

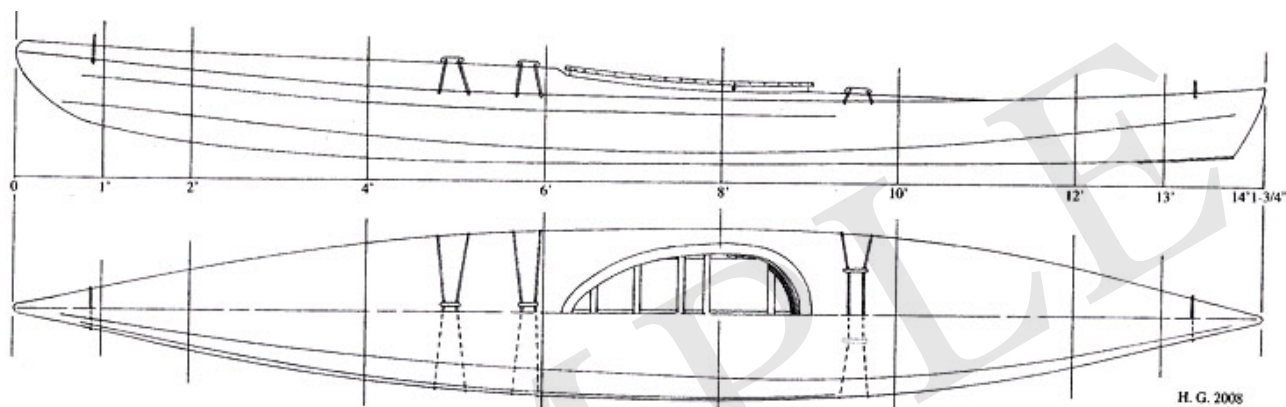


CAPE FALCON KAYAK



Building the F1 Kayak

SPECS	LENGTH	WIDTH	WEIGHT	<i>measurements vary depending on paddler size</i>
	14'-3"	23"	29lbs	



Equally at home on quiet estuary back channels, extreme surf and howling winds, glassy high mountain lakes, or long trips down big water rivers with occasional rapids, you'll be hard pressed to find another kayak that can do so many things so well as the F1.

Comfortable, lightweight, maneuverability, quickness, cargo capacity, handling in surf and wind, and most importantly, customized to your exact body proportions, the F1 feels like exactly what it is: a kayak designed by paddlers. We've omitted useless overhanging ends that are a hindrance in caves, tight channels, the wind, and your garage, but left the waterline long enough that you can still punch it up to 5 mph when you need to give it some juice. Optimized for the normal cruising speeds, the combination of lower weight, a flared hull, and a slightly shorter waterline reduces wetted surface results in noticeably less paddling effort. This combination of playfulness and touring capability means not only can you get where you are going, but you'll have more fun along the way.

Getting Started

STARTING THE BUILD

These plans accompany an 8 hour instructional video. Together they will give you everything you need to know to complete the kayak, along with a skill set you can use to build just about any kayak you can imagine. The build should take between 40 and 60 hours, depending on your experience level and whether or not you are starting from a Cape Falcon Kit or from scratch. Kit builders may skip ahead of the prep steps and start the build.

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About Cape Falcon Kayak

Brian Schulz is founder and owner of Cape Falcon Kayak. A lifelong builder, designer, and avid multi-disciplinary paddler, Brian is passionate about how the experience of building and kayaking connects us to nature, ourselves, and each other. Learn more at: capefalconkayaks.com



