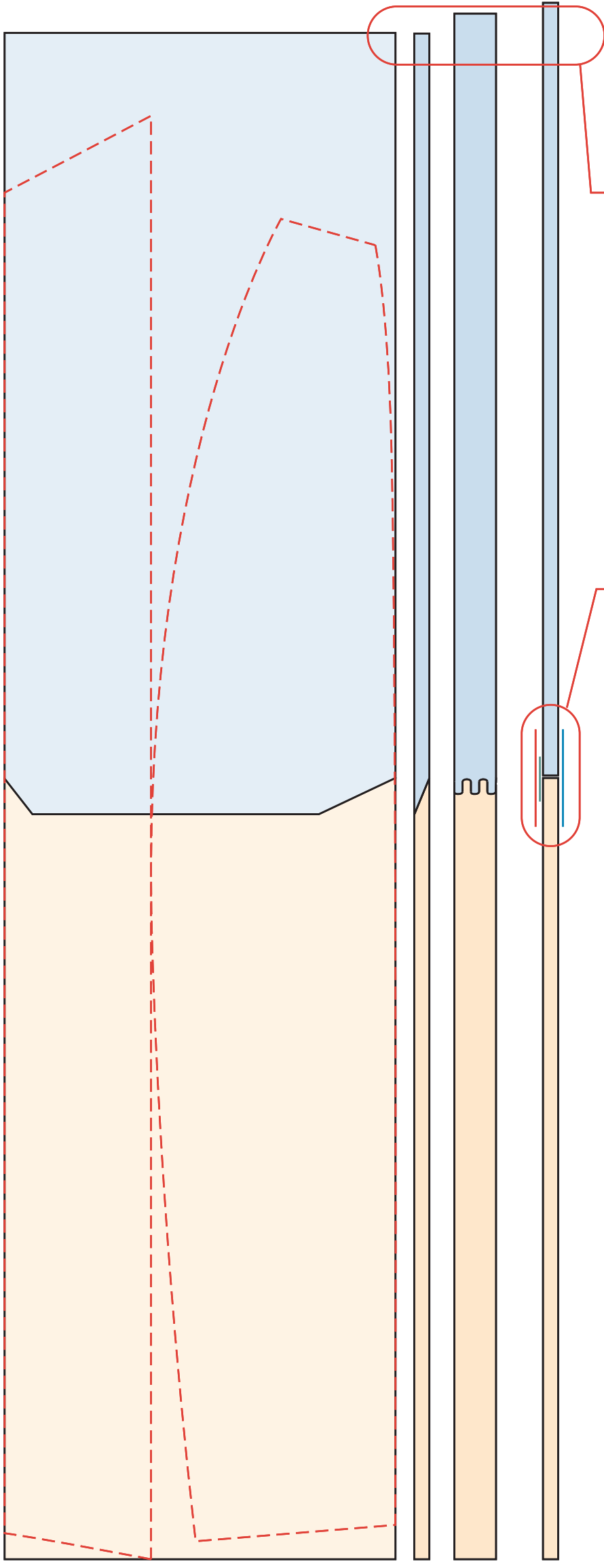
Two 4x8ft or 1220x2440mm sheets of plywood - Excess at end is for what kind of scarf/joint you use



This page shows the layout of the hull panels on the plywood. If you are using Metric panels there will be more gap between the bottom and side hull panels. With US panels, the two will touch at about 7.5 ft from the transom end. Just be careful when laying out the lines and when cutting out the panel sets!

One 4x8ft or 1220x2440mm plywood sheet for a single bow panel, and double transom panels. Scrap plywood can/should be used between these two panels to thicken the transom for use with an OB Moter.

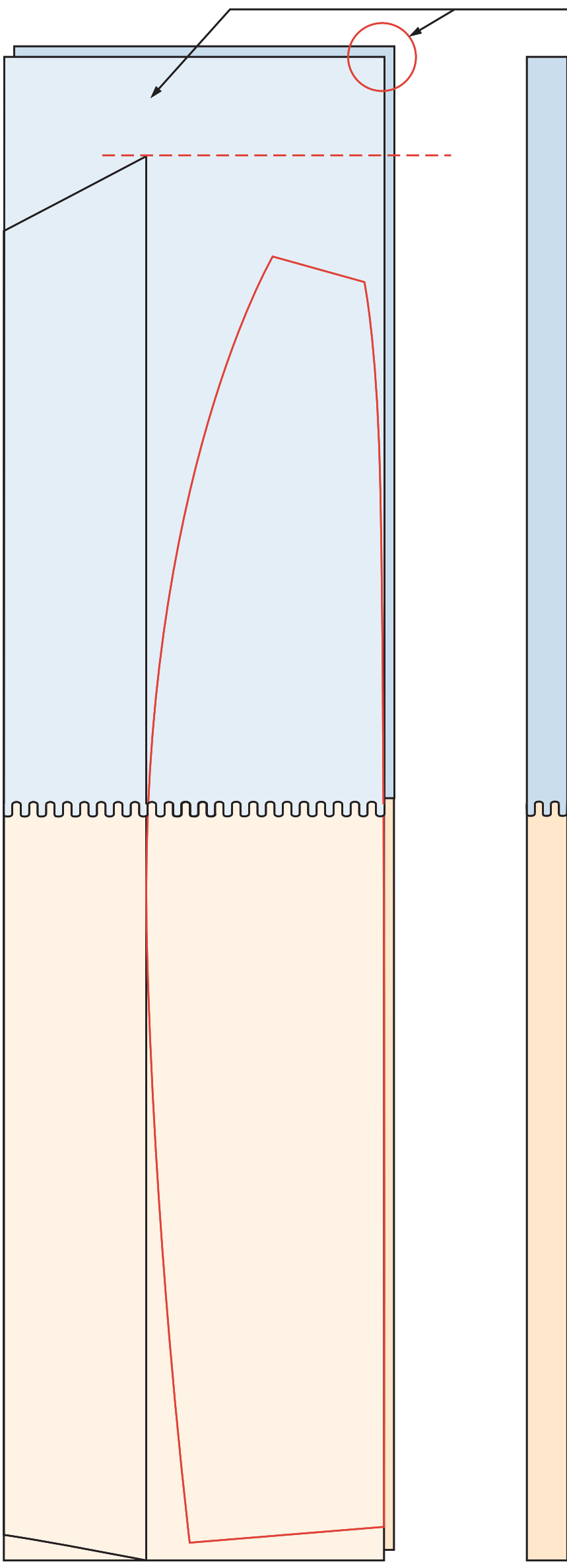




The overall length of the "plywood set" will vary with the type of joint used to make the length needed for this hull!

Or you can use a "Payson Joint" where the ends are butted together and layers of glass cloth are attached to both sides. Two on the inside, and one on the outside. The outside layer will be covered by the bottom cloth to give two layers.

With a 12:1 scarf ratio, the overlap for 9mm/3/8" will be either 108mm or 4 1/4". If you use finger joints with either 9mm or 1/2" bits; the overlap will be 2" for US and what ever is used for finger joint guides in the EU.

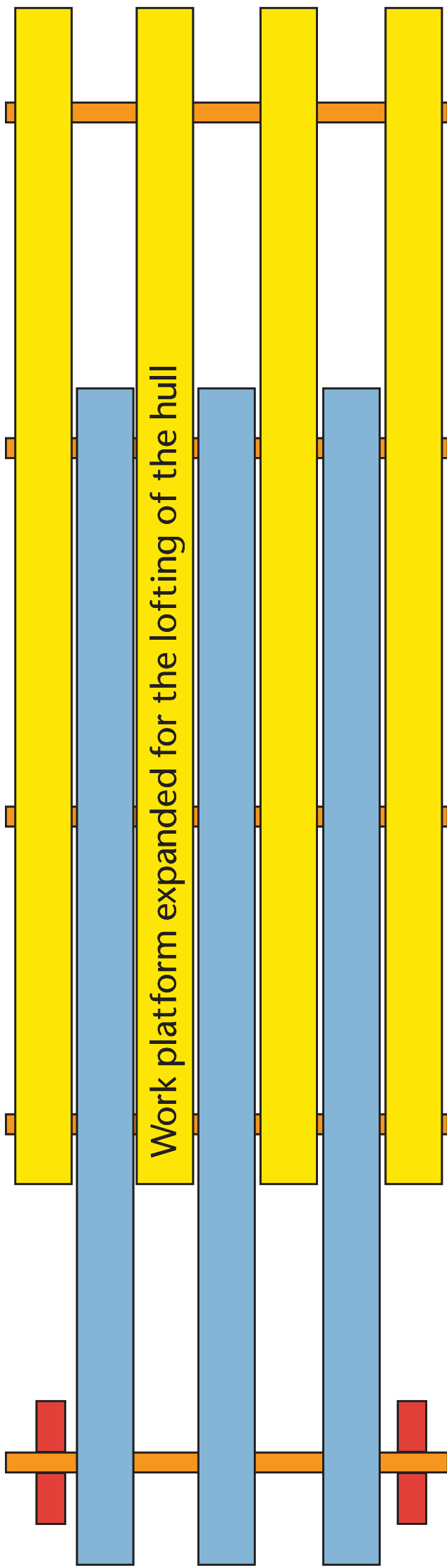
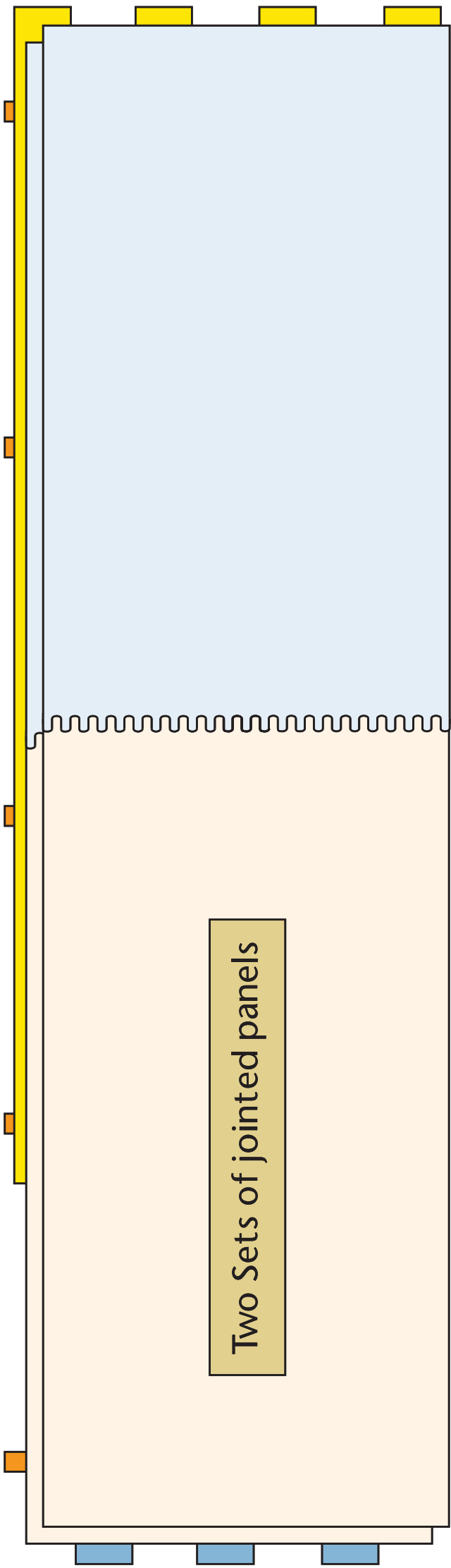


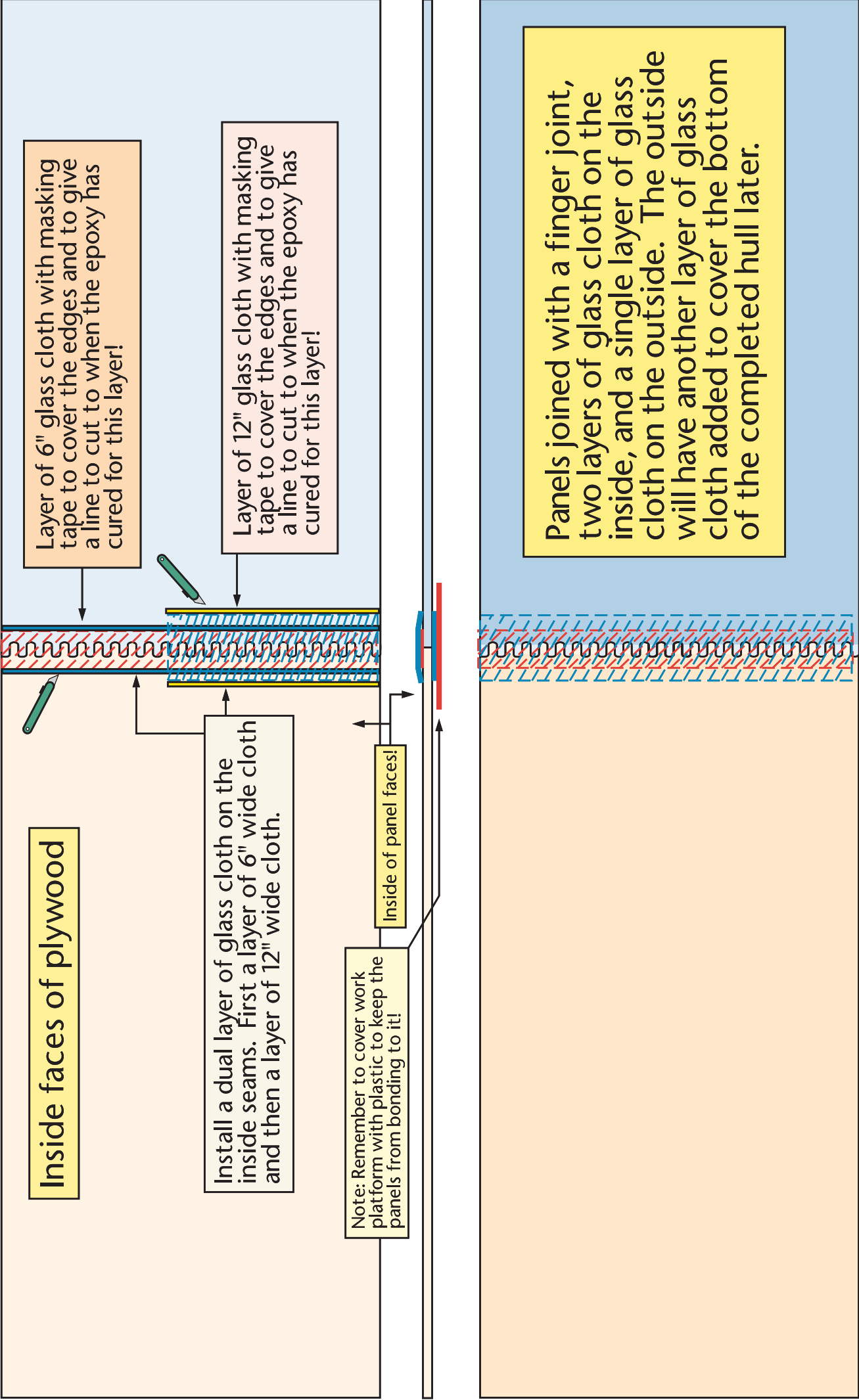
For this design set I will use the "finger joint method", which I find is the easiest and fastest way to join thin 4mm-12mm plywood. I find it is also the strongest joint for home builders without a special jig to get the "perfectly beveled" scarf joints for each sheet. The strength of a joint is at the "surfaces" of the joined panels and most scarf joints can not achieve a perfect mating of the top surfaces of the plywood!

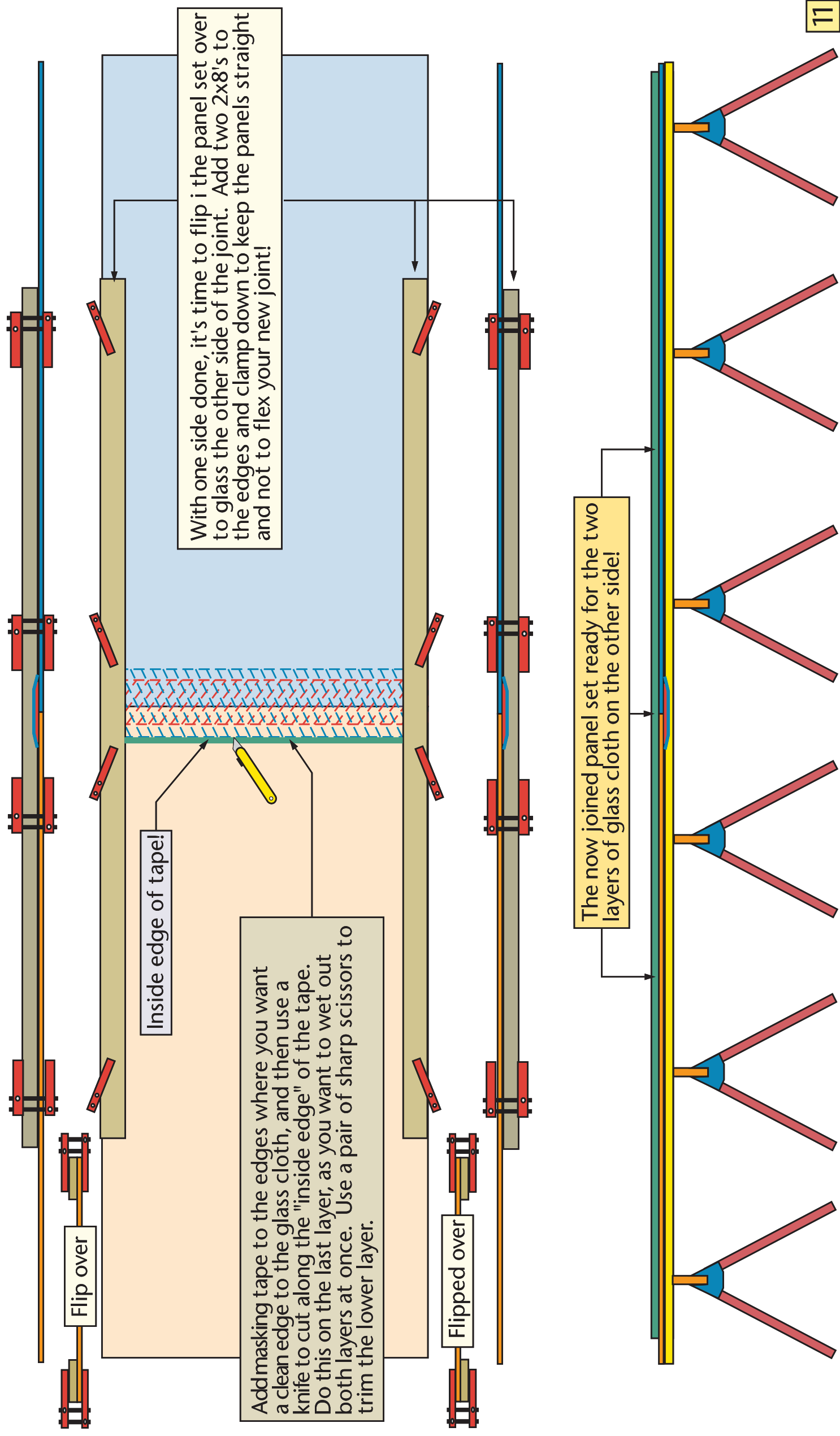
Note: you will have two sets of these panels to make up the hull of the 14ft Nuthatch!











Flip over

Inside edge of tape!

With one side done, it's time to flip i the panel set over to glass the other side of the joint. Add two 2x8's to the edges and clamp down to keep the panels straight and not to flex your new joint!

Add masking tape to the edges where you want a clean edge to the glass cloth, and then use a knife to cut along the "inside edge" of the tape. Do this on the last layer, as you want to wet out both layers at once. Use a pair of sharp scissors to trim the lower layer.

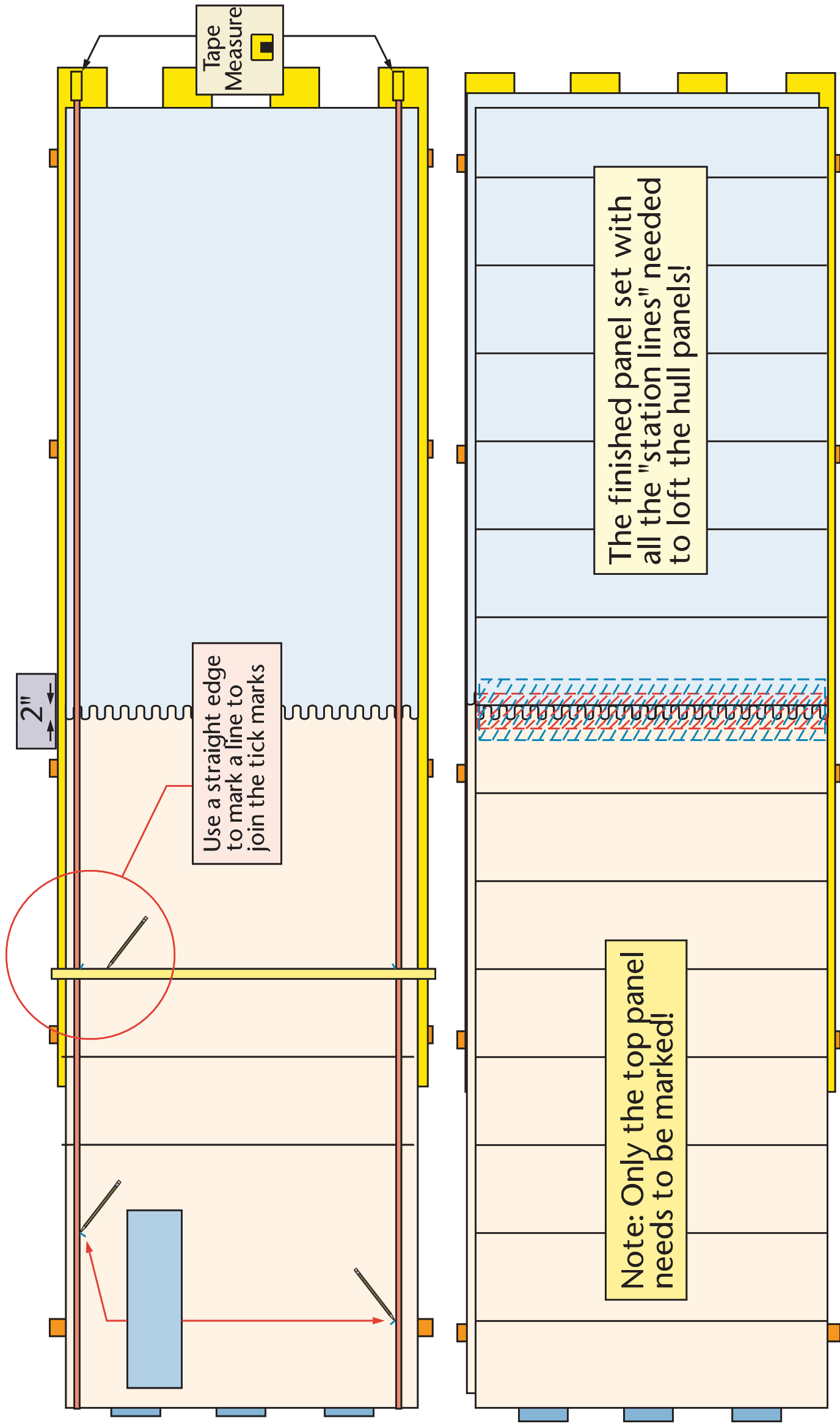
Flipped over

The now joined panel set ready for the two layers of glass cloth on the other side!

Two sets of joined panels ready for the next step!

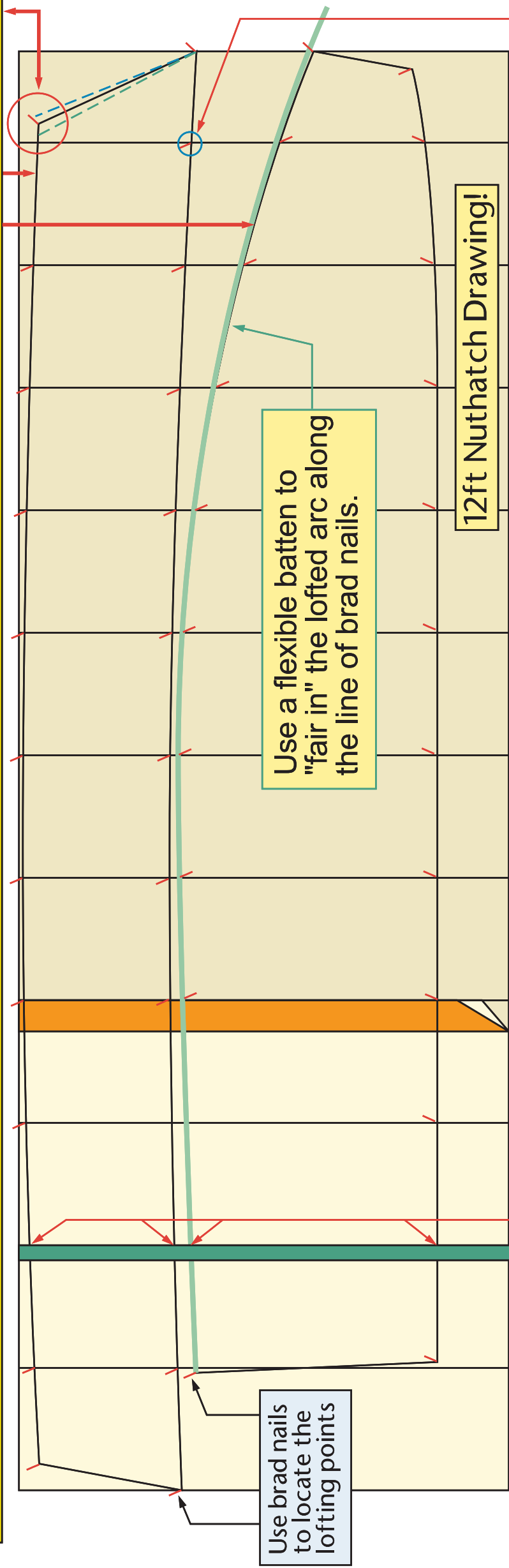
The diagram illustrates two identical horizontal assemblies. Each assembly consists of a light blue rectangular panel on the left and a light orange rectangular panel on the right. These two panels are joined at their top edges by a horizontal strip of material featuring a repeating geometric pattern of blue and red lines. The two assemblies are positioned side-by-side, separated by a vertical white line. A central text box with a black border contains the text 'Two sets of joined panels ready for the next step!'.