BUILDING THE F1 KAYAK

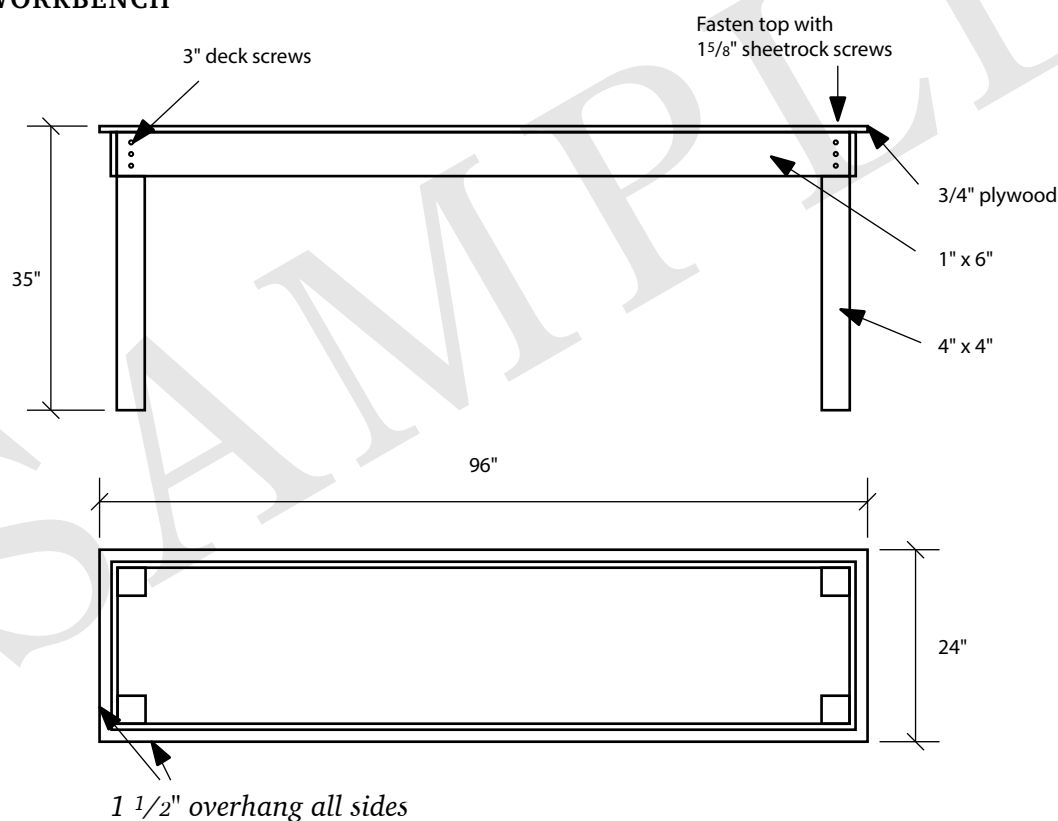
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Setting Up Your Workspace

A clean, organized workspace is probably the most important ingredient to an easy build and a nice finished product. Good work benches, appropriate saw horses, and lots of light all matter. I personally like to start with two simple 2'x8' workbenches 35 inches tall. This gives me a 16 foot long table to that works great for mortising gunwales, rounding stringers, bending the coaming, and organizing everything I need during the build without having to constantly bend over and shuffle things on and off the table. If this is going to be your primary shop bench, consider adding a lower shelf and locking casters. If you only have one 8 foot table or are using existing workbenches, you'll want to buy a straight 14' 2"x8" to do the longer prep on.

For my sawhorses I find that 32 inches is a nice width. Anything narrower and I end up knocking the boat on the floor all the time, wider than 3 feet tends to get in the way. Short people can get away with 32 inch tall horses, average people will do better with 35 inches, tall people 37 inches.

SIMPLE WORKBENCH



Safety Reminder!

The earlier you start in the process the more tools you'll need to use. It's your responsibility to get proper training when working with any woodworking tool. I do want to mention that sometimes the most innocuous tools can cause the most serious injuries. Be careful with Japanese saws and chisels! Also, it's always a good idea to wear ear, eye, and respiratory protection.