To Do, To Do, To Do: Measure the "arc lengths" of the two mating curves of the side and bottom panels! The top panel should be 1/4" longer! adjust the lower bow corner in or out to get this extra 1/4"



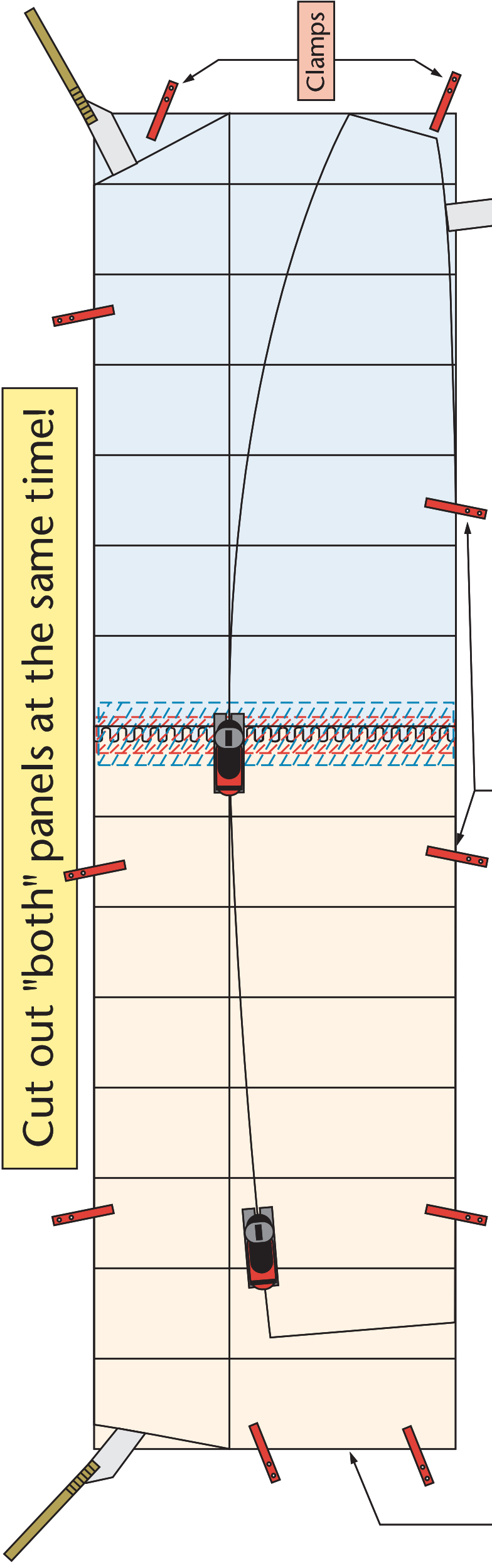
Use a good quality 4-5ft rule to locate the lofting offset marks on the station grid lines.

Note: Before you separate the cut out panel pairs, take a "fine bladed saw" and cut notches in the upper edge of the panels. You will need these "station line cut marks" later in construction to locate and "square up" all the interior cross braces, seat panels, mast partner, and oarlock sockets.

Outside scarf end points aft!

Keep Clamped Together!

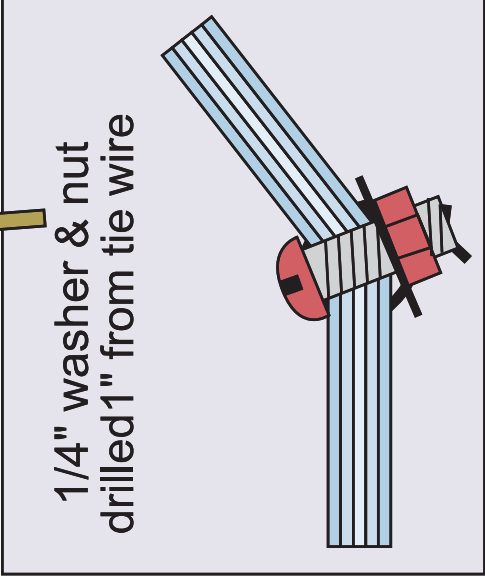
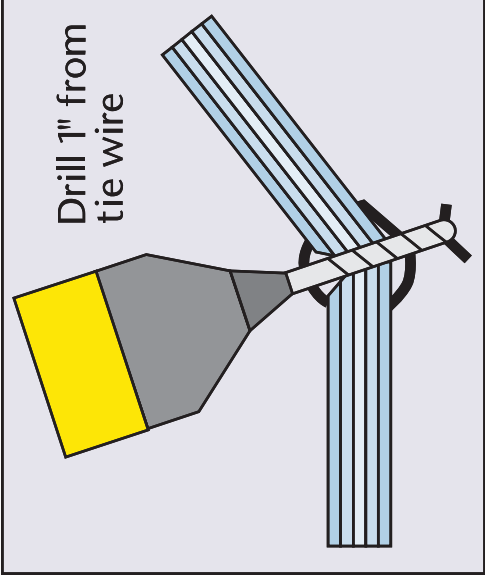
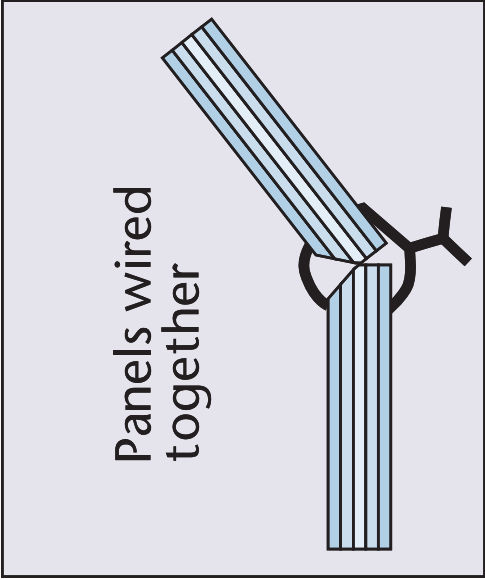
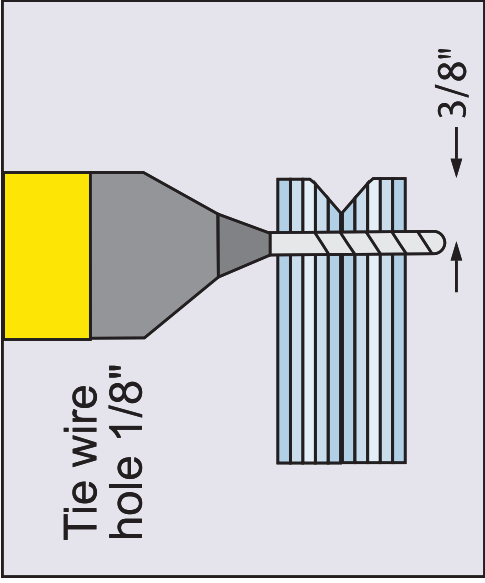
Inside plywood faces



Cut out "both" panels at the same time!

Keep at least two clamps on the dual sheets as you cut out the four hull panels from the ply sets!

Note: The second panel is underneath the one shown!





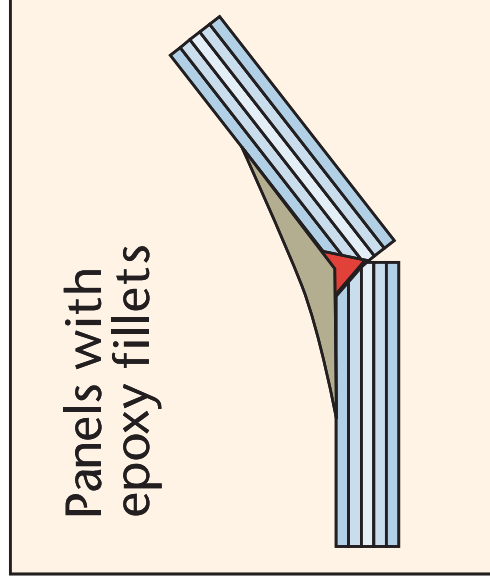
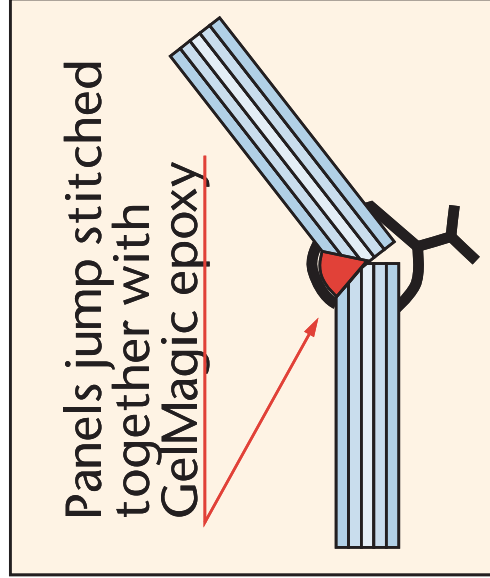
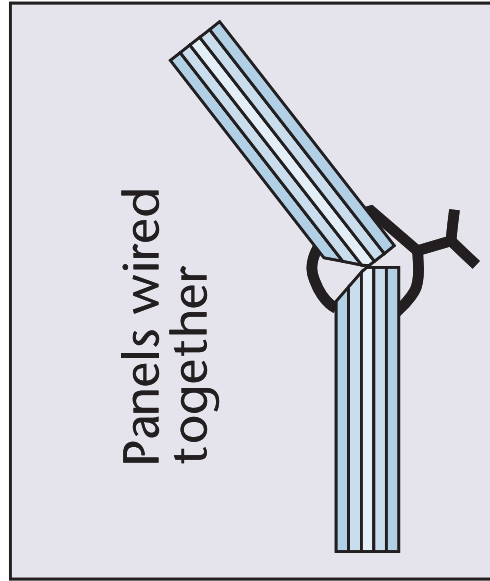
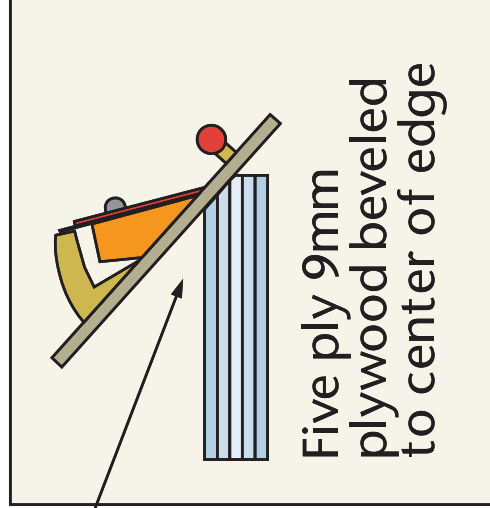
Do not bevel top edges of side panels!

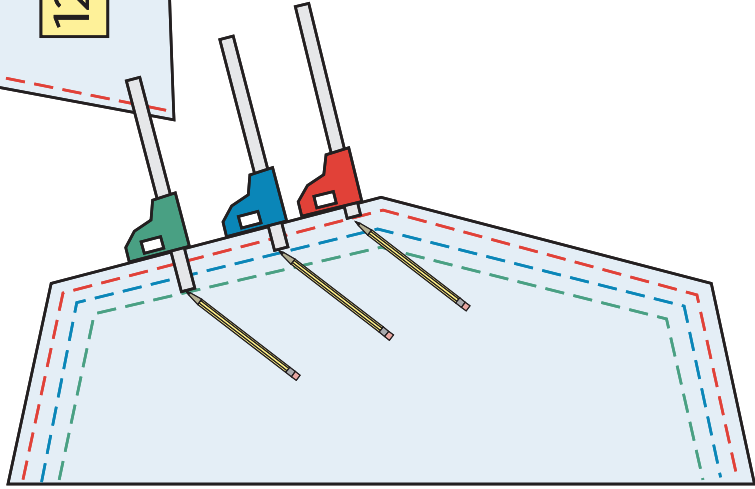
Bevel bottom and end edges on the two side panels only!

Use a plane or rasp to bevel the edges.

Bevel all edges on the inside faces of the two bottom panels

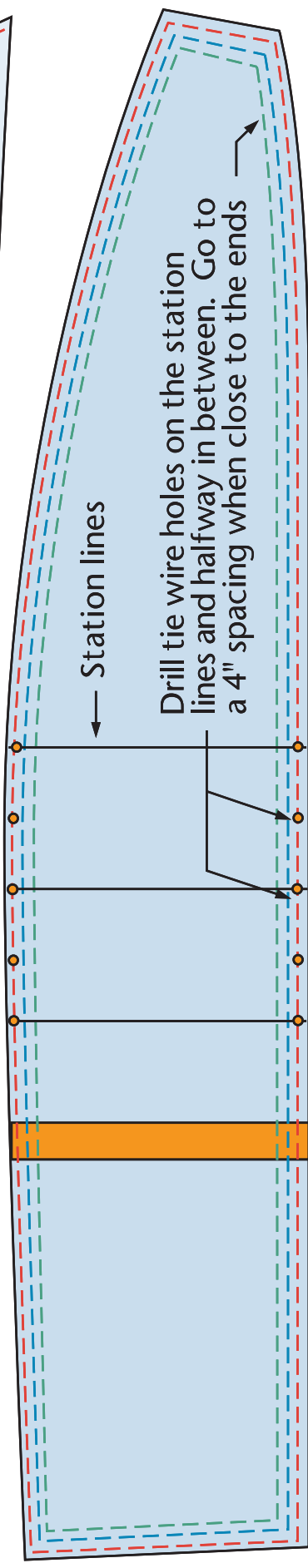
Note: Bevel "only" the inside edges!





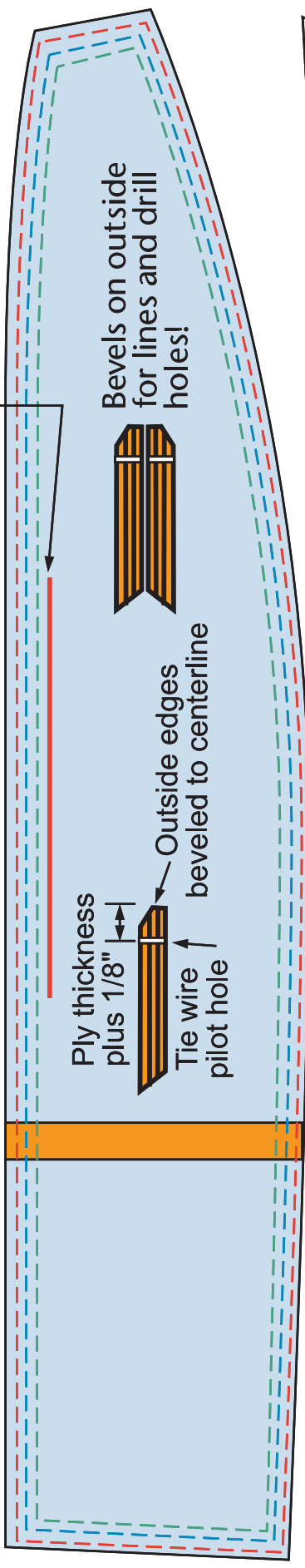
## 12ft Nuthatch Drawing!

You only need to mark the tie wire set back lines on the side panels. You may add the blue and green lines for the glass tape if you want. BUT! do not drill the holes for the tie wires on the side panels yet! You will do that on assembly.



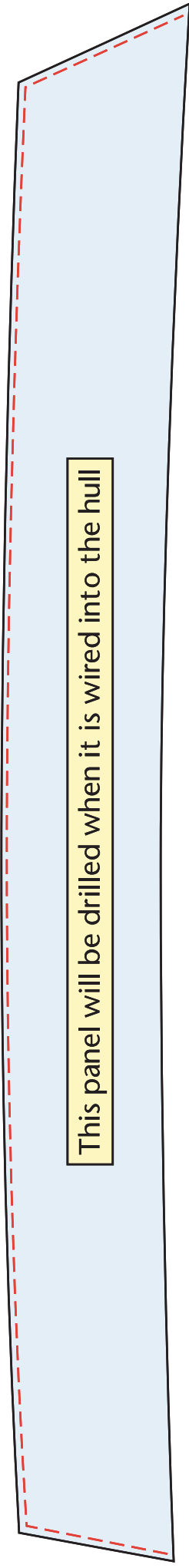
Finished panels ready to be wired together! The dashed red lines are for the tie wire drill hole set back, the blue lines are for the edge of the 2" fiberglass tape, and the green lines are for the edge of the 3" fiberglass tape.

2" offset line for locating the keel when cutting the opening for the daggerboard trunk.



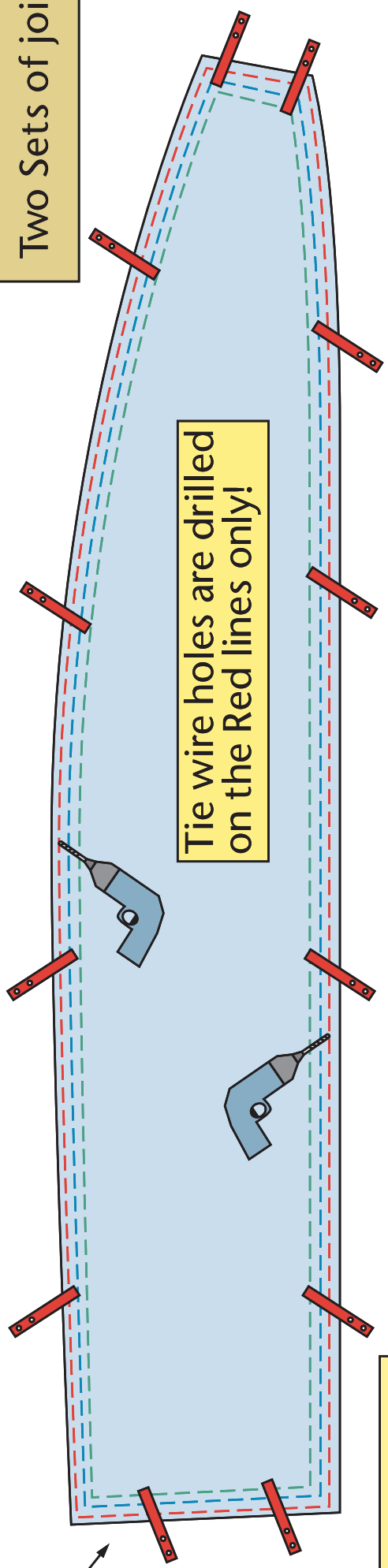
Red 3/8" offset for tie wire drill holes  
Blue 1" offset for 2" fiberglass tape  
Green 1 1/2" offset for 3" fiberglass tape

Note: Reduced to fit on page!



This panel will be drilled when it is wired into the hull

Two Sets of jointed panels

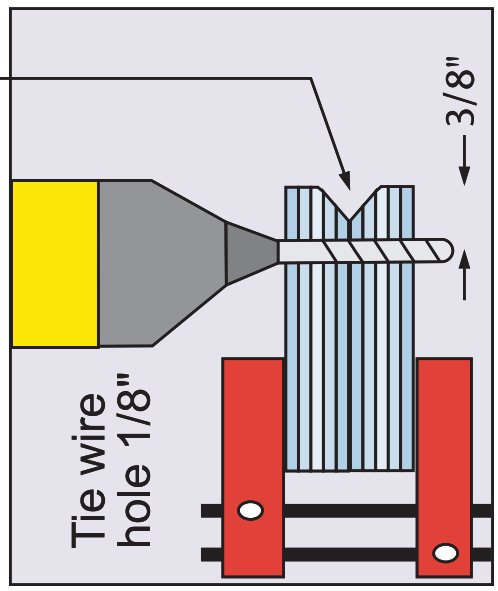


Tie wire holes are drilled on the Red lines only!

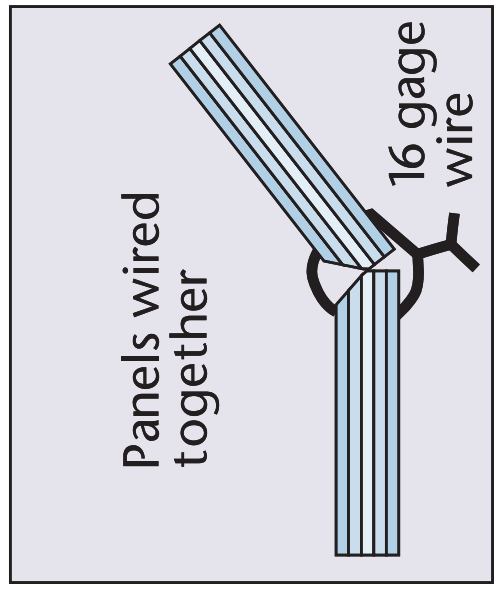
Note: Beveled faces clamped together!

Drill both panels at the same time

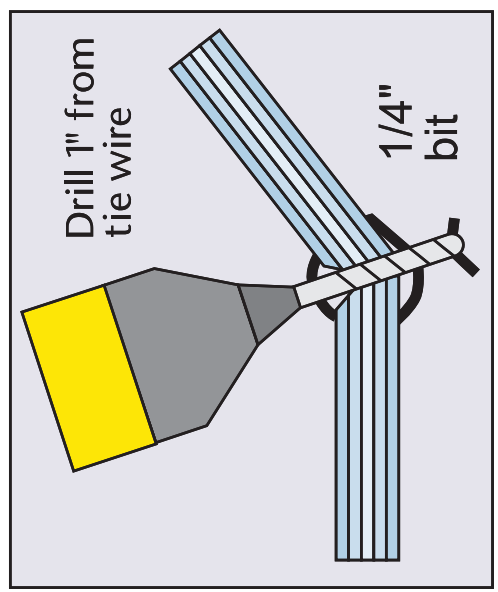
12ft Nuthatch Drawing!



Tie wire hole 1/8"

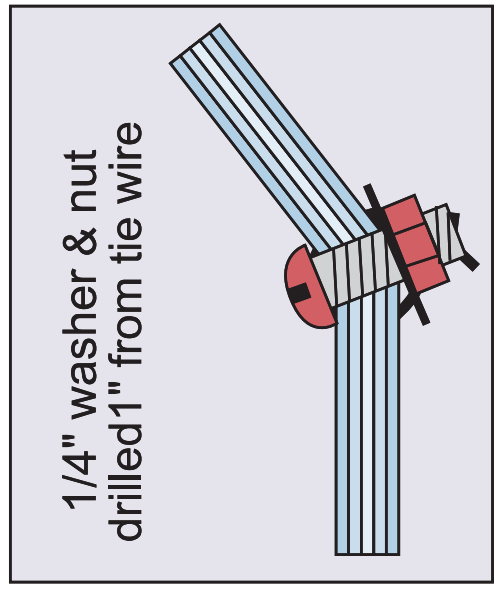


Panels wired together

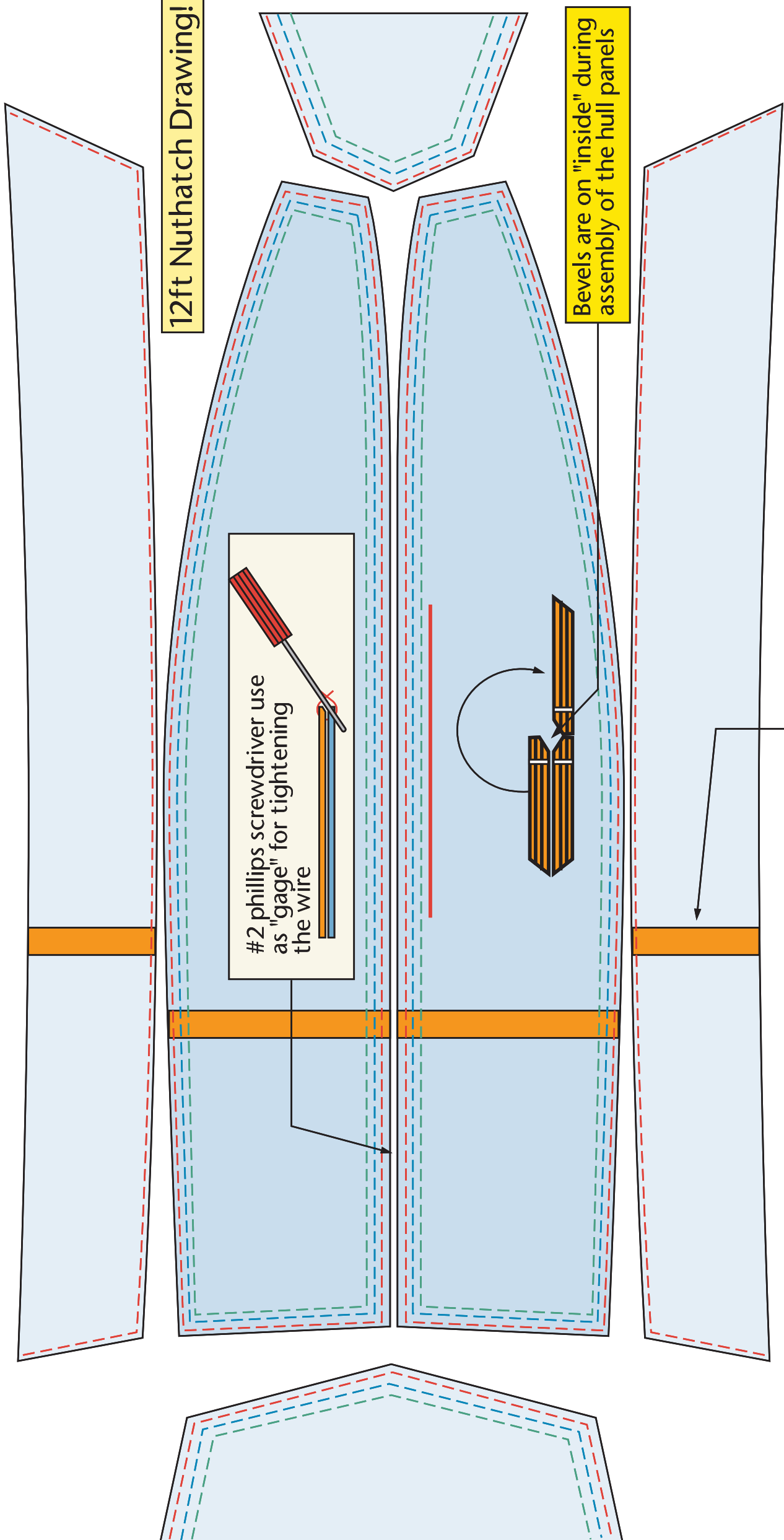


Drill 1" from tie wire

1/4" bit



1/4" washer & nut drilled 1" from tie wire



12ft Nuthatch Drawing!

#2 phillips screwdriver use as "gage" for tightening the wire

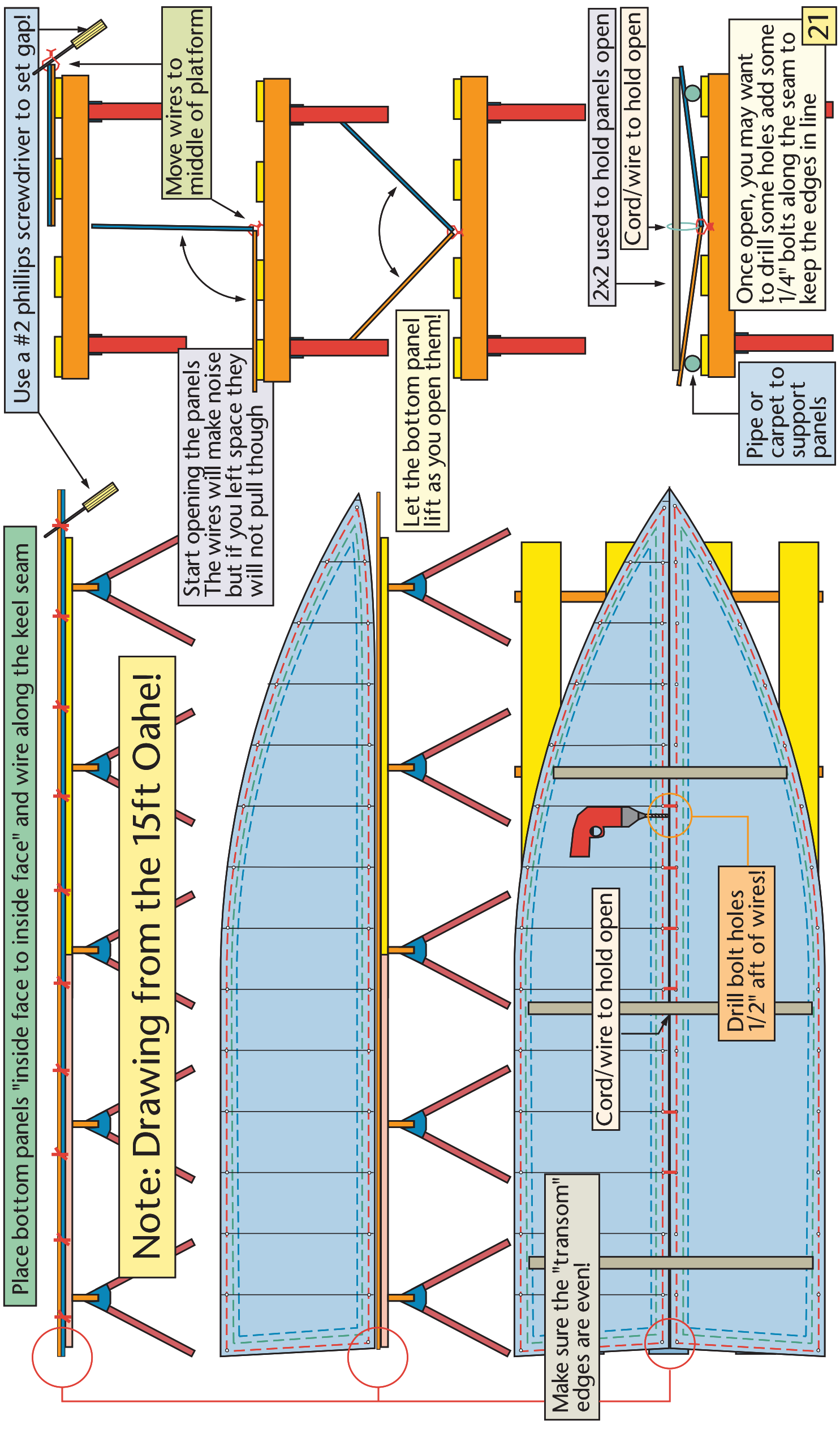
Bevels are on "inside" during assembly of the hull panels

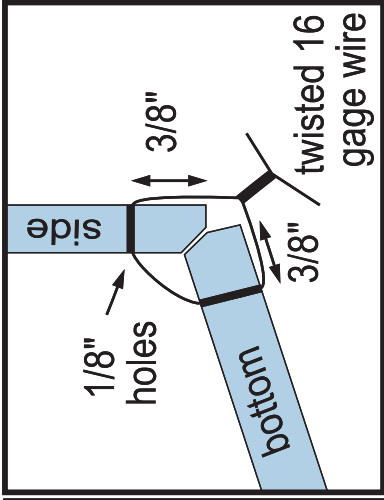
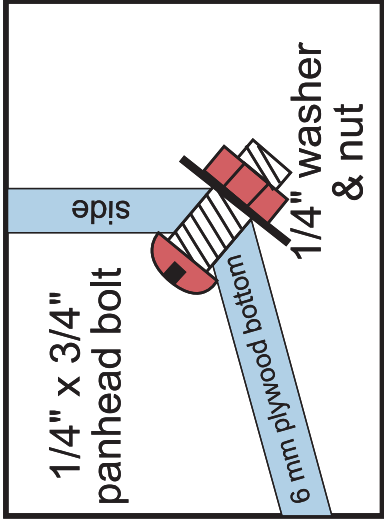
Note: The scarf locations will be different on the 14ft Version!

Note: Reduced to fit on page!

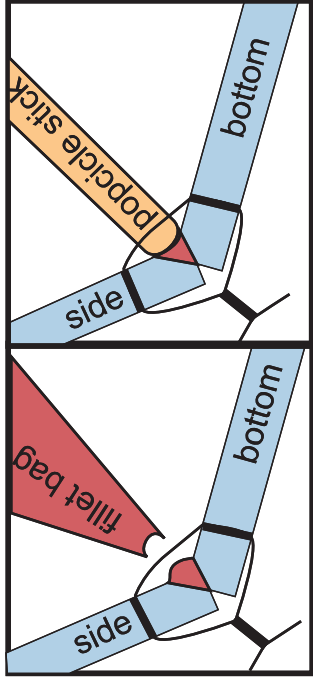
Place bottom panels "inside face to inside face" and wire along the keel seam

Note: Drawing from the 15ft Oahe!

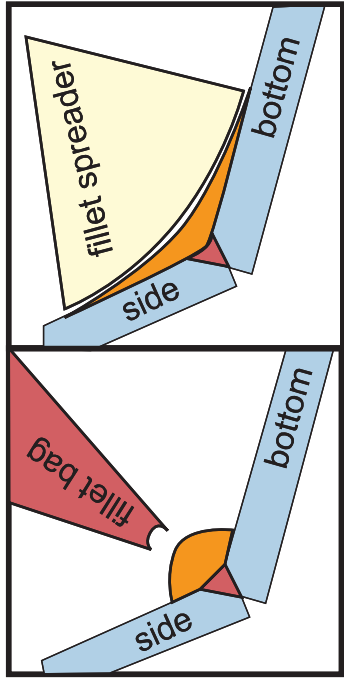




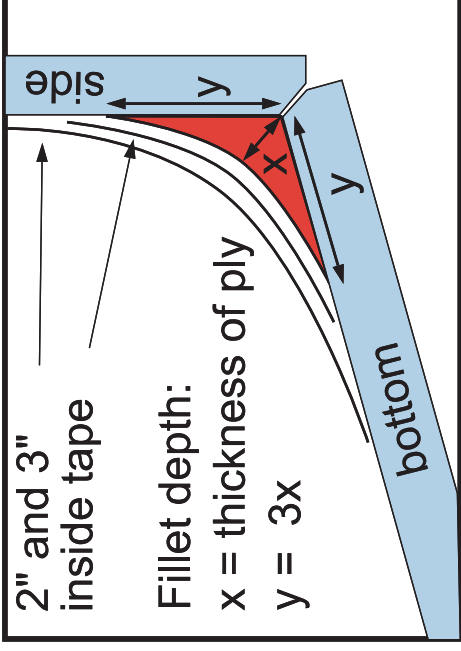
Wiring and bolting the panel sections together



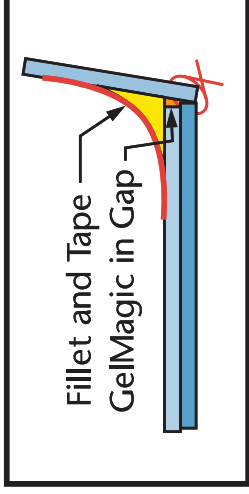
Jump Stitch



Applying and Spreading the Fillet

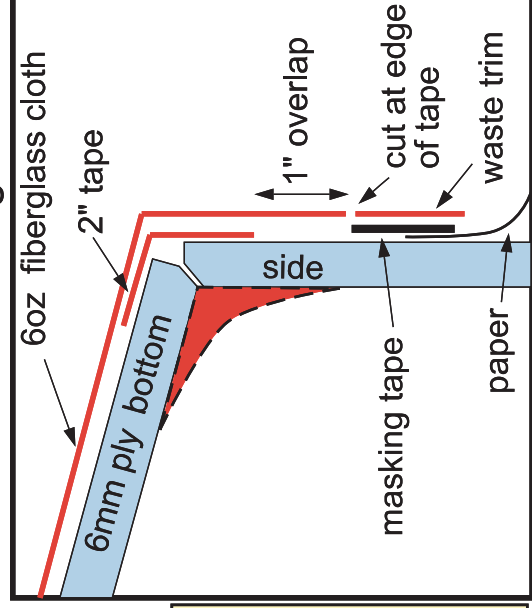


Cross section of taped seam



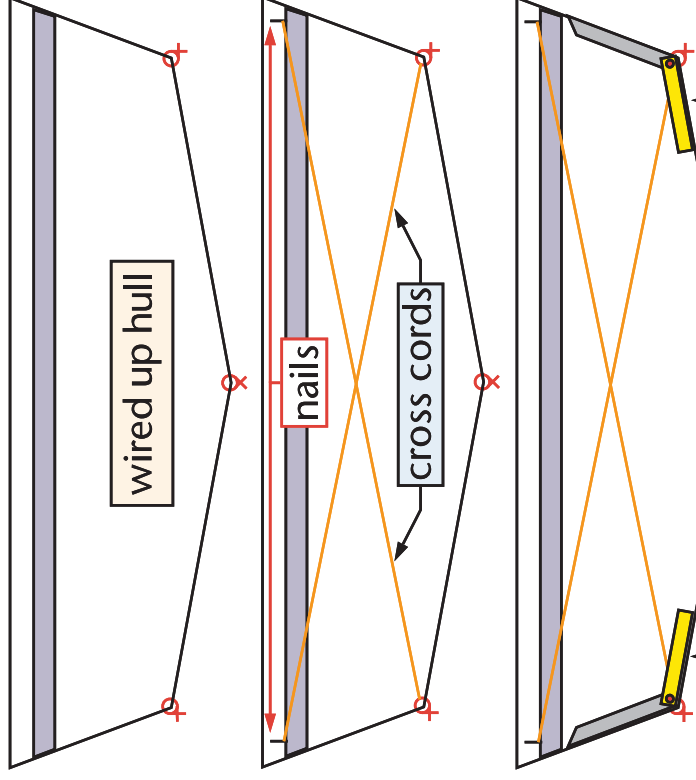
Double Transom Panel

Bottom outside edge details



Read the instructions as you study these drawings. Each picture tells a story. Use the cardboard model you made to visualize the directions.

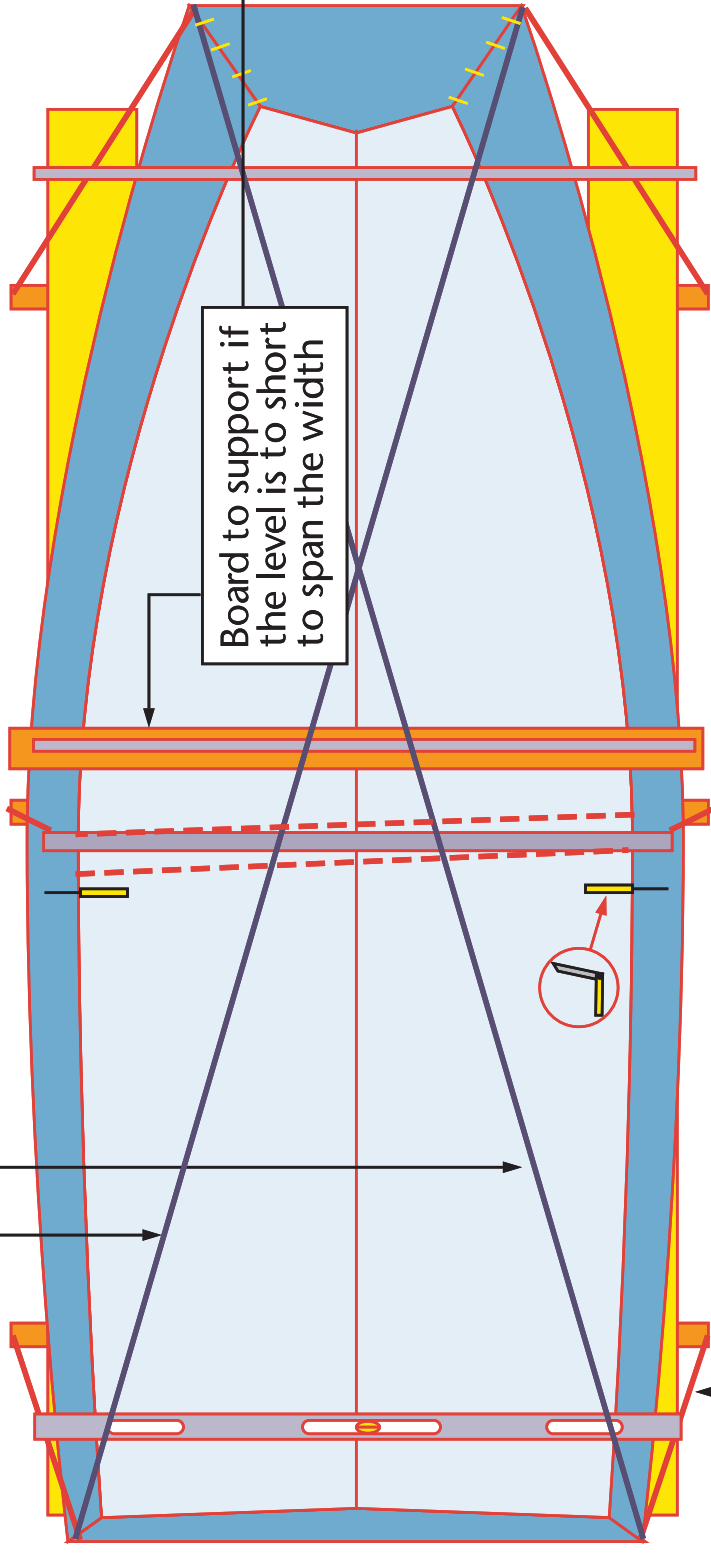
Squaring up the side to bottom panels at the beam of the hull



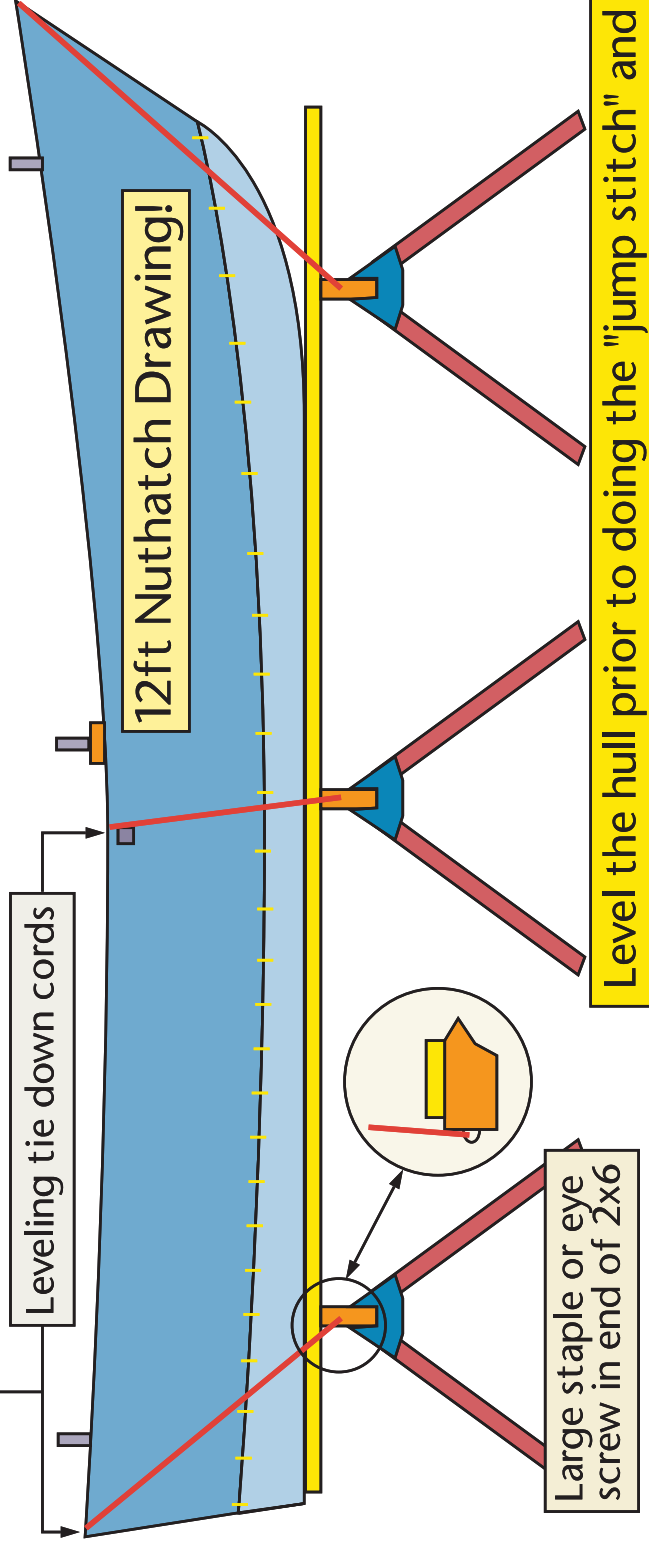
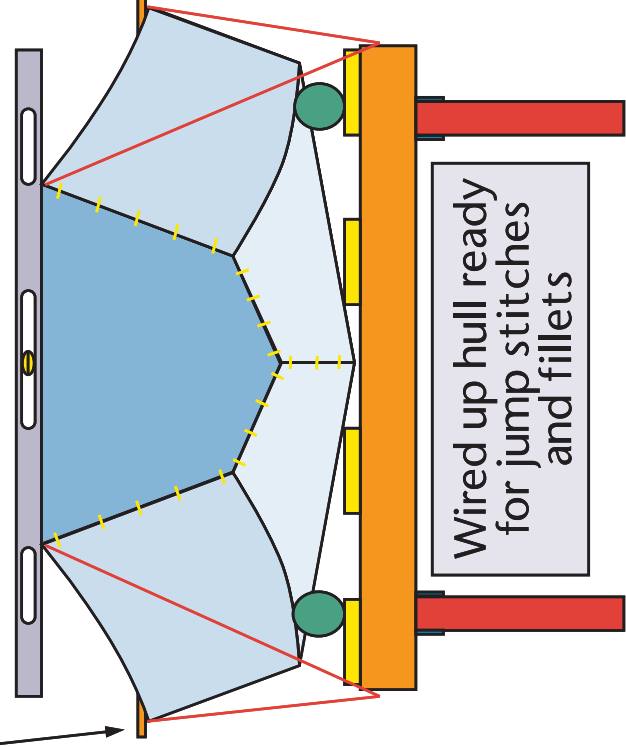
Compare the angles on both sides and tighten or loosen one or both "green" cords until the angles are the same. Recheck the level and square of the rest of the hull after you do this. Recheck again if those need adjusting too; until you are happy and the hull is level and square!

Cross hull tension lines used to "square up" the hull. Adjust until the "cross hull distances" are the same!

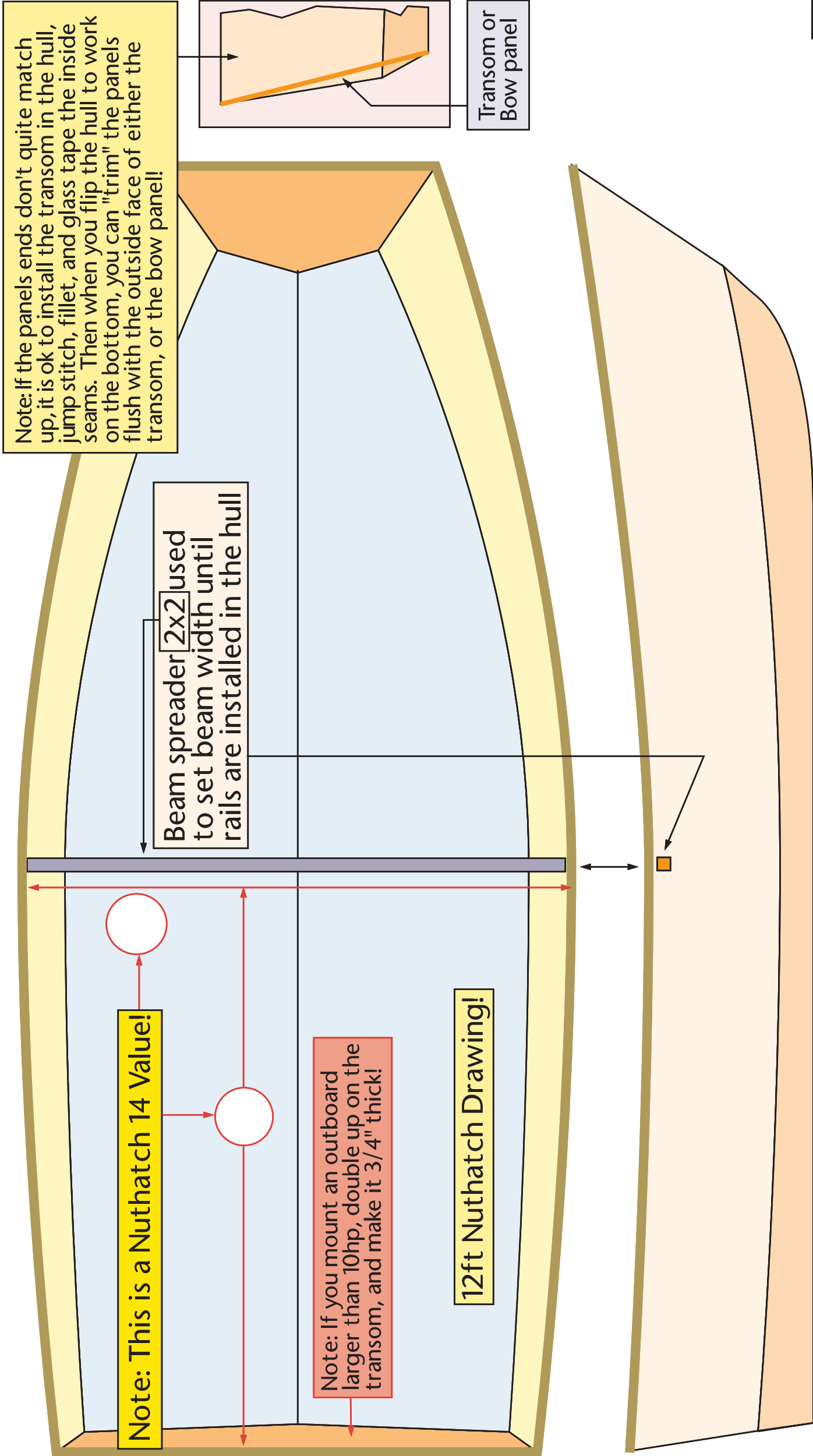
Do not "over tighten" cords!