Tools

RECOMMENDED TOOLS FOR PREP WORK

(large tools can often be borrowed, or time rented in a woodworking shop)

Table saw with sharp, thin kerf blade
for ripping wood

Planer
for thicknessing wood

Minimum ¾hp band saw with aggressive (4t) ½" new blade
for cutting out paddle blank

Plunge router with ¼" and ⅜" spiral upcut carbide bits
for cutting mortises — this can also be done with a drill, see plans

3 ¼" power planer
various uses, I strongly recommend Bosch 3365

Sliding compound miter saw
for crosscutting wood, cutting angles

12v drill and 12v driver, inexpensive to buy as a set
various uses, I recommend Milwaukee

4-inch angle grinder with 30 grit sanding wheel
not strictly necessary but very useful

RECOMMENDED TOOLS FOR BUILDING THE KAYAK

combination square

Japanese saw

block plane

tape measure

12 ea 2-inch metal spring clamps

2 ea 3-inch mini C clamps

2 ea medium size engagement clamps

12v drill with ⅛", 7/64", 1/8", 3/16", ¼" and 9/32" twist drill bits

1-inch chisel

¾-inch chisel

hammer

pliers

box of pencils

pencil sharpener

couple of sharpies

tailors tape

work gloves

propane torch and knife with wooden handle for heating to cut skin, or a commercial hot knife

Safety glasses

ear muffs

wallpaper steamer

Chisels and plane will need to be sharpened, so a honing guide and stone will also be needed. I personally use a Norton 1000/4000 water stone and a Veritas honing guide.



BUILDING THE F1 KAYAK

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Materials

WOOD

1ea 1"x12"x16' or equivalent clear straight grained cedar
(14' will work)

1ea 1"x8"x10' clear straight grained cedar

1ea 4"x4"x8' clear straight grained cedar

Enough clear straight grained freshly cut or air dried white oak to make 30 ribs and one coaming (*you can do this from a piece with a finished dimension of $1\frac{5}{16}$ " x 6" x 8'* if the wood is perfect, wider if it is not)

Several pieces of stronger softwood (fir, spruce, ect) for the deck beam immediately aft of the cockpit that will occasionally take the weight of the paddler. 2ea (one is a spare) $\frac{3}{4}$ " x $1\frac{5}{8}$ " x 26"

Several pieces of ash or other rot resistant hardwood for the aft deck stringers, see drawings

2 ea 4' long $\frac{1}{4}$ " dowel, birch or other well made dowel

1 ea $\frac{3}{16}$ " dowel, same

2 ea $\frac{1}{8}$ " dowel

HARDWARE

50 ea $\frac{3}{4}$ " 14 gauge bronze (or stainless) ringshank nails.

4 ea $1\frac{1}{4}$ " #14 flathead phillips stainless steel sheet metal or wood screw (for F1 or LPB foot braces)

4 ea $\frac{3}{4}$ " #6 stainless flathead phillips screws for rub strips

MISC STANDARD LUMBER AND PLYWOOD

a 2'x2' sheet of $\frac{1}{2}$ -inch of medium-grade plywood is enough to make all the jigs.

a 4'x8' sheet of $\frac{3}{4}$ -inch ply wood will make both the deck beam and coaming jig, and leave you a 2'x8' sheet for the top surface of a single 2'x8' workbench.

a 12' 4"x4" cut in 4 pieces forms the legs for a workbench

two 10' or three 8' 1"x6"s complete that workbench

a 14' long 2"x8" gives you a work surface for mortising gunwales and rounding and beveling stringers

SKINNING

Fabric and goop kit from Corey Freedman, www.skinboats.com
(also sells rare earth pigments)

1 roll of unwaxed dental floss

1 roll of #9 seine twine

DISPOSABLES

Plastic mixing cups

Ordinary plastic cups

1 quart Watco danish oil or Corey's Boat Sauce (www.skinboats.com)

2 sheets 120 grit sandpaper

8 oz tube gorilla glue

$\frac{3}{4}$ oz tube aquaseal

Small tube super glue

1 roll $\frac{3}{4}$ -inch blue tape

1 roll $1\frac{1}{2}$ -inch blue tape

10 pairs disposable nitrile or vinyl gloves

one big heavy nail, $\frac{3}{16}$ " diameter
(for burning deck line holes)

tie wire (for threading deck lines)