Carpet reminates to support the chine. Try not to put them under the middle of the bottom panels!







Note: If the panels ends don't quite match up, it is ok to install the transom in the hull, jump stitch, fillet, and glass tape the inside seams. Then when you flip the hull to work on the bottom, you can "trim" the panels flush with the outside face of either the transom, or the bow panel!

Beam spreader 2x2 used to set beam width until rails are installed in the hull

Note: This is a Nuthatch 14 Value!

Note: If you mount an outboard larger than 10hp, double up on the transom, and make it 3/4" thick!

12ft Nuthatch Drawing!

Transom or Bow panel



Cut to fit to corner

12ft Nuthatch Drawing!

Cut to fit from space to corner

Locate and install the oarlock spacer block first! Then add the rest of the gaps and spacer blocks until you get close to the ends, then you fill the space with a block that will reach the corners!

Note: "XX" values will be larger on the 14ft Version!

Oarlock Sockets

Place a screw in the center of the spacer block, and watch out for screws underneath!

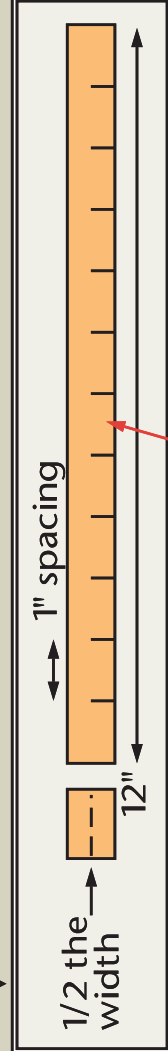
6" long mast partner lock block take priority over all other blocks and spaces! See page 24

The spacer blocks at the ends will be (should be) longer than a normal block

Not to scale!

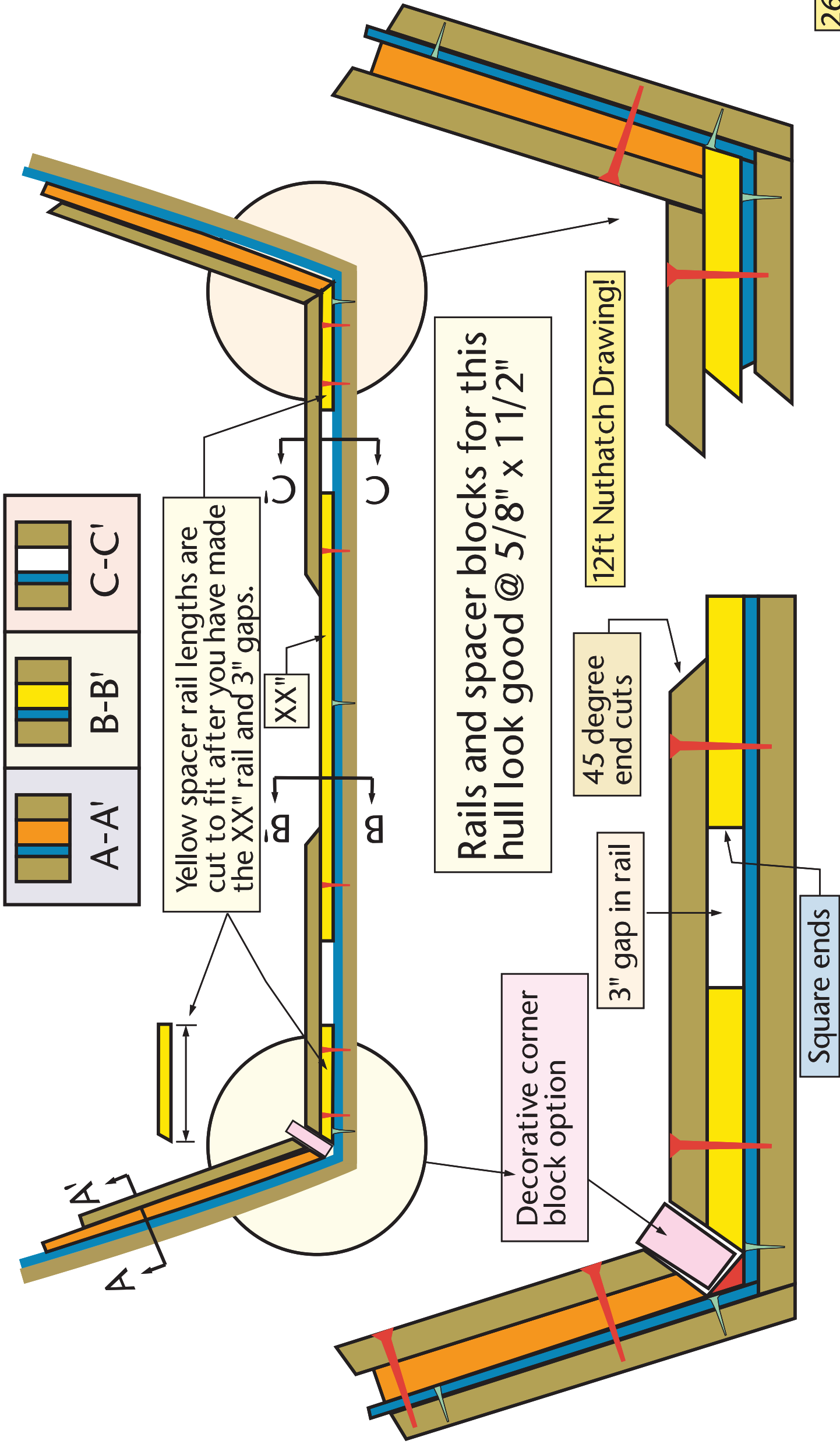
A 3" gap and a 3" spacer block look good

The oarlock socket block can be from 8" to 12" long. If you row go with the longer block.



1. Install the oarlock/mast partner spacer block
2. Measure off the first "gap"
3. Install the first spacer block on either side of the oarlock/mast partner spacer block
4. Repeat until you get to the end, and fill that space with a spacer block that will go to the corner. It will be longer than a normal spacer block

Remember where the screws are!



The diagram shows a stack of five colored blocks (white, light green, dark green, yellow, and dark green from top to bottom) on a blue base. A dashed orange line indicates a layer being removed from the stack, with an arrow pointing to the right.

A horizontal bar is shown with arrows at both ends. The bar is divided into four sections by three vertical tick marks. The first section on the left is labeled "3\"", the second section is labeled "XX\"", the third section is labeled "3\"", and the fourth section on the right is labeled "3\"".

Plywood scrap  
glued to bottom  
of corner for added  
strength!

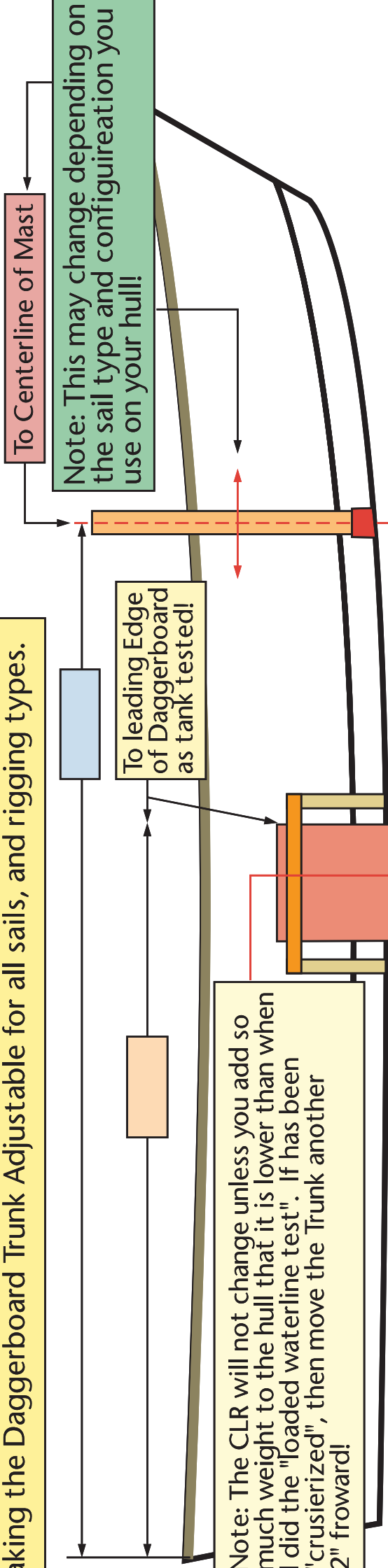
Wear plate for motor bracket inside and out!

Be sure your motor's bracket can span this width of rail!

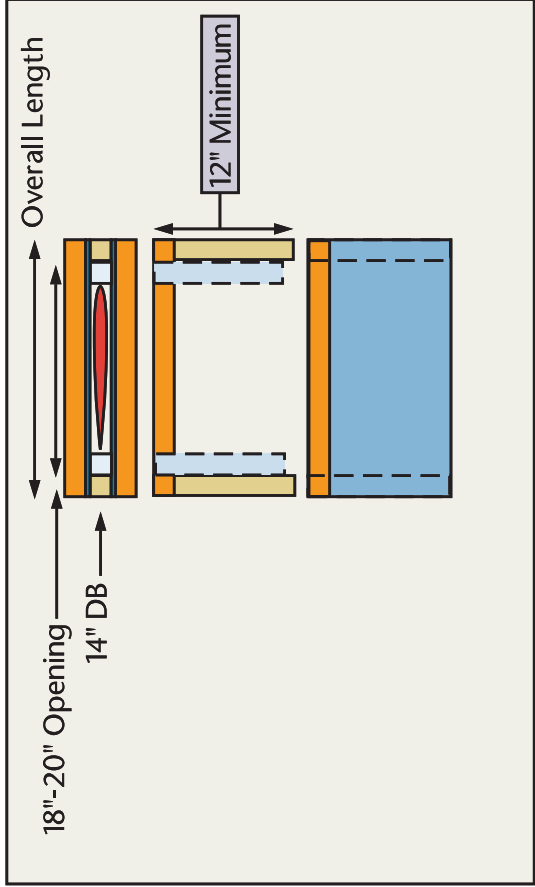
# 12ft Nuthatch Drawing!

Wood filled epoxy or EZ-Fillet used to fill and finish the gaps in the corners

Making the Daggerboard Trunk Adjustable for all sails, and rigging types.

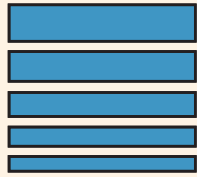
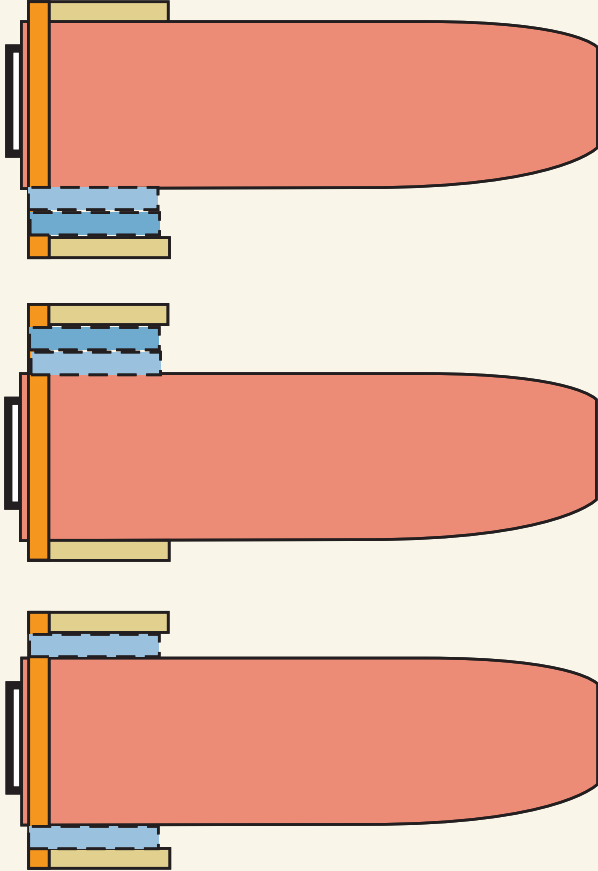


Note: The CLR will not change unless you add so much weight to the hull that it is lower than when I did the "loaded waterline test". If has been "crusierized", then move the Trunk another 2" foward!

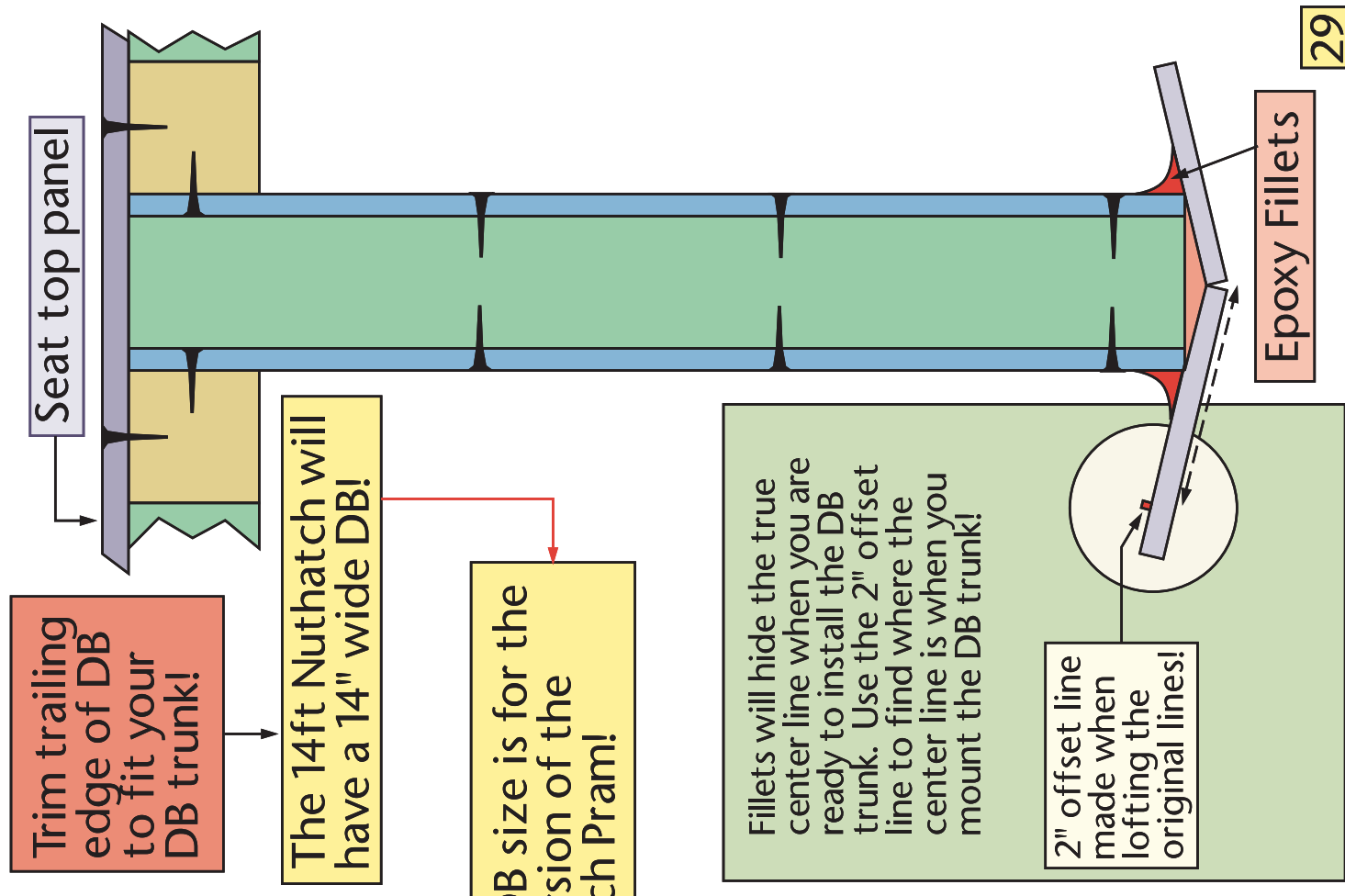
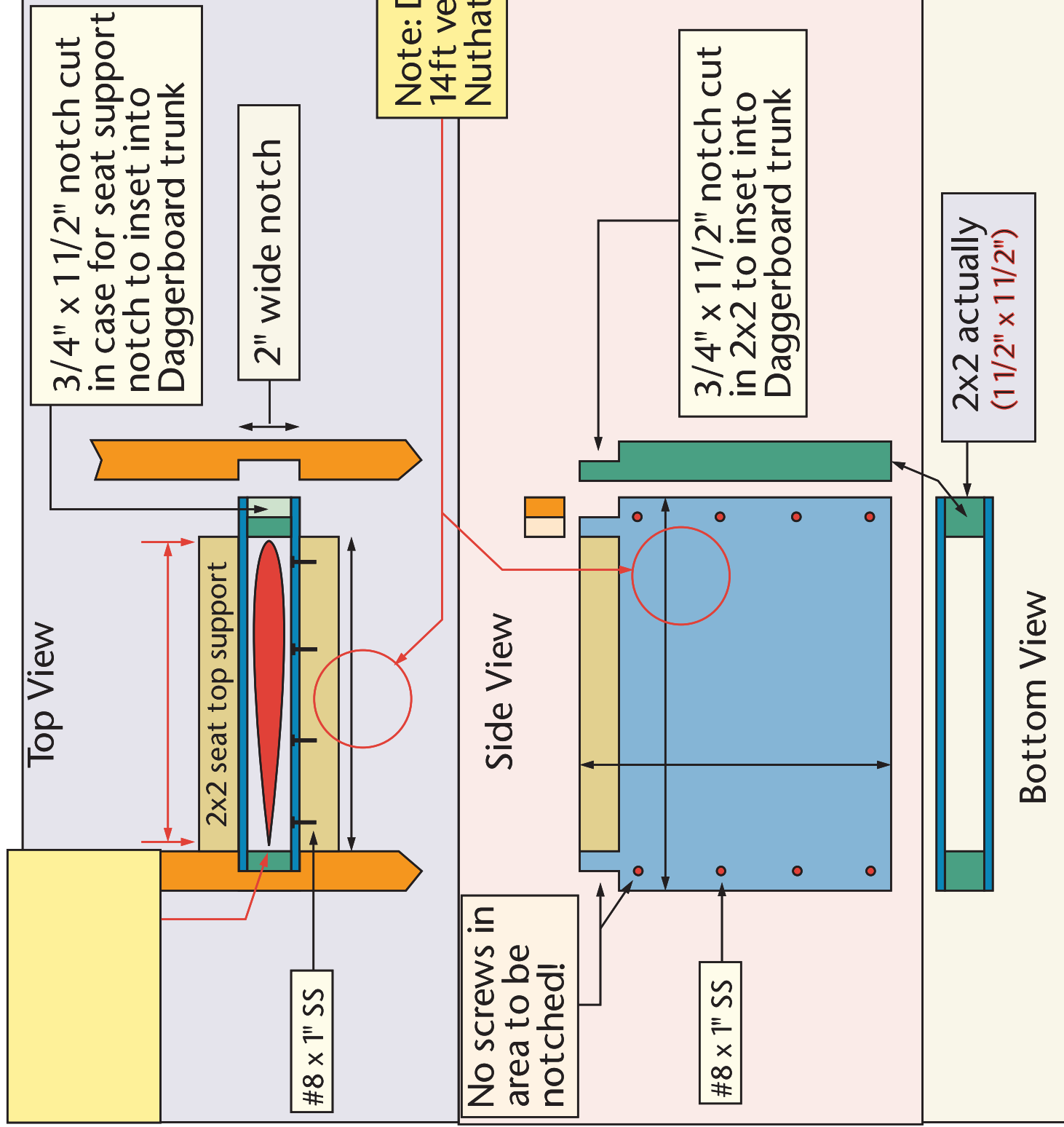


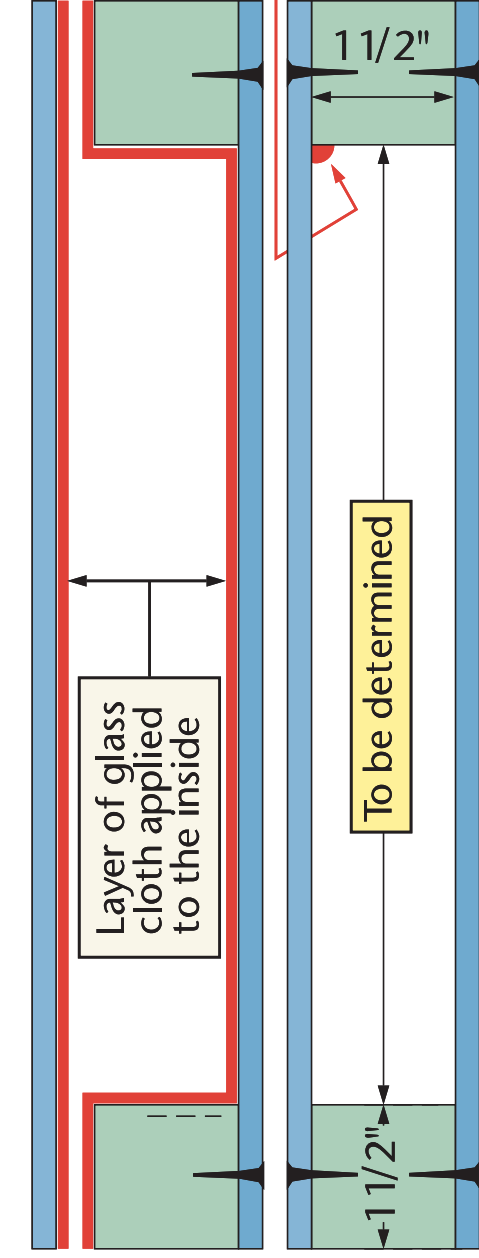
The construction of the Daggerboard Trunk will be the same as shone on the following pages. Follow all those instructions with regard to the fitting of all the 2x2's, screws, fillets, and glassing the inside of the DB Trunk. Mounting the DB Trunk in the hull will also be the same as shown in those drawings.

Make spacer blocks to fit in the DB Trunk when sailing for the first time. Move them around so your have a "slight weather helm" when going to windward. You may have to modify the sizes to get the correct steering response with the sail type and combination you chose for your hull!



You made need to make several thicknesses of the spacer blocks to get the right amount of rudder response!





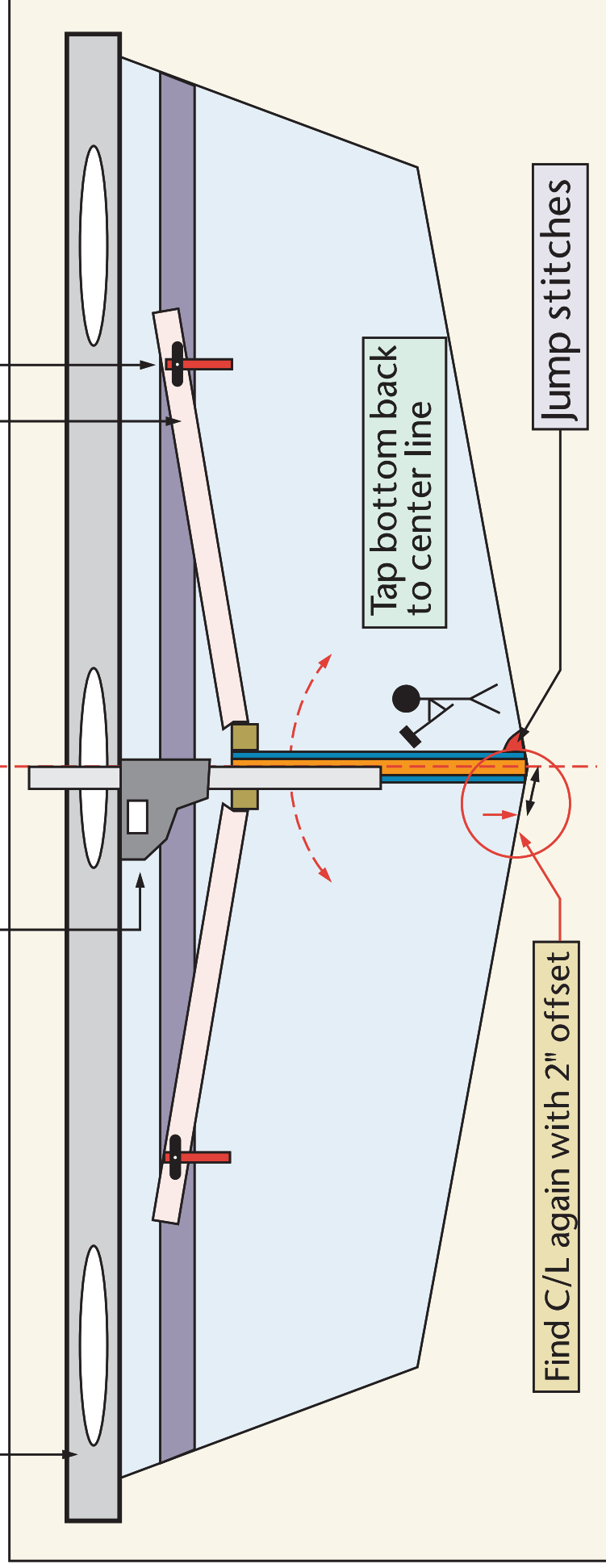
Line DB case with a layer of fiberglass cloth to protect the insides from damage for the life of the boat.

Epoxy together, and make sure that a small bead forms on the inside.

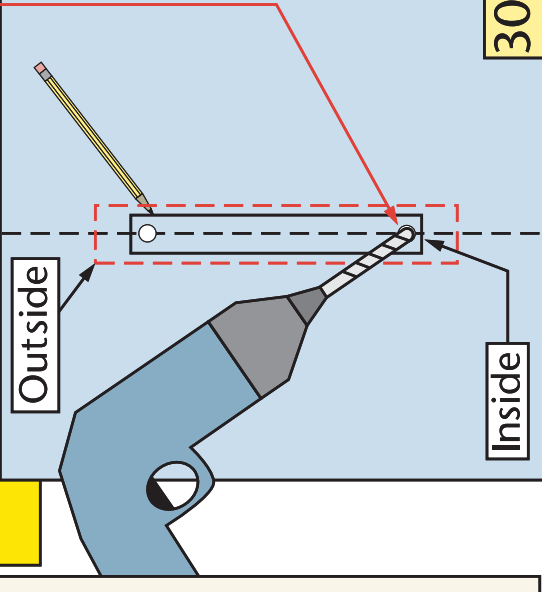
Hold DB case in place with scrap wood and clamps. Add jump stitches along the case to hull panel seams.

Use gage on level to locate the top of the daggerboard case on the center line

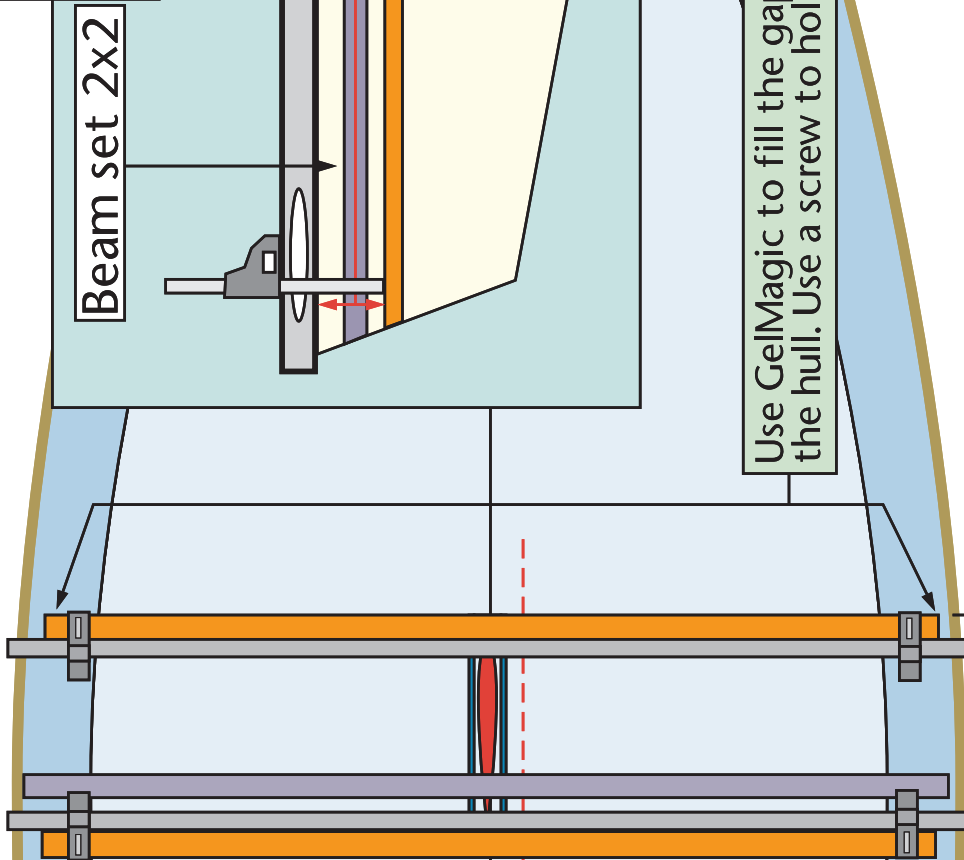
Level hull



Before you epoxy the case to the hull, locate it's position and mark the outside. Remove the case and mark the interior dimensions, then drill two location holes on the center line to tell you where the DB case is when you are working on the bottom with the hull flipped!



The DB case sets the height of the seats in the hull, and that is 12". Once the DB case epoxy has cured, you can add the first two 2x2 seat support bars. They will be used in the next drawing to set the heights of the rest of the seats in the hull.



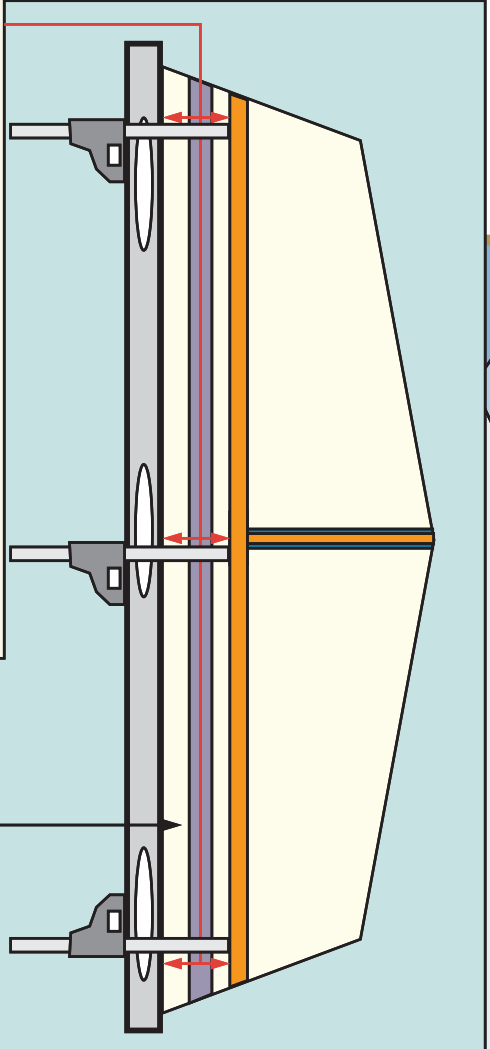
2" offset line made when lofting the original lines!

Note: 14ft Nut version measurement!

7' 6" to leading edge of Daggerboard case

Hull is still level and tied down. Use to find equal heights on both sides of 2x2's

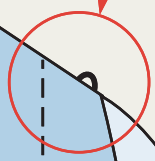
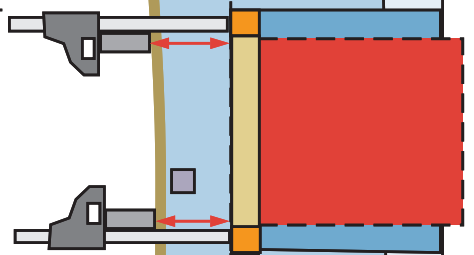
Beam set 2x2



Use GelMagic to fill the gap between the 2x2 and the hull. Use a screw to hold alignment until cured.

12ft Nuthatch Drawing!

Epoxy and screw square of 1/4" ply to end of 2x2 on excessive gaps. It looks bad, but it works, and will be covered on all sides by plywood for strength.



U-bolt, backing block, washer, and nylock nut 31

It helps to make a "big compass" out of scrap plywood left over from cutting out the panels.

12ft Nuthatch Drawing!

Use a level to make sure the "leveling 2x2's" are even bow to stern off the DB case's top.

This works for any hull or seating style

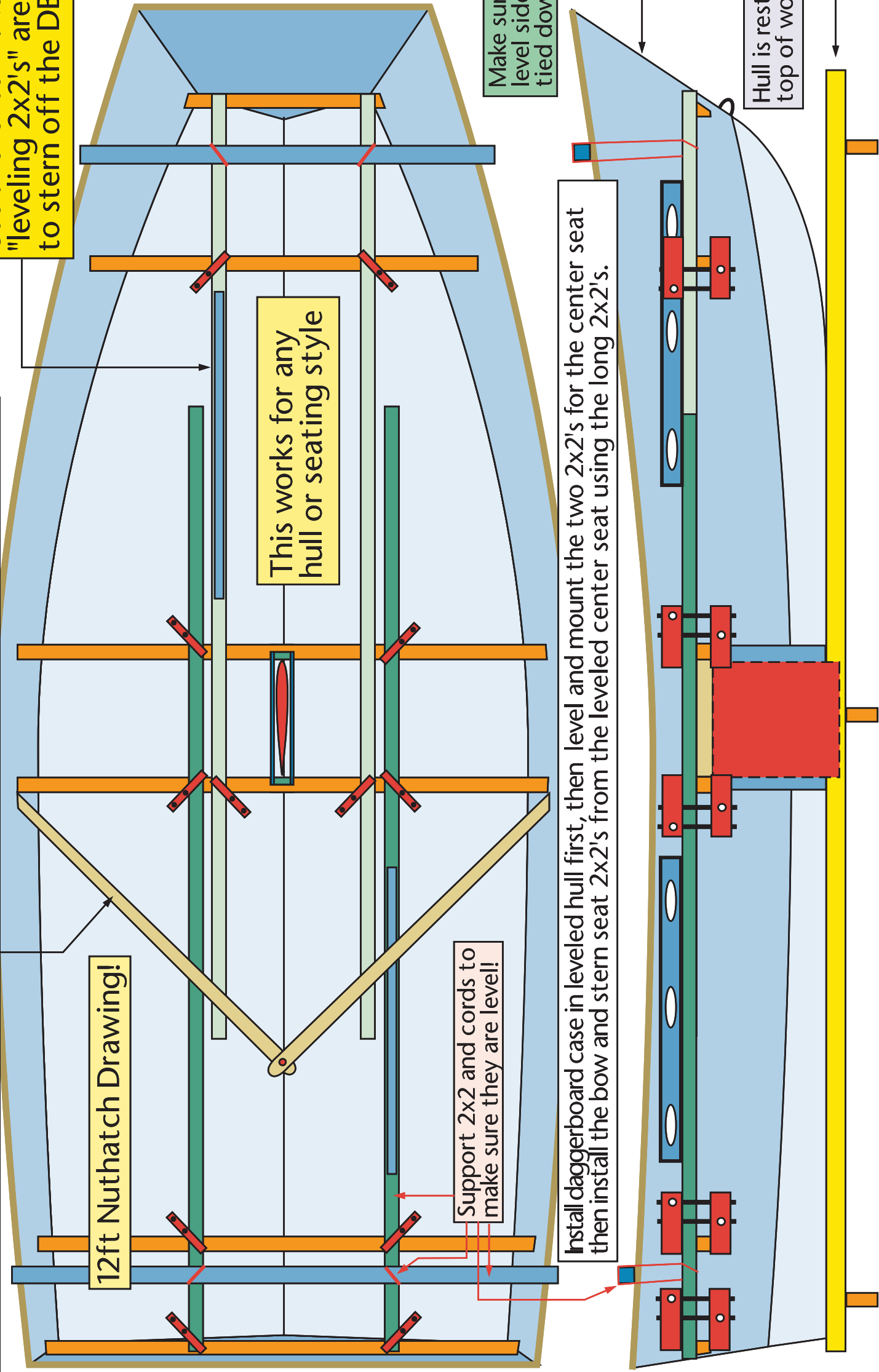
Scrap wood compass

Support 2x2 and cords to make sure they are level!

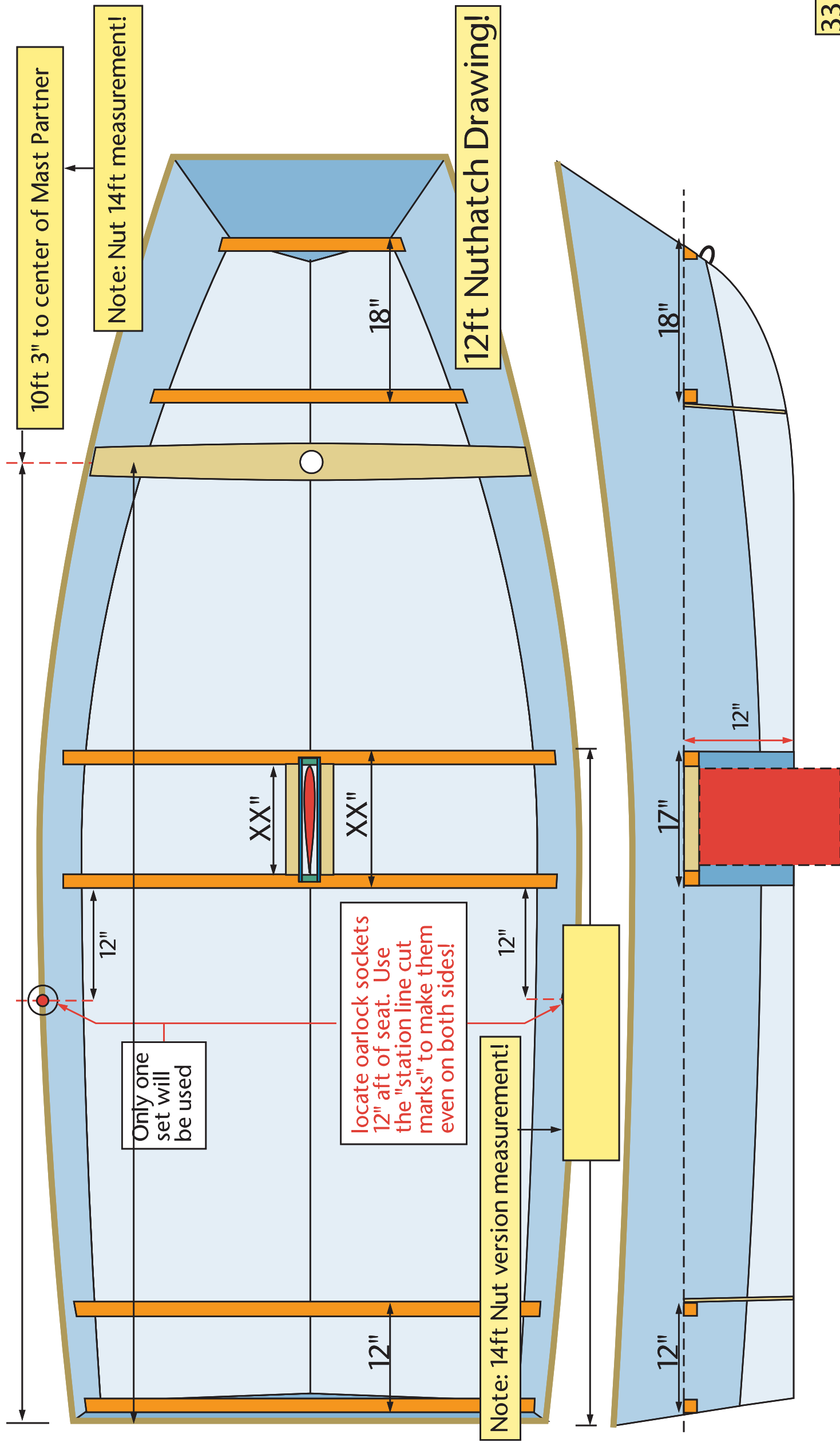
Make sure the hull is level side to side and tied down!

Install daggerboard case in leveled hull first, then level and mount the two 2x2's for the center seat then install the bow and stern seat 2x2's from the leveled center seat using the long 2x2's.

Hull is resting on keel on top of work platform



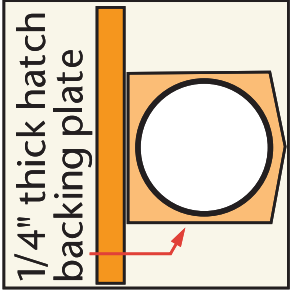




Side seat panels can be angled or vertical in the hull. Angled looks better, and has more resistance to fore and aft forces.

Remember to leave room for 2x2 seat support rail in hatch area!

Panels that can be used for this style of hull, or not

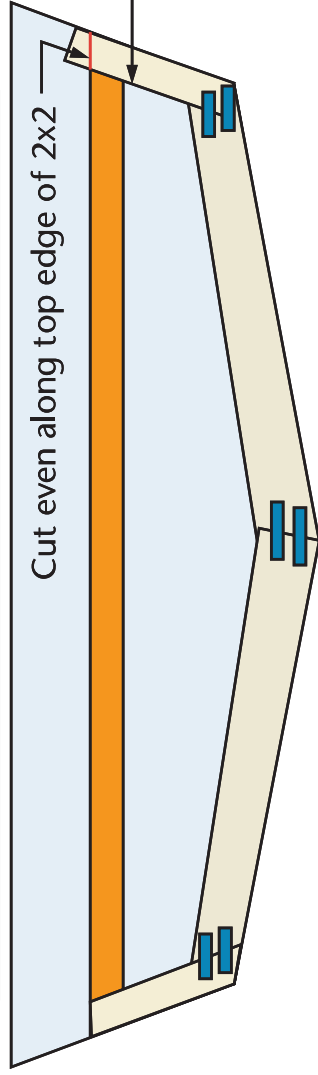


34

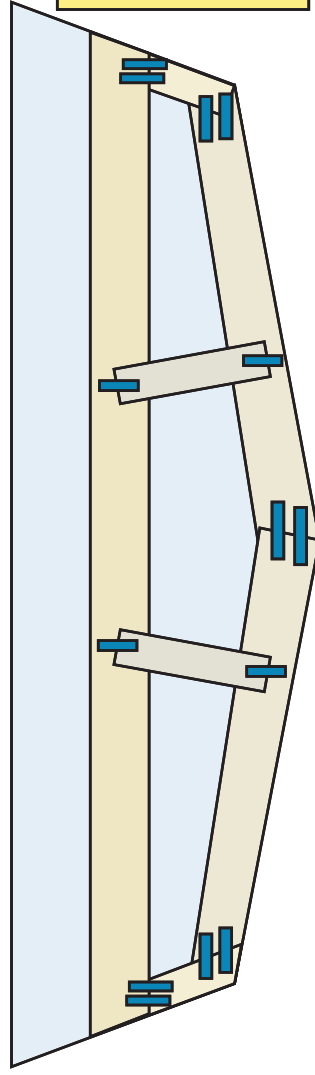
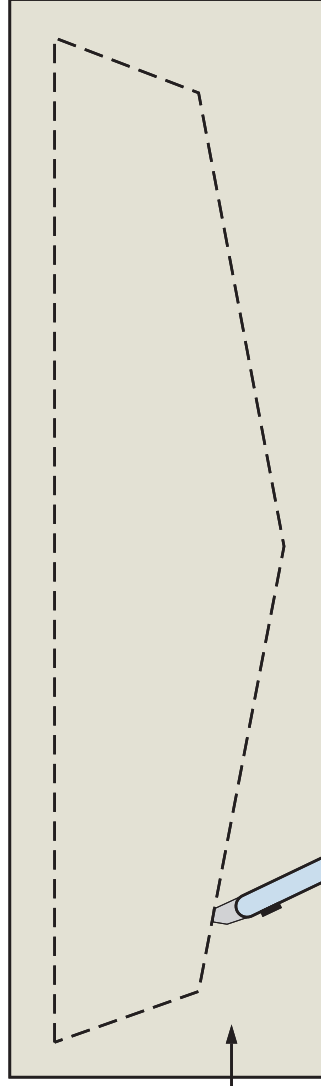
Measure seat tops and sides to fit your hull

12ft Nuthatch Drawing!

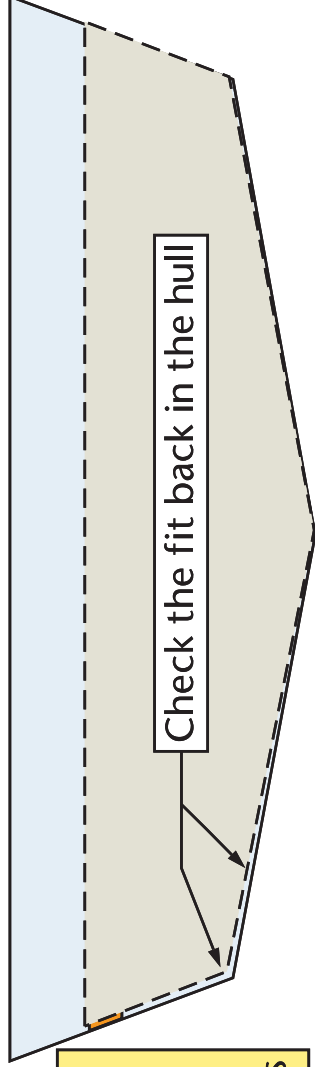
An easier way to fit the interior panels!