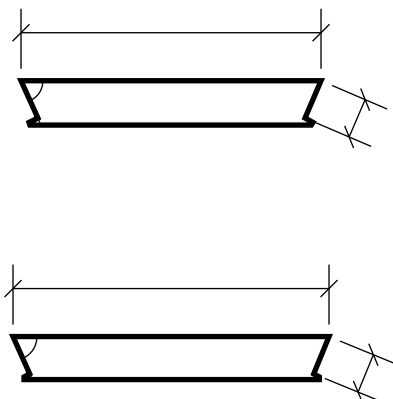
1 roll of flat artificial sinew

$\frac{1}{2}$ " thick HDPE for rub strips and toggles

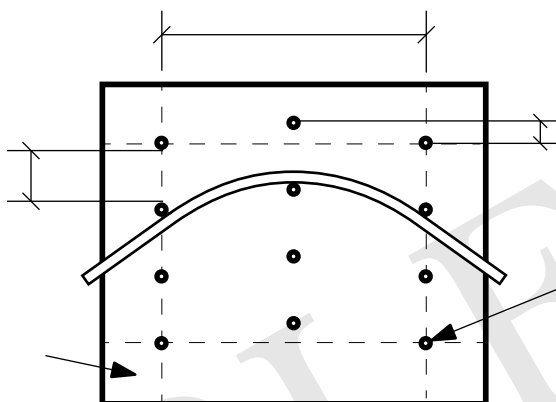
Work gloves for steam bending
(*I prefer the thinner cotton ones with the rubberized grip*)

Forms and Jigs

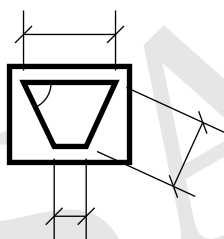
SPREADER FORMS



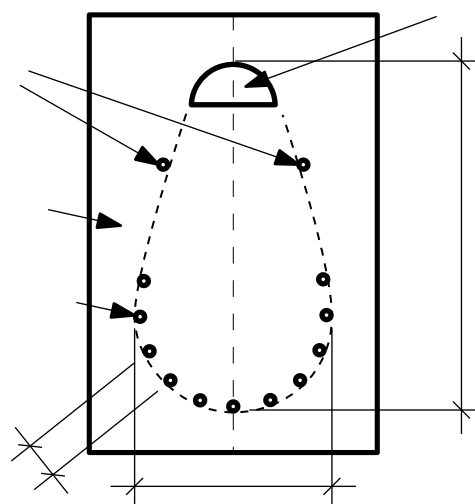
CURVED DECK BEAM LAMINATING JIG



CAPTURE FORMS



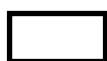
COAMING JIG



"SPECIAL STICKS"