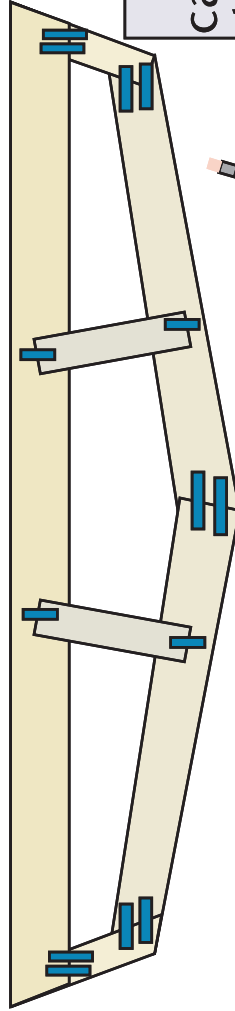
Cardboard strips sheet



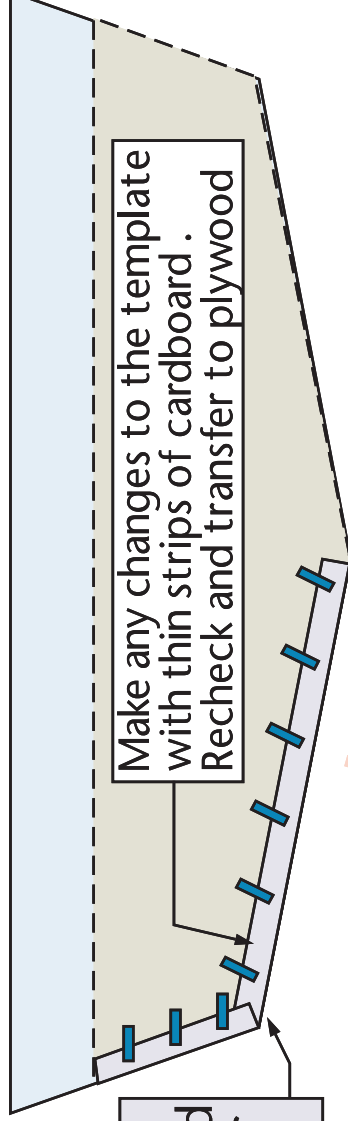
This is an alternative to using a spiling stick to find the dimensions to the interior panels



Check the fit back in the hull

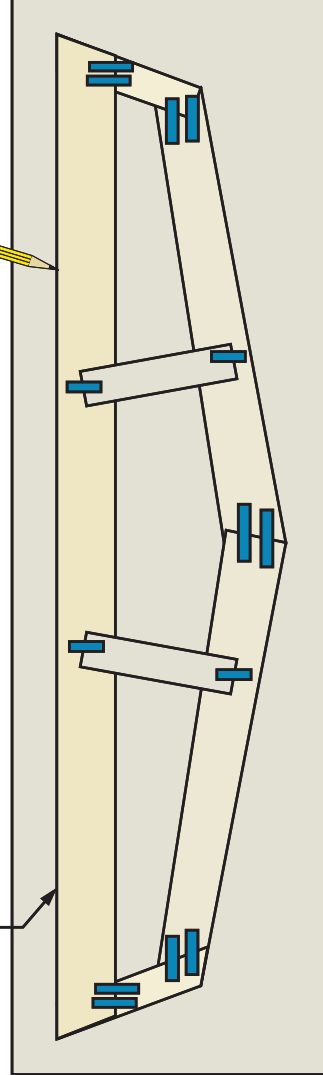


Light weight cardboard taped to template for a better fit

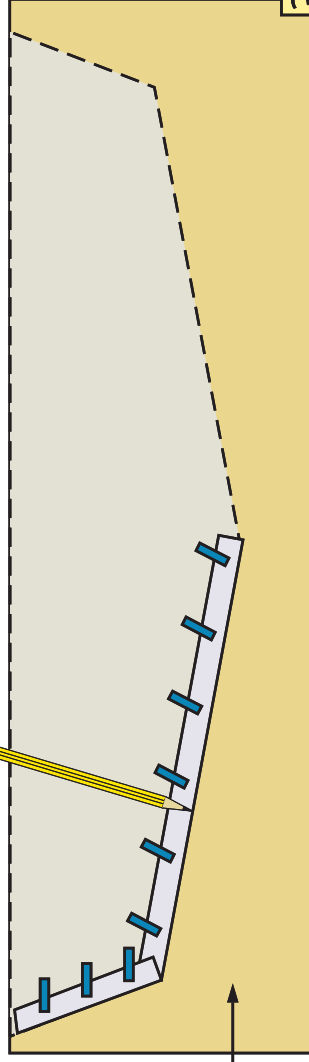


Make any changes to the template with thin strips of cardboard. Recheck and transfer to plywood

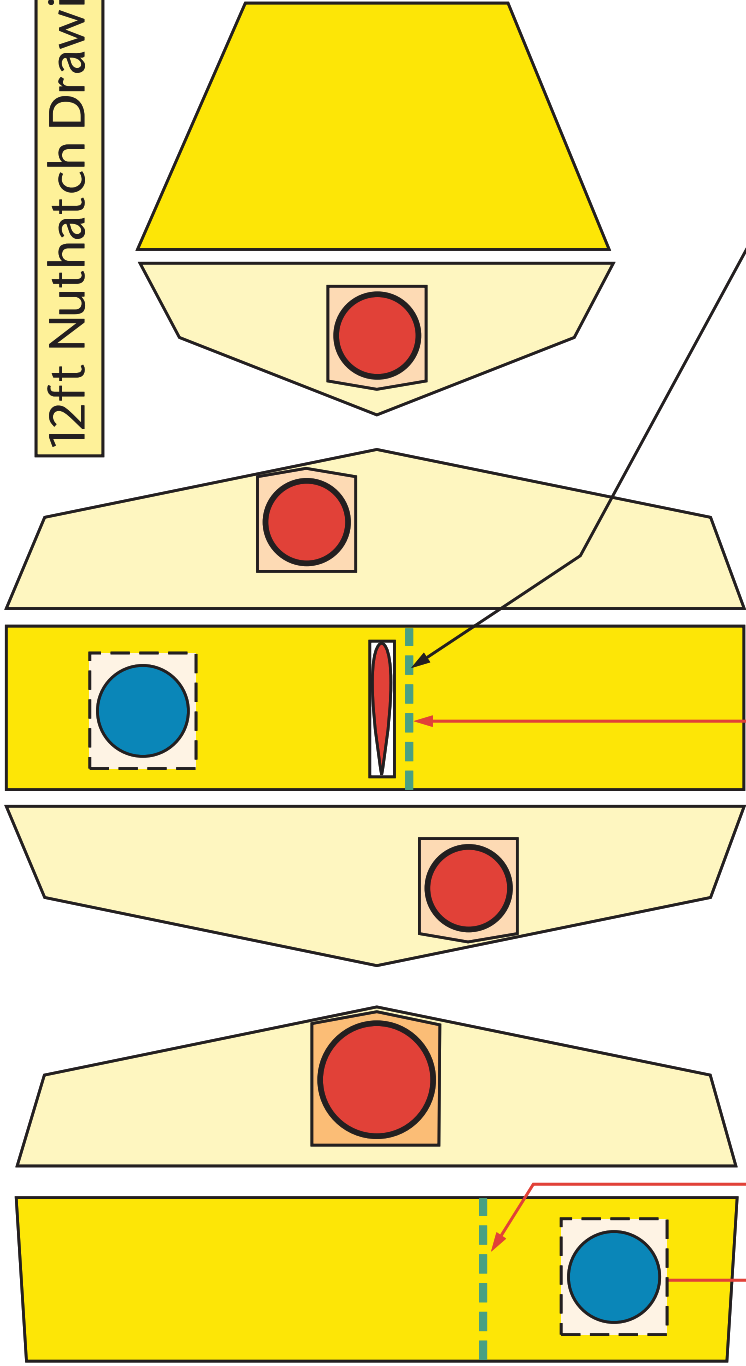
Use a pencil to outline the template you have taped together from the interior dimensions of your hull. Remember, all hulls will be different!



Plywood sheets



# 12ft Nuthatch Drawing!

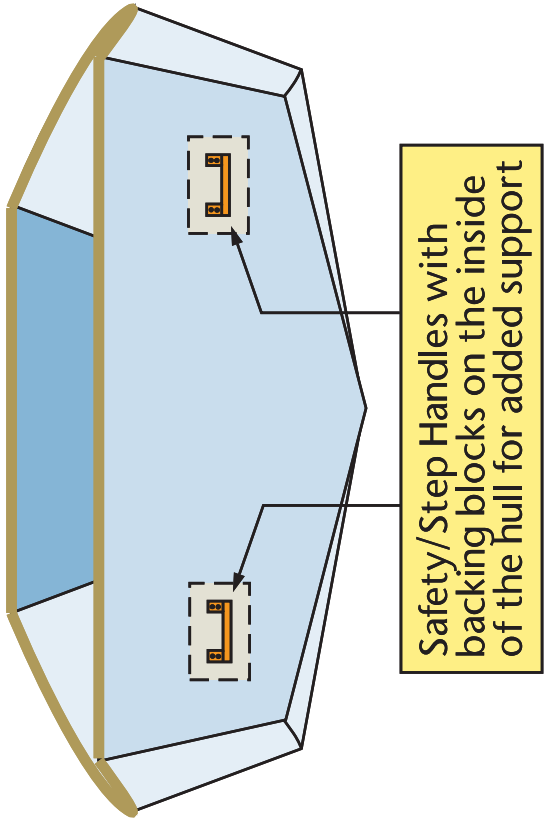
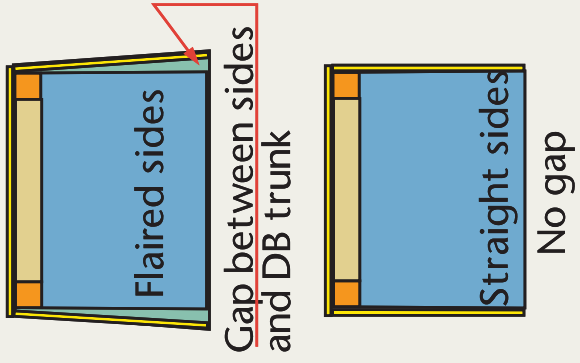


Extra hatch mounted for top access to a built in cooler. Add an extra bulkhead and line all sides with sheet foam.

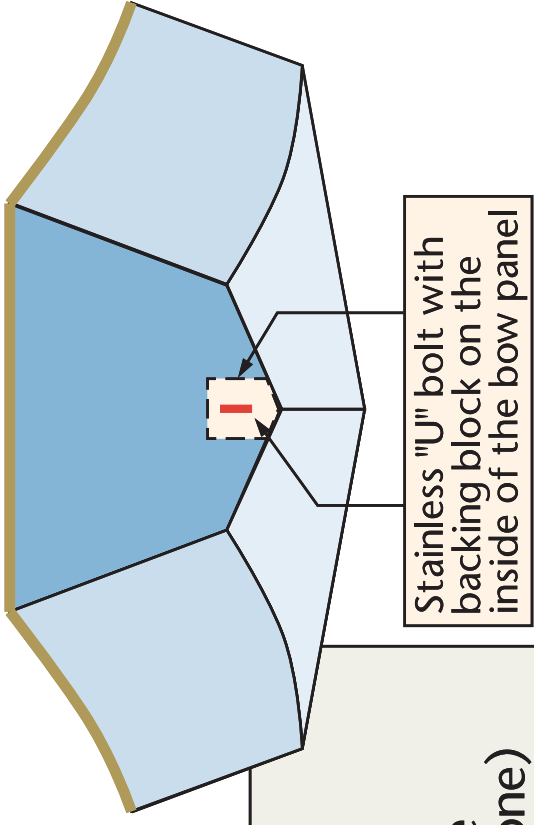
Butted edges or overlapped top to side panels

This style needs to be filled with fairing or fillet compound and shaped

Note: If you mount your seat support side panels at an angle, you will have to add a bulkhead (just one) on either side of the DB case. This will limit the amount of water intrusion that can happen if a hatch comes loose.

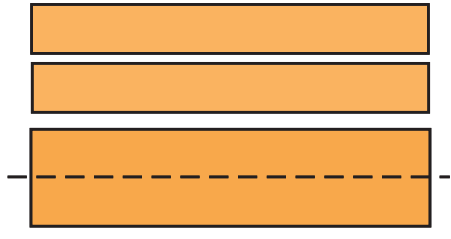
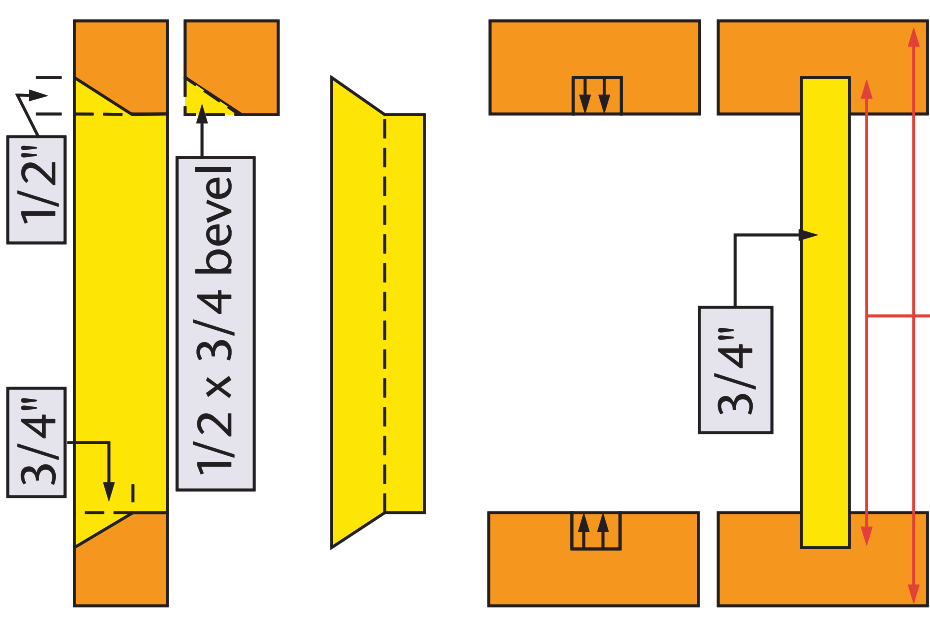
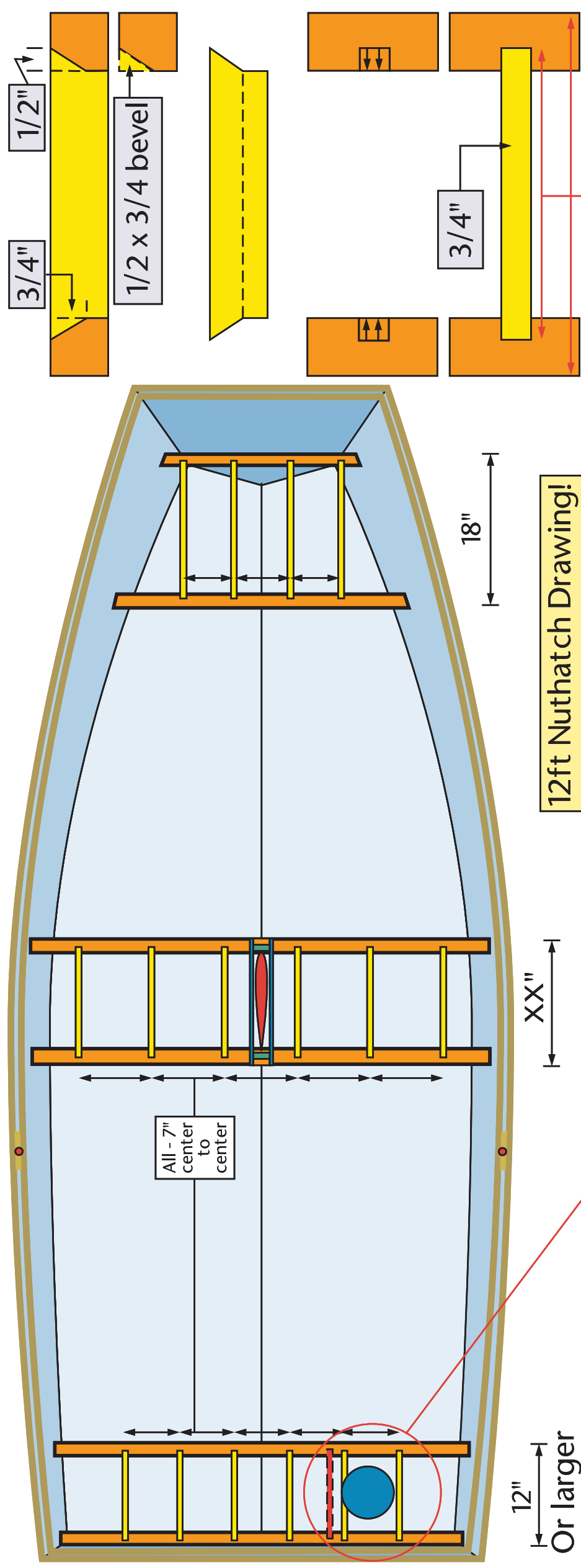


Safety/Step Handles with backing blocks on the inside of the hull for added support



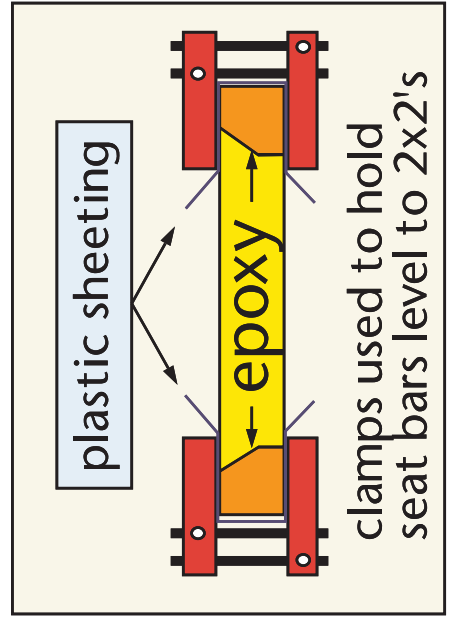
Stainless "U" bolt with backing block on the inside of the bow panel

Finished, fitted, and ready to install interior seat panels for the sailing version of this hull.



If you install a "cooler" in your hull, you may want to change the spacing between the seat support braces to fit the hatch between them

Make seat support bars from scrap 2x2 cut in half



## Outside Hull Bottom

## Outside Seams

Use knife to cut along upper edge of masking tape

## 3" fiberglass tape

Use a 2-3" putty knife to fair in the edges. 3/4" wide is good enough for the 3" tape and 4oz cloth

## Air tank edging details for interior seat seams

## Edges sanded but not faired

3" fiberglass tape to add strength to the joint and to smooth the edge

Gelmagic or fairing compound to fill and round the gap for the fiberglass tape

Threaded quarter turn or pop out

Two layers of backing blocks to hold the wood screws to attach the hatch

## 3" glass tape

Wood filled epoxy fillets covering the ends of the 3" glass tape to hide the ragged ends and for a better looking finish

## Inside Seams

Hull panel

Top of air tank

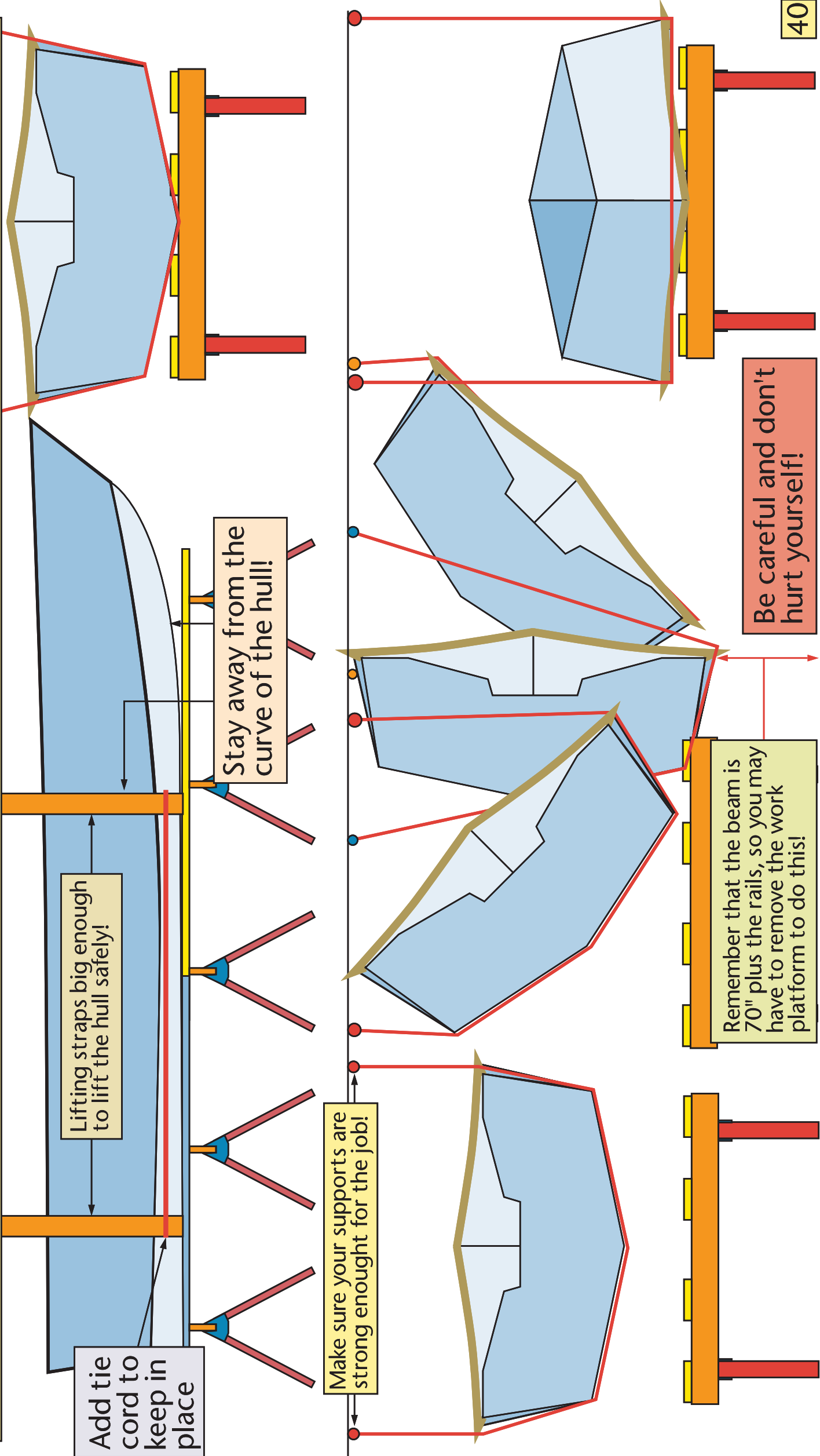
One set of oarlocks  
to row in and out  
from the dock

12ft Nuthatch Drawing!

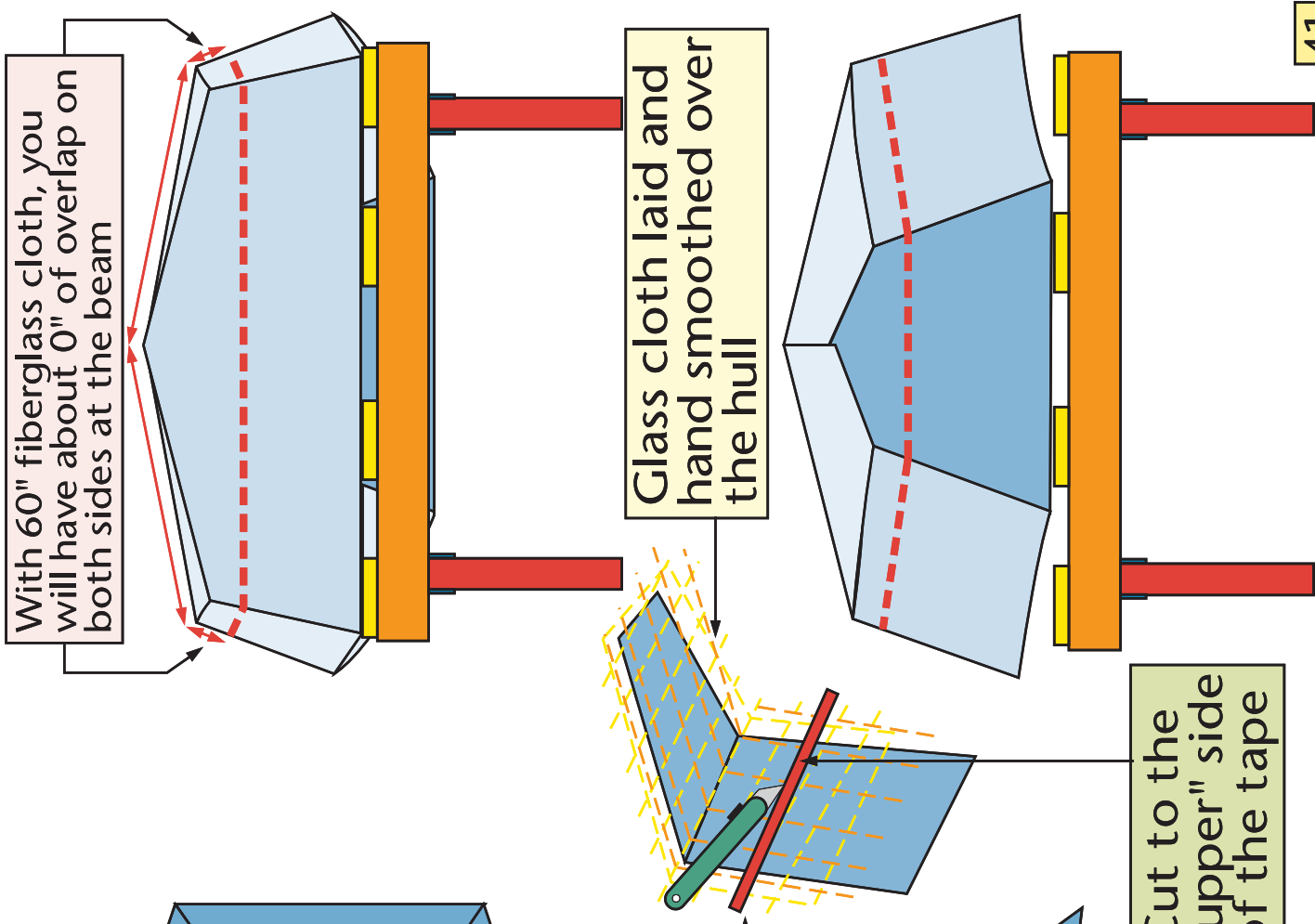
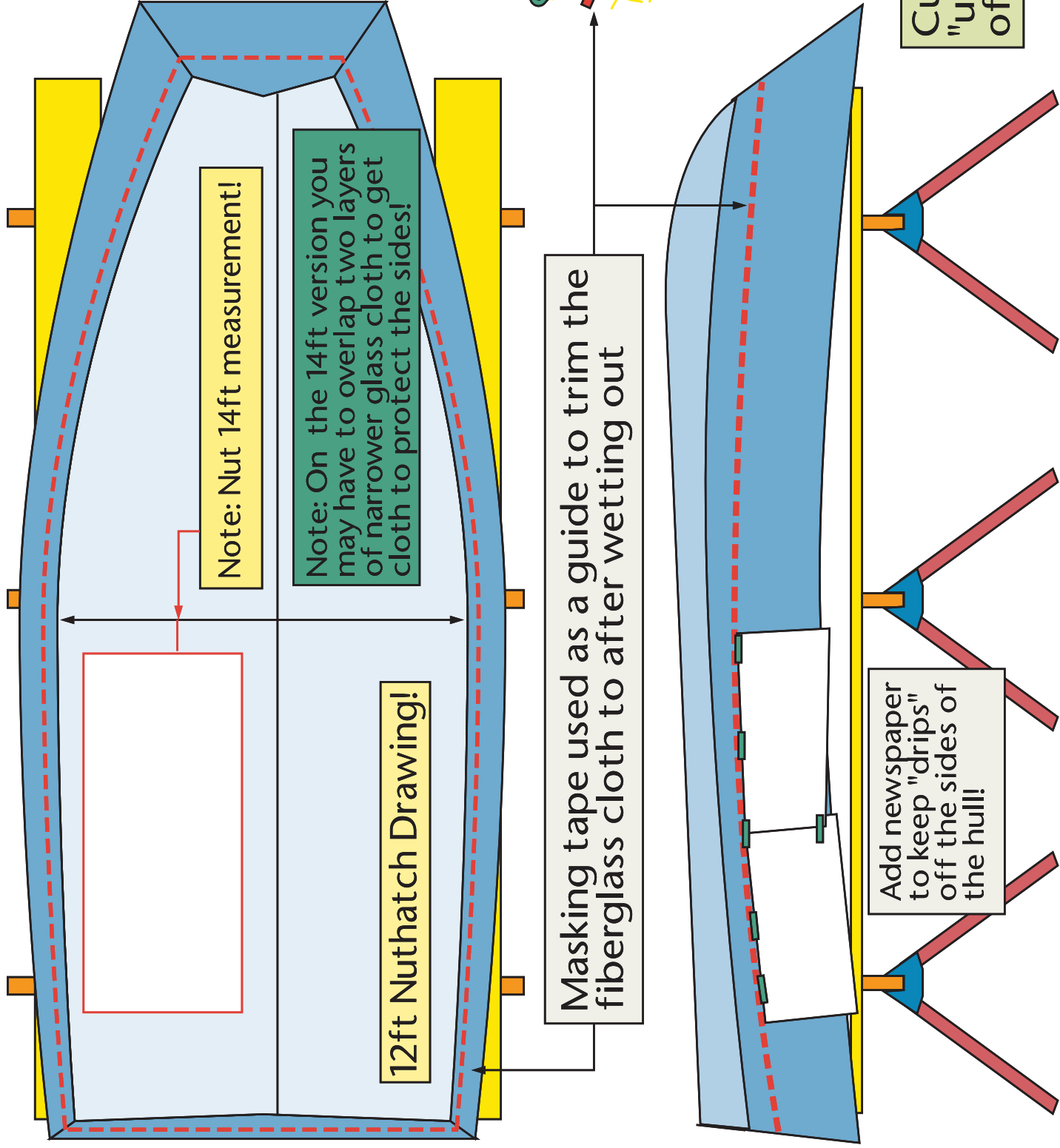
One style of Finished Hull, yours may be different!

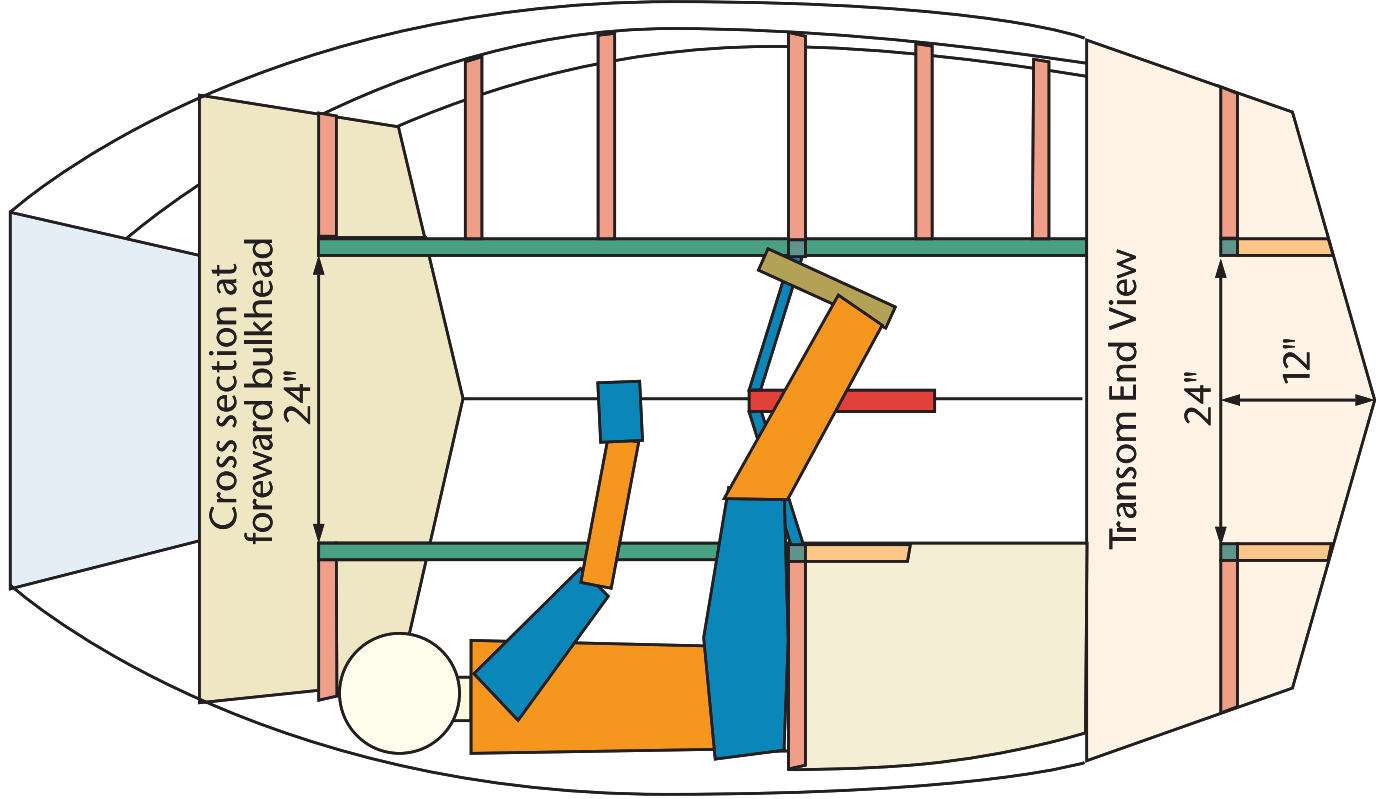
Safety  
step  
re-entry  
handle

Note: Before you finish off the interior of the hull you may need to flip the hull and finish all the bottom work!

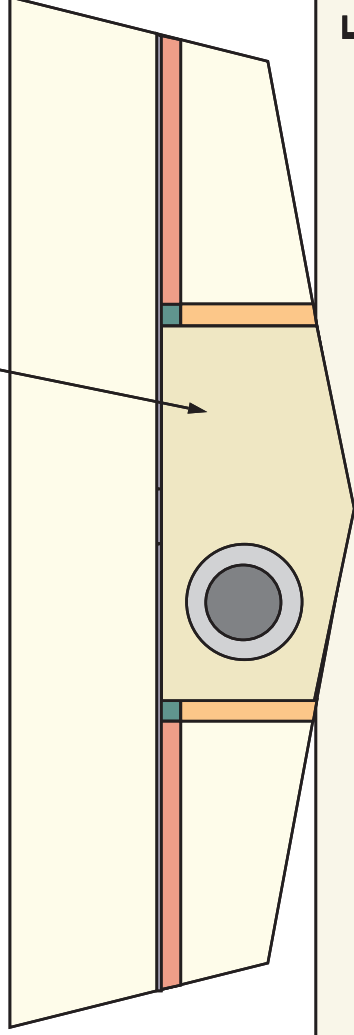
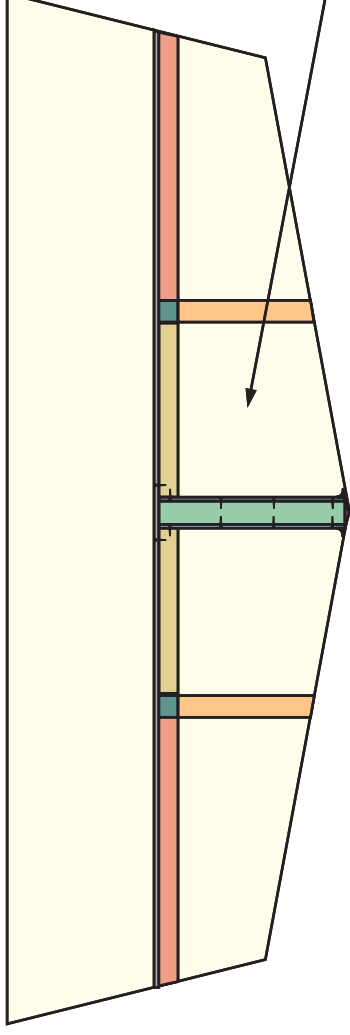




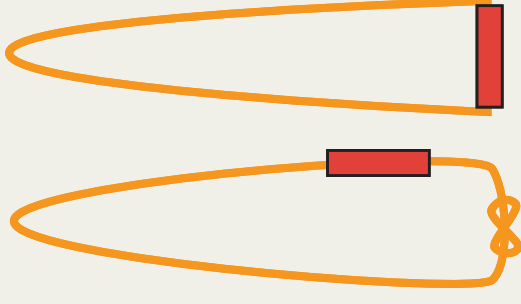




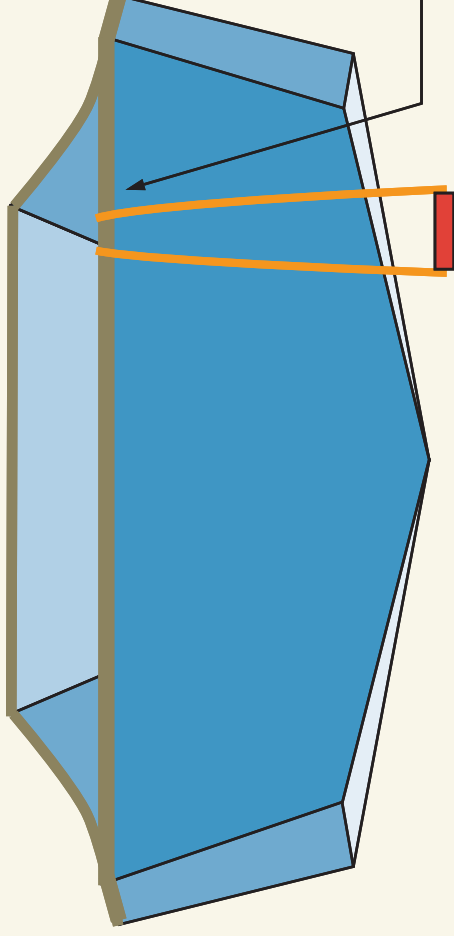
DB trunk can be left open on each end or completely covered and turned into storage and floatation



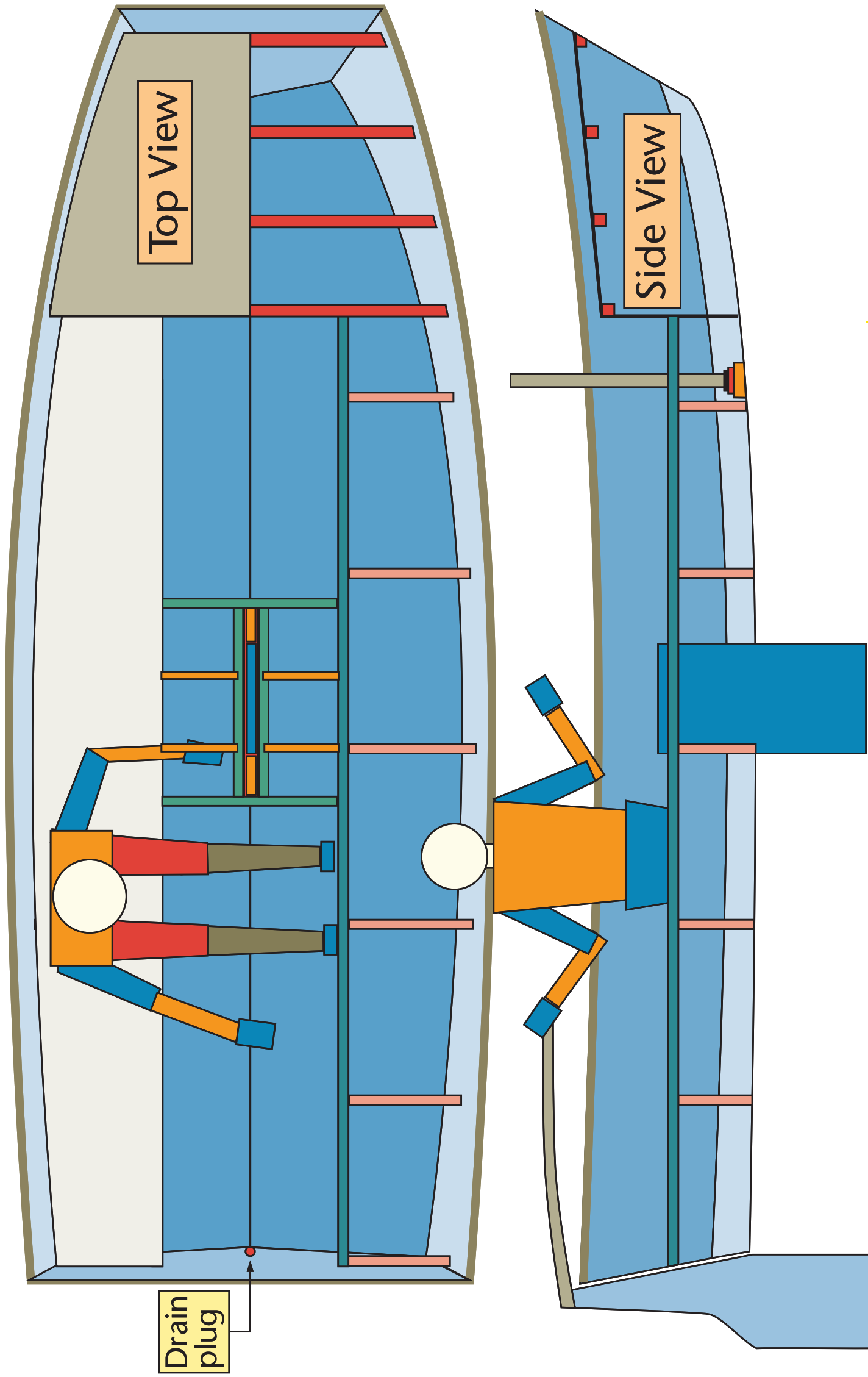
Take some 1/2 line and slide a 6" section of 3/4" PVC pipe on it. Tie a "square knot" and slide the pipe over the knot.



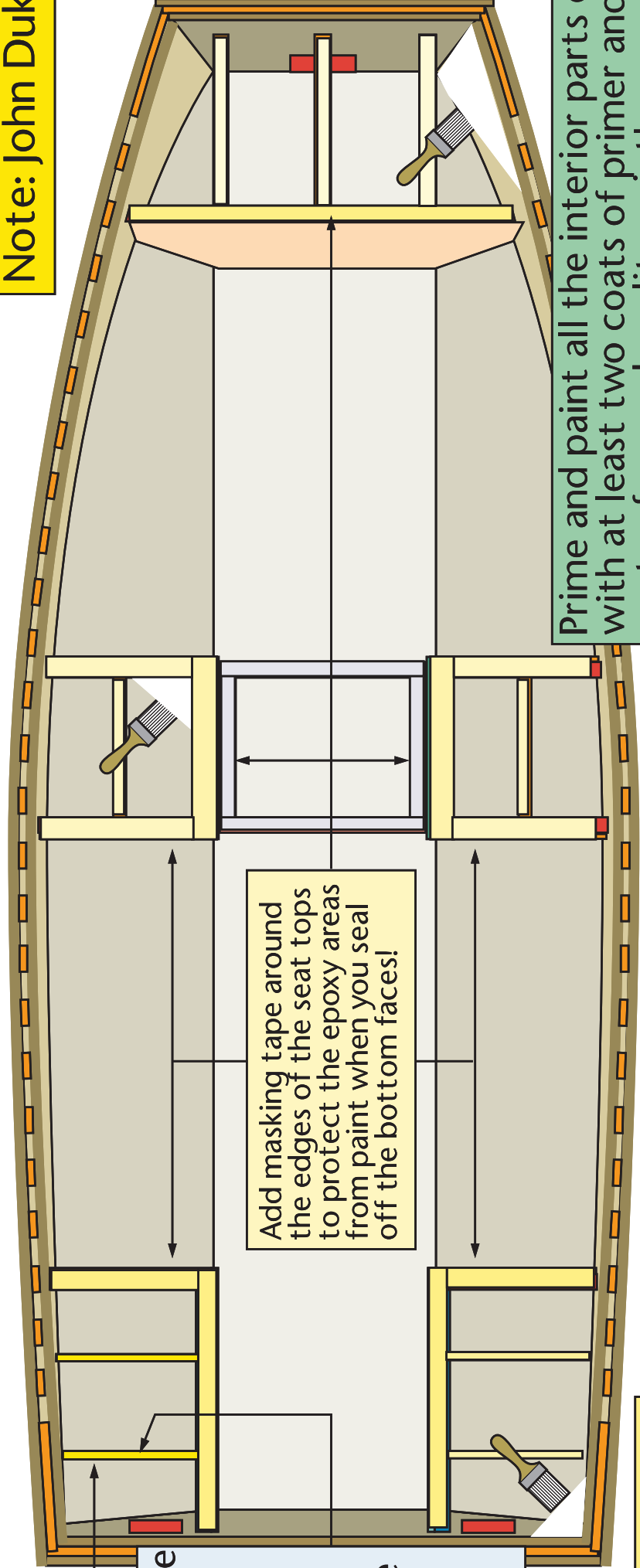
For your safety, make a "self rescue sling" to help getting back in the boat after a capsized or man over board incident!



Loop on itself through a gap in the stern rail



Note: John Duk drawing

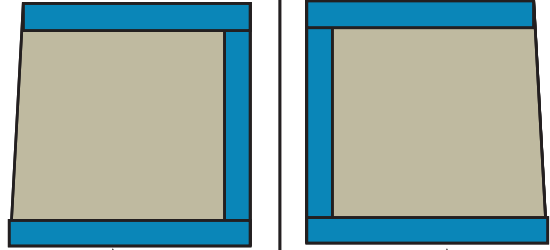


Paint all the faces of the 2x2 seat supports with paint except the top, tape covered face

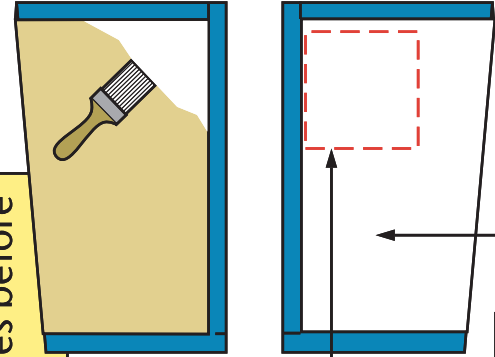
Add masking tape around the edges of the seat tops to protect the epoxy areas from paint when you seal off the bottom faces!

Prime and paint all the interior parts of the hull with at least two coats of primer and as many coats of a good quality paint!

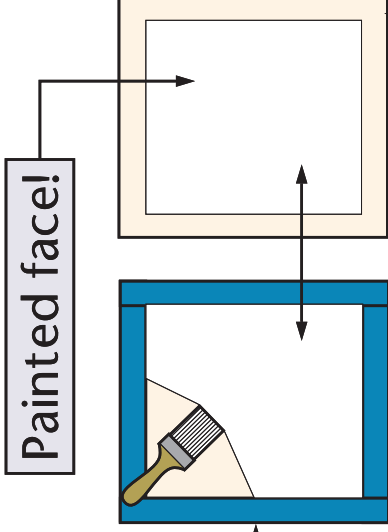
Install any backing blocks for the seat bases before you paint!



Add masking tape around the edges of the seat tops to protect the epoxy areas from paint when you seal off the bottom faces!

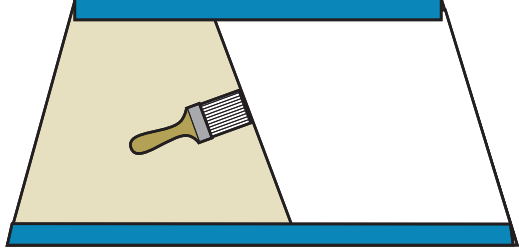


Painted face!



Painted face!

Bare wood for coating of epoxy!



# Rudder/Daggerboard Cutout Template

NACA 0010 12ft Nuthatch Drawing!

See page #47 for Nut 14 DB shaping drawing!

Make copy, paste to cardboard or scrap plywood, cut out center and use to "shape" your rudder and daggerboard.

Rudder Head

Tiller made from leftover scrap plywood. Use the leftover wood between the bottom and side panels in the curved part at the bow end.

Easier and better looking method

Overlap and radius top of side panels

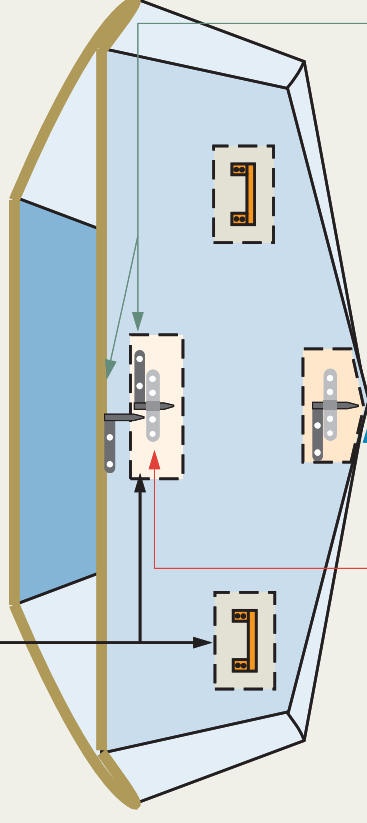
Two pieces may be used for the center seat tops

Joint

See page #XX for details on saving scrap for using on the seat tops

"you can do it like this, or you can do it like that" ....

Backing Blocks



Mount the upper Gudgeon so that the "shorter" of the two Pintles will just clear the bottom of the rail! Mount the lower Gudgeon so the lower Pintle clears the keel line!

Wood filled epoxy filet

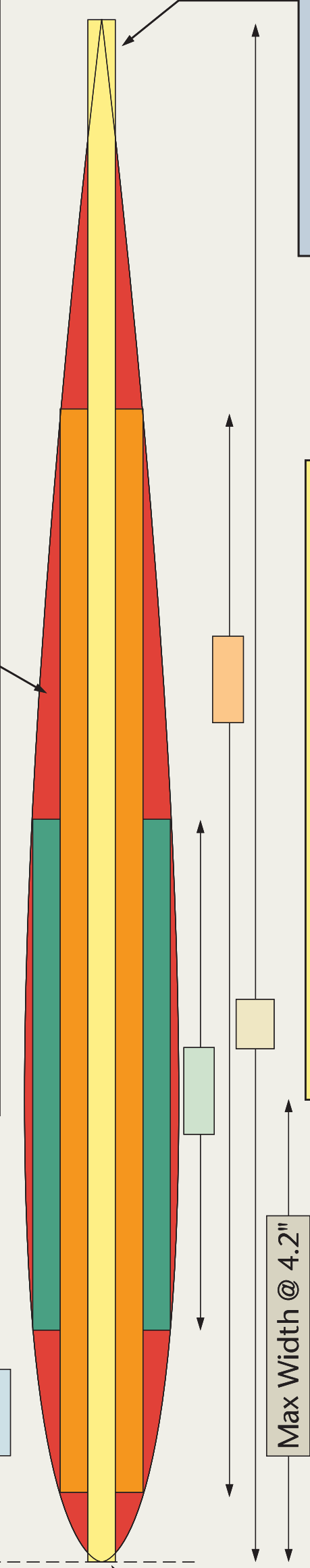
3" glass tape

Seat facing panels

# NACA 0010 x 14" Daggerboard Cross Section

Not to Scale!

Fair in red areas with EZ-Filler or QuickFair    Sand and shape after cured.