Special Stick # 1



Special Stick # 2

*(make two of each,
so you have a spare)*



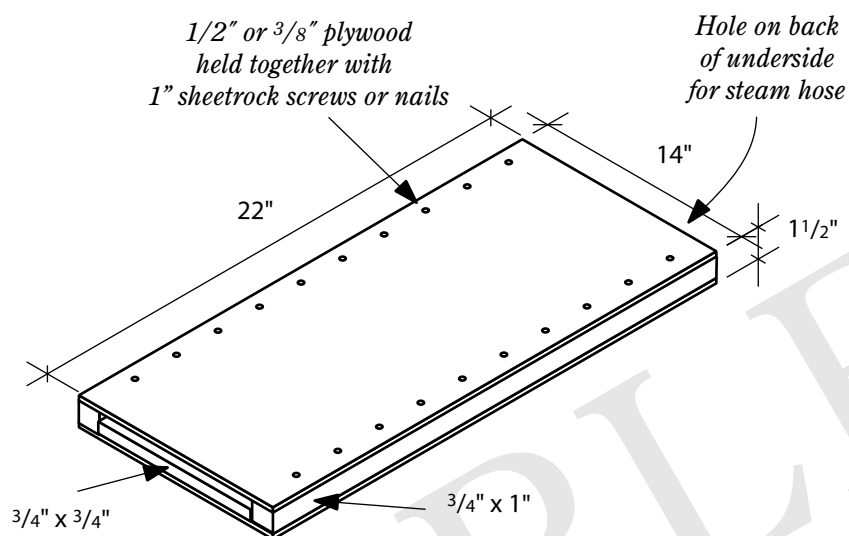
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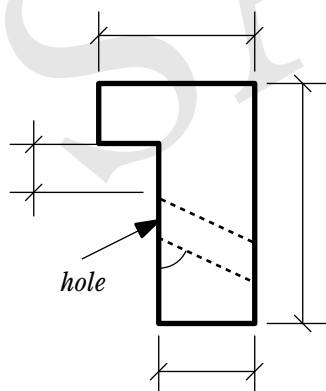
Steambox and Drill Mortise Jigs