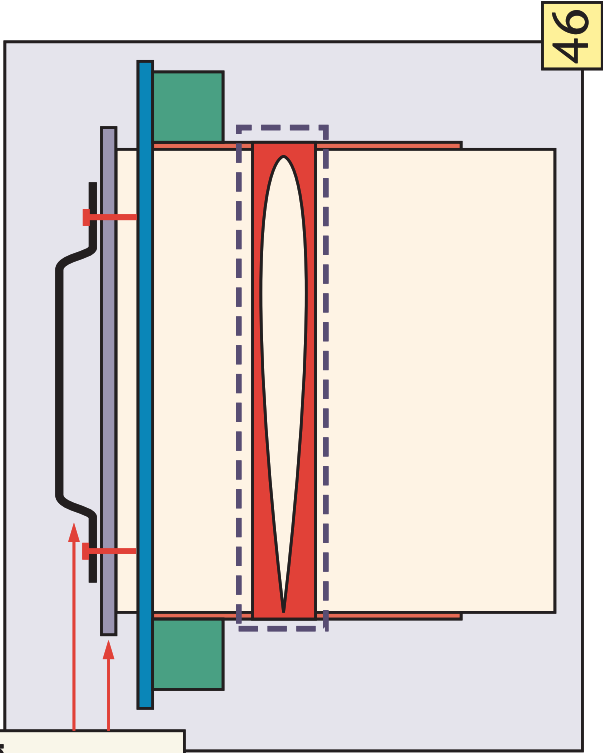
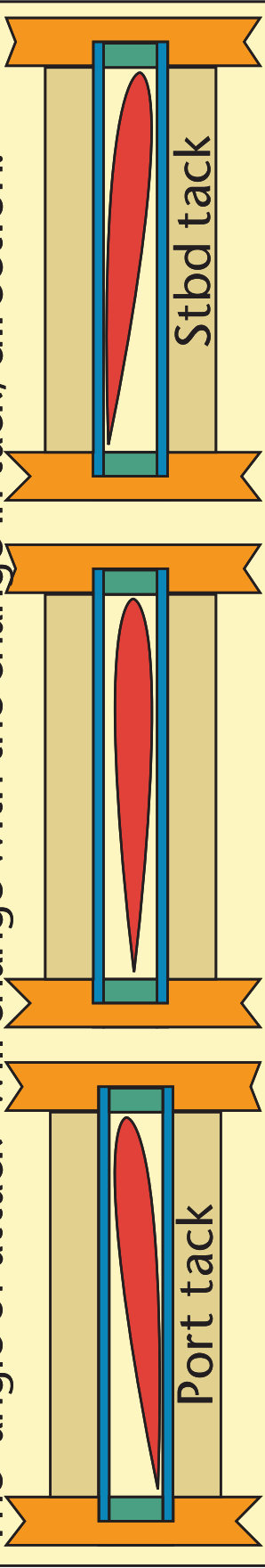


Made from layers of 1/4" (6mm) plywood and shaped with fairing compound

2" x 17" x 1/4" plywood at top, and a handle screwed into the daggerboard

**Daggerboard Plans**  
This is a "jibbing" daggerboard, and will change it's attack angle on each tack. It helps point higher than a "fixed" daggerboard.

With the wide opening and the NACA shape, the DB will "jibe" in the trunk. The "angle of attack" will change with the change in tack/direction.



Foil Cross Section  
reduced 75%

Not to scale!

Full Scale

NACA 0010 x 14"  
Daggerboard Cross Section

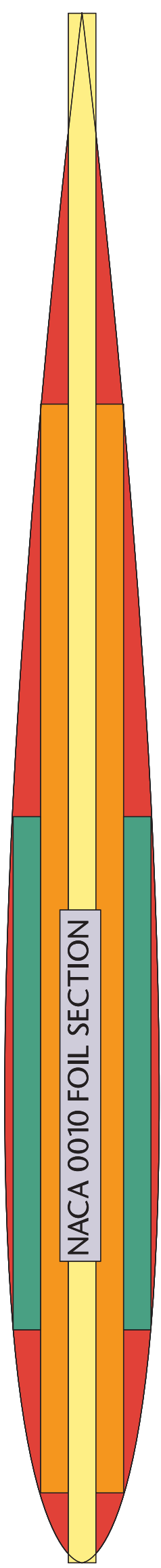
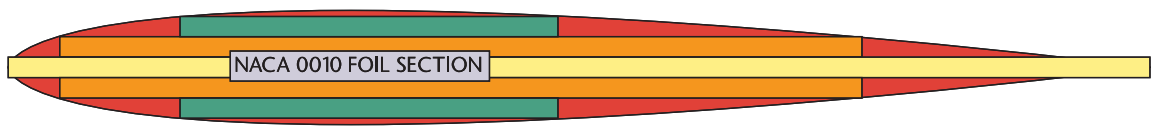
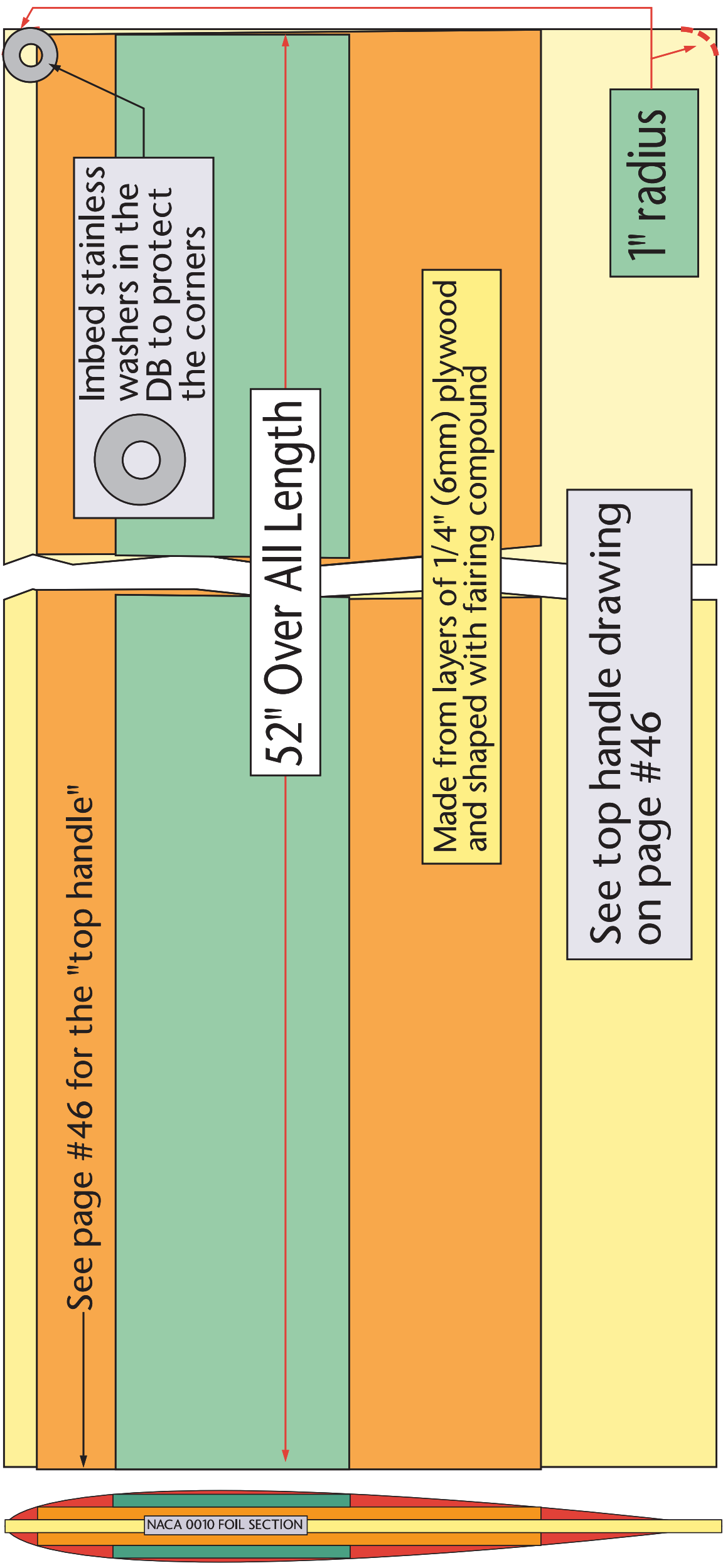
Foil Part #1

Print out this page and  
glue to cardboard. Cut  
out parts #1 & #2 and  
align the arrows and  
use as a template.

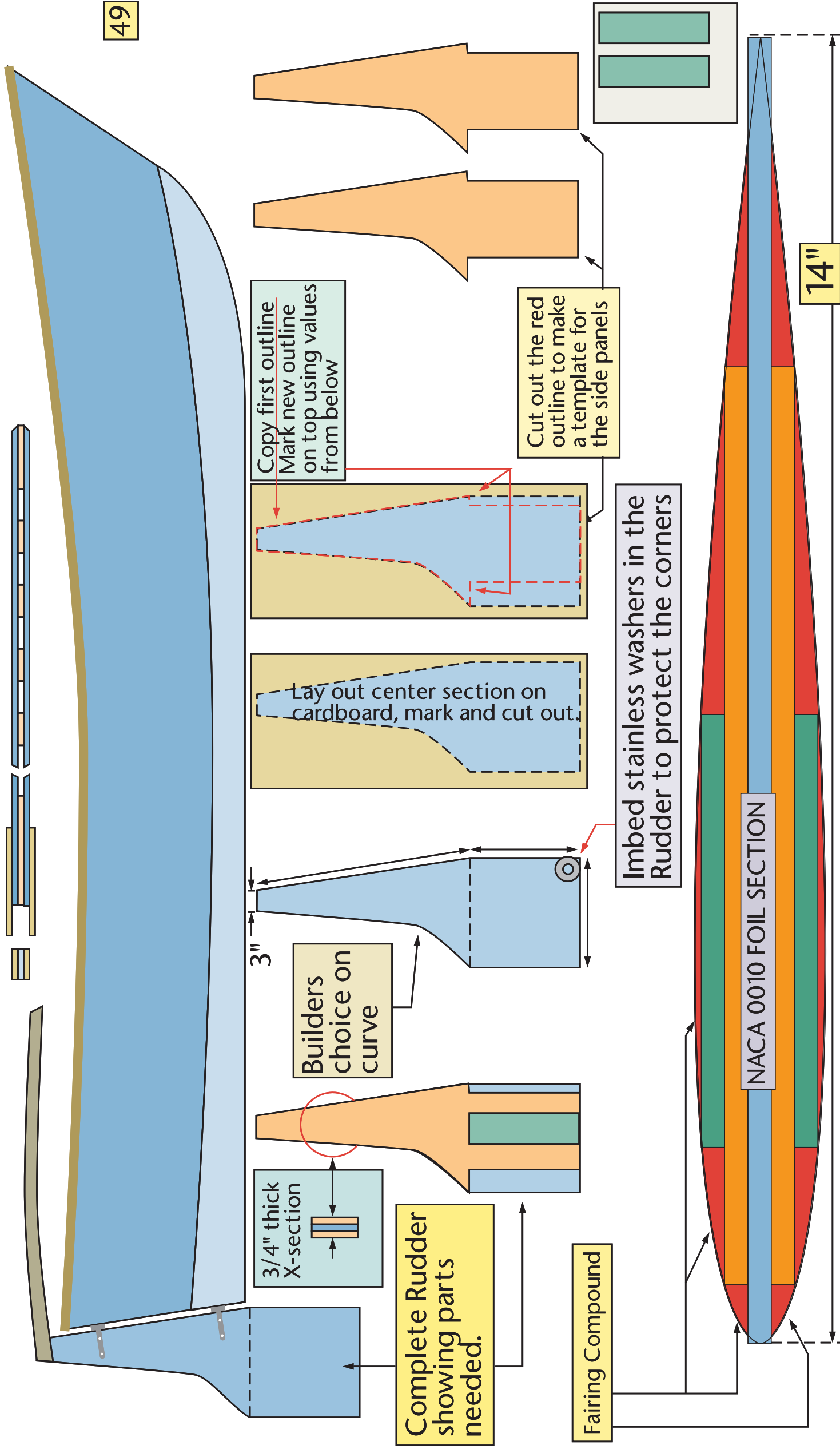
Once the cardboard  
template fits, make one  
out of plywood scrap  
to use shaping the  
fairing compound  
for the final outline

Foil Part #2

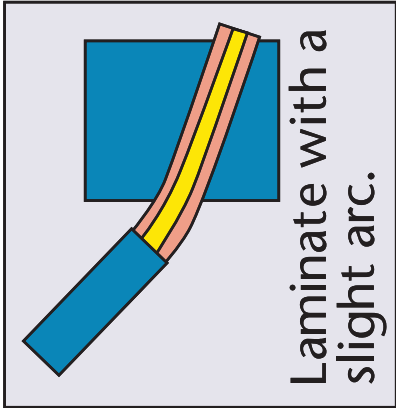
Full Scale



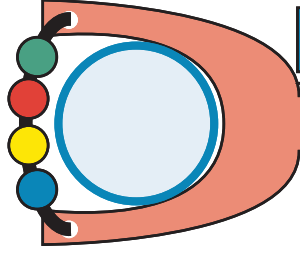




Gaff Rig Setup



Cord & Balls



Laminate with a slight arc.

2"



Gaff jaws sized to fit your mast. Three layers of plywood scraps works fine

Lengths

Mast: 18ft

Boom: 8ft 6"

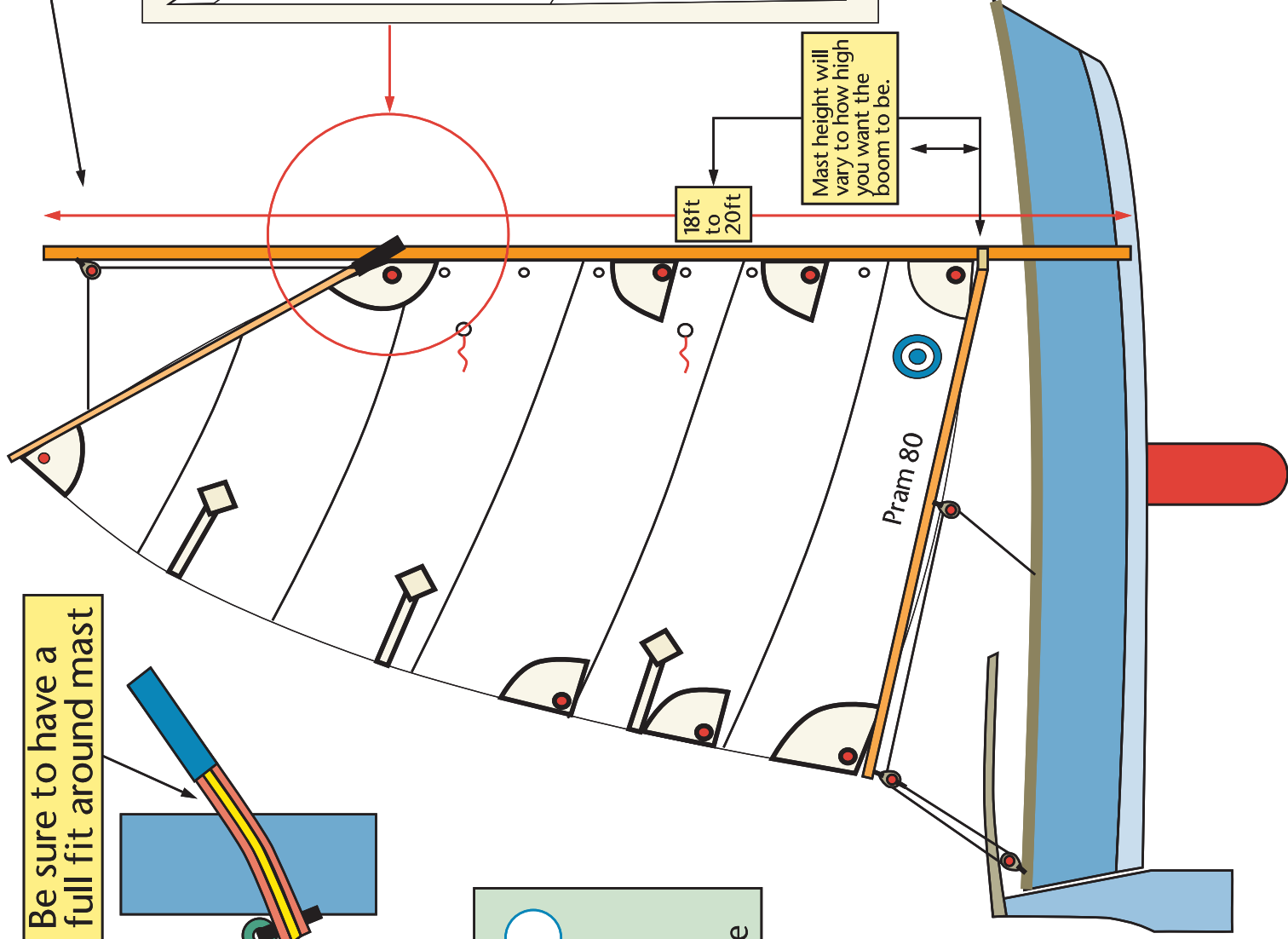
Gaff pole: 6ft 5"

Measure after you get the sail!

Neil Pryde

Pram 80

Sail



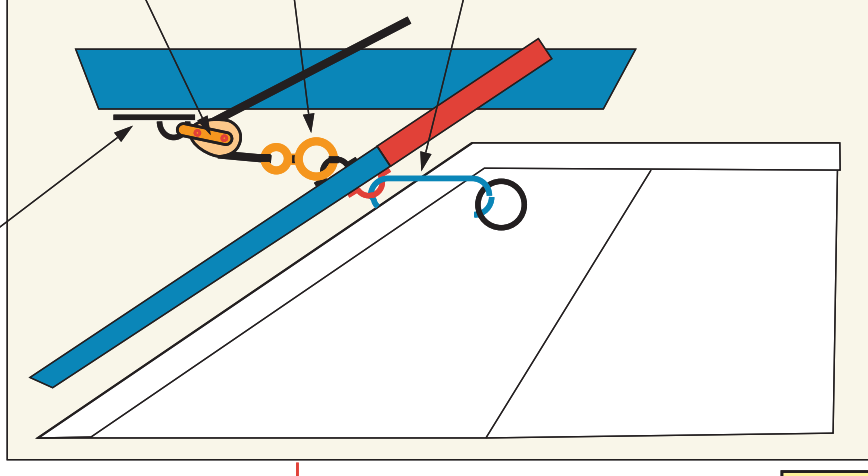
RL-318  
SS Spin Strap

Or the next size up

RL-205  
Blocks

SS Trigger  
Snap Shackle  
SD-146048

SS Swivel Eye  
Boat Snap  
SD-146131



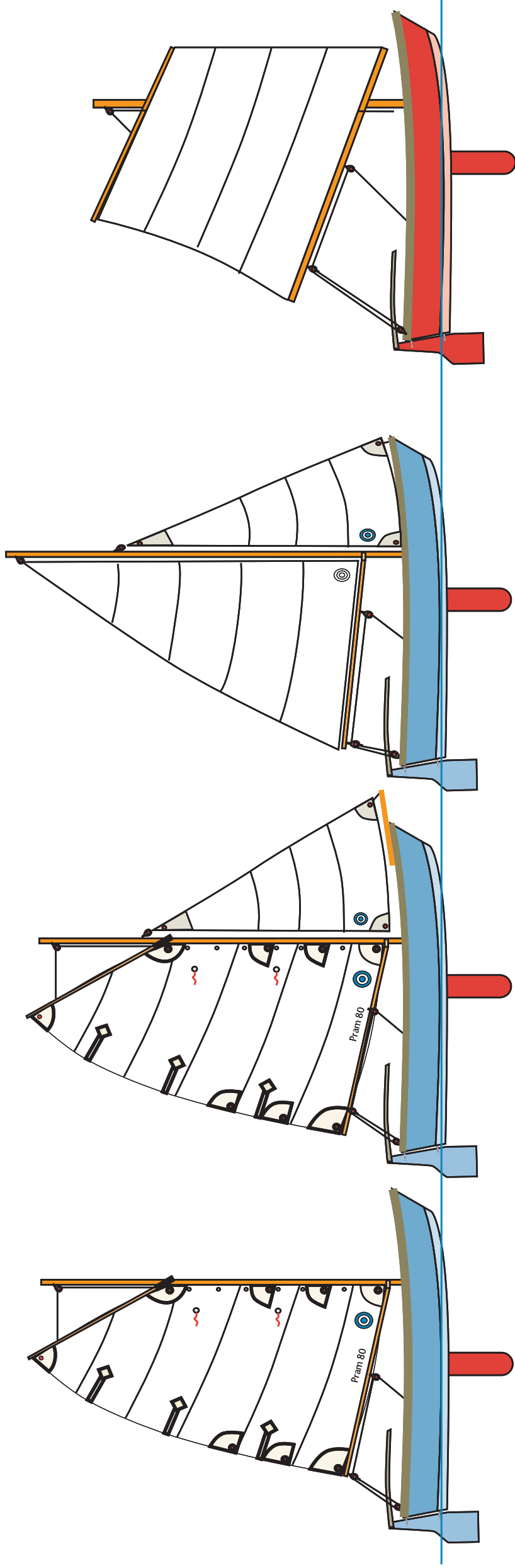
RL#'s are RaceLite (made in USA)  
SD #'s are SeaDog (all available)  
at [www.duckworksbbbs.com](http://www.duckworksbbbs.com)

Diameters/Wall

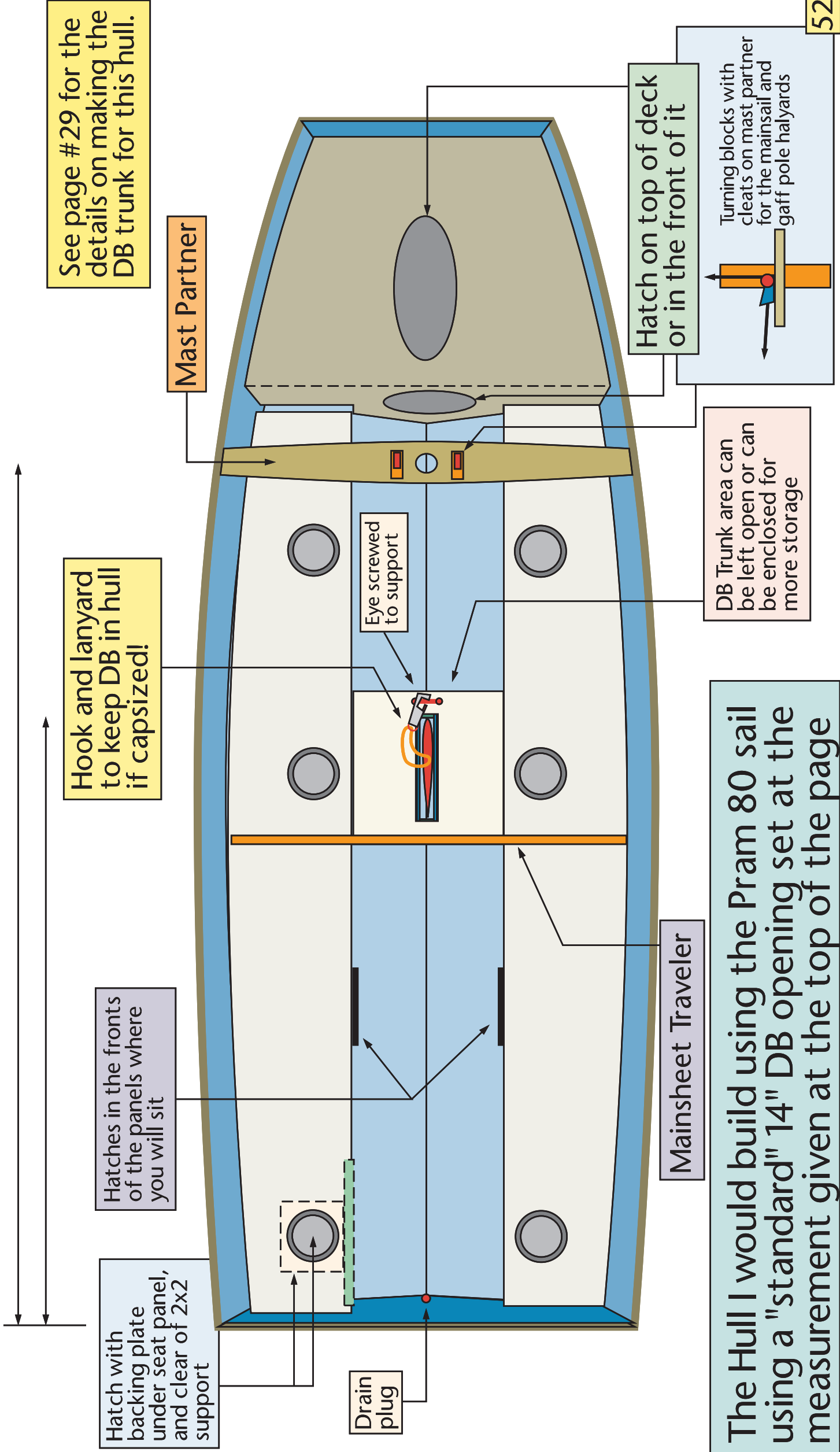
Mast: 2" / 0.065"

Boom: 1 1/2" / 0.065"

Gaff pole: 1" / 0.065"



Note: Different sail combinations and styles are shown here. Be sure to get the CE (center of effort) of the sail(s) from your sail maker to know where to place the mast in the hull for "your" sail configuration. The CLR (center of lateral resistance) for the hull is set based on the waterline of the hull as it sits in the water. If your hull sits in the water more than it was designed for, then you will have to move the Daggerboard and mast forward of what is shown in the plans. This is why I showed the longer DB trunk in the drawings, so you can "fiddle" with the placement of the DB and the Mast.



See page #29 for the details on making the DB trunk for this hull.

Mast Partner

Hook and lanyard to keep DB in hull if capsized!

Hatches in the fronts of the panels where you will sit

Hatch with backing plate under seat panel, and clear of 2x2 support

Drain plug

Eye screwed to support

DB Trunk area can be left open or can be enclosed for more storage

Hatch on top of deck or in the front of it

Turning blocks with cleats on mast partner for the mainsail and gaff pole halyards

Mainsheet Traveler

The Hull I would build using the Pram 80 sail using a "standard" 14" DB opening set at the measurement given at the top of the page