STEAMBOX

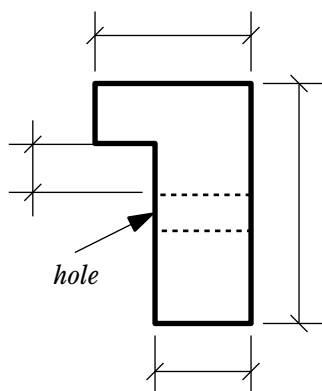


DRILL MORTISE JIGS

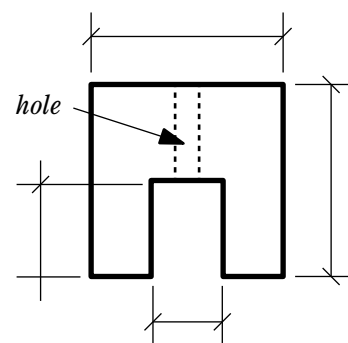
made from hardwood



Angle Deck Beam



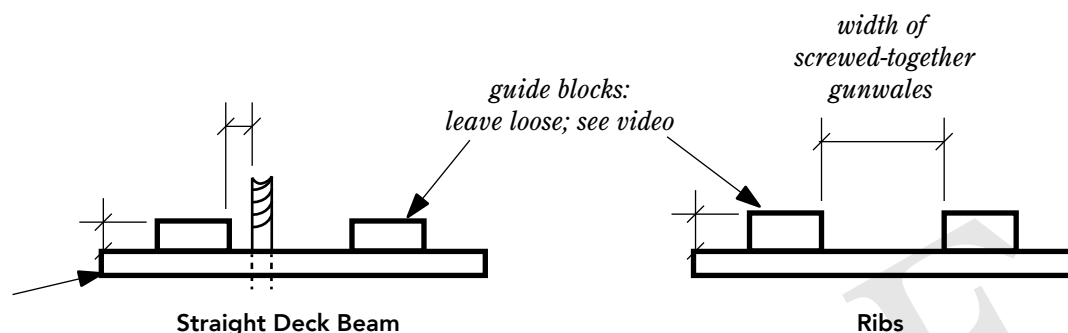
Straight Deck Beam



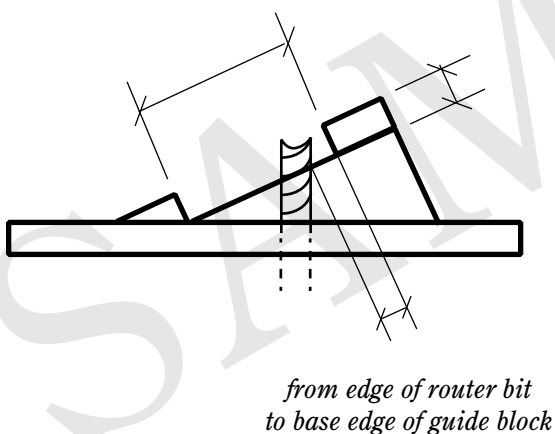
Ribs

Plunge Router Mortise Jigs

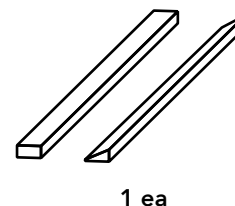
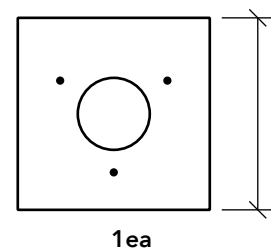
STRAIGHT DECK BEAM AND RIB MORTISING JIGS



ANGLE DECK BEAM MORTISING JIG



Jig Cut List



Building the Jig

Start with an _____ piece of $\frac{1}{2}$ -inch plywood. Locate the center and screw locations for router (plate should be square to router handles), mark, drill, and countersink for router screws, then drill a large hole (2"-3") in the center.

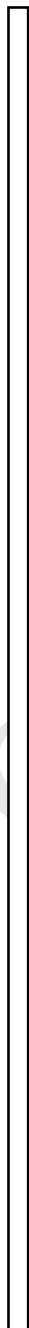
Next, build two tapered hardwood blocks and guide blocks, as shown.

Screw plywood base to router and extend $\frac{3}{8}$ " bit as high as possible. Then, carefully float all pieces until the base edge of the square guide block lines up $\frac{1}{2}$ " from the edge of the bit. Use temporary blocks to ensure the jig stays 2 $\frac{1}{2}$ " wide for gunwale. Once position is located, carefully mark and pilot, then screw all pieces in place.

Cut List

All wood is red cedar unless otherwise noted.

Gunwales (x2)



Stringers (x2)



Keel



Foredeck Stringer



Aft Deck Stringers (x2)

made of Ash



Laminated Curved Deck Beams

#1, 2, & 3

(x15 plys)

made of Red Cedar



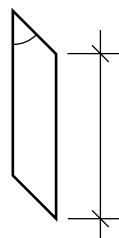
(always a good idea to cut a few extra, finished deck beams should be about 13/16" thick)

Aft Deck Beam #4

made of Douglas Fir or Ash



Bow Stem



Aft Deck Beams #5 & 6



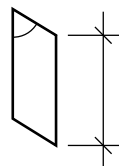
Ribs

(x30, allows for 10 extra)

made of White Oak



Stern Stem



Dowels

made of Birch or Mahogany

Coaming

made of White Oak

Coaming Lip

made of White Oak

Secondary Stringers (x2)



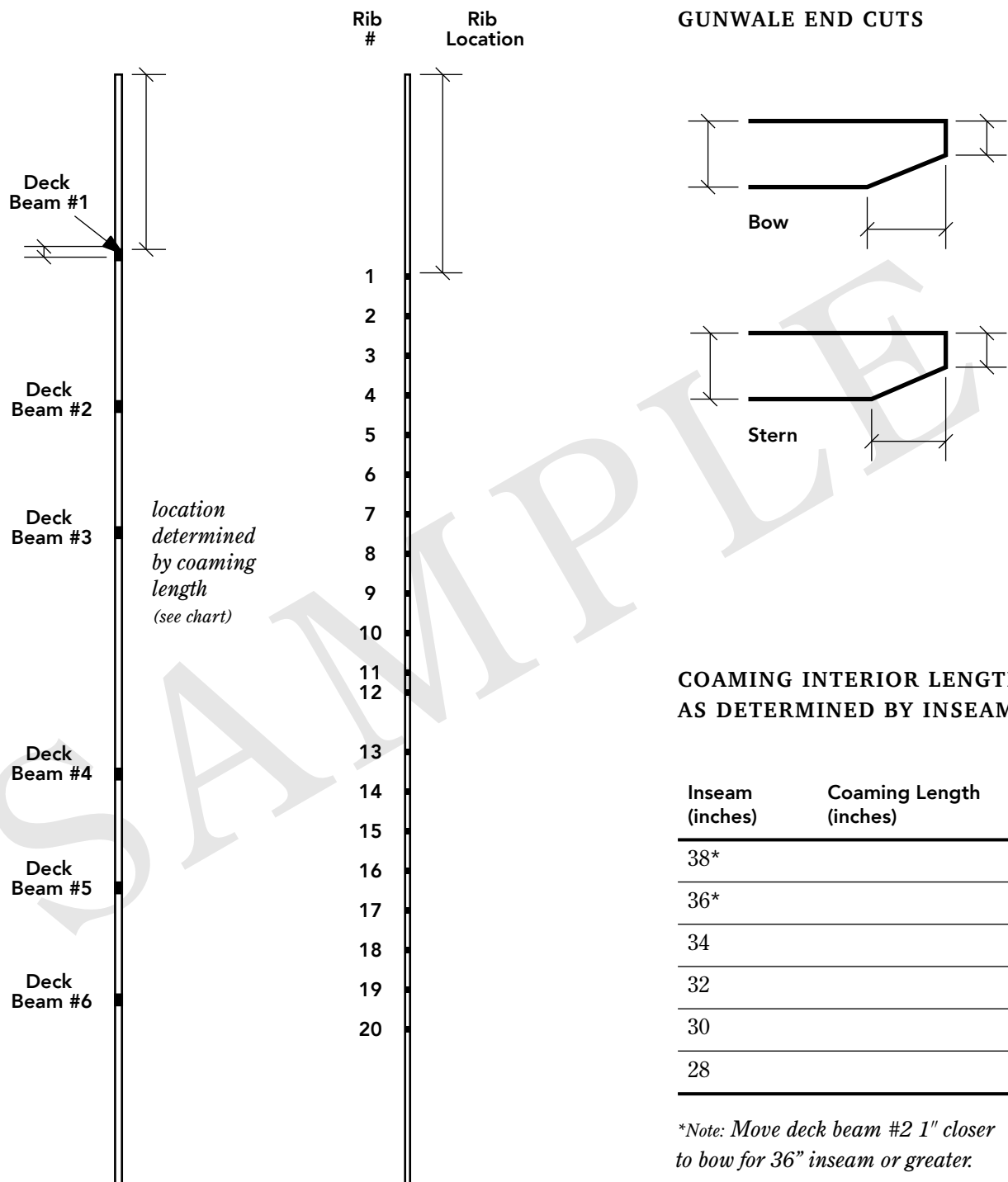
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Gunwale Layout

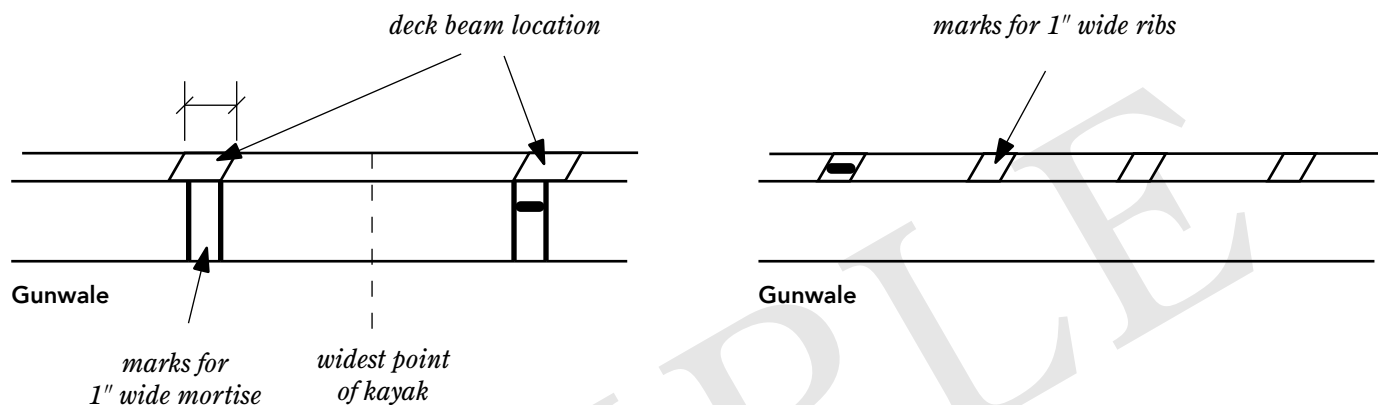


Forward edges of deck beams and ribs are measured from forward end of gunwale

Mortises

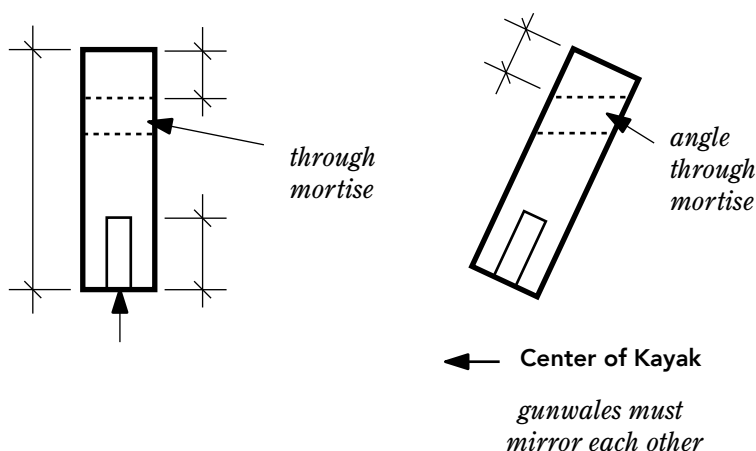
MARKING FOR MORTISES

Ribs are easily marked by holding a combination square (1-inch wide) at the rib location and marking both sides of the square. Deck beam mortises are marked one inch wide as well, connecting to the edge of the deck beam marked closest to the center of the boat. Put another way, deck beam tenons will locate at the back of the deck beam in the first three deck beams, and to the front of the deck beam for the last three deck beams.



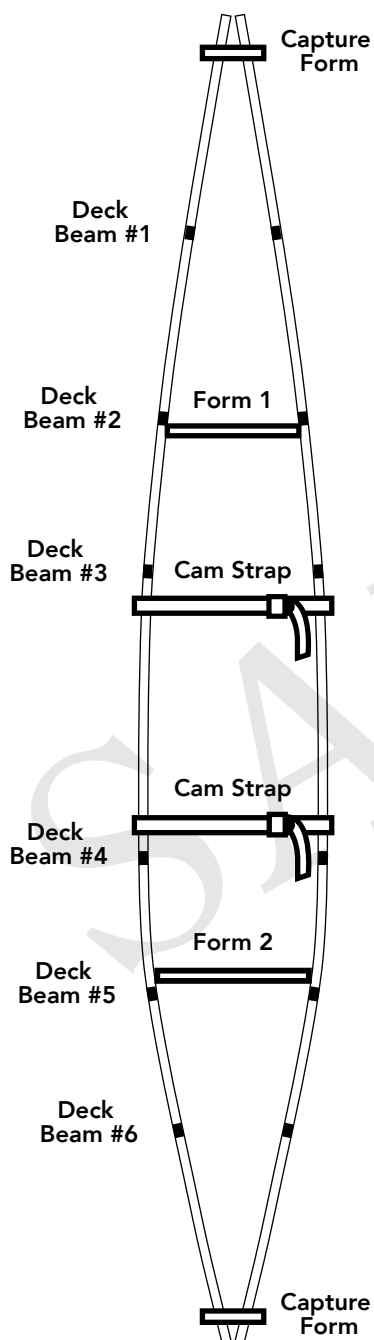
MORTISING THE GUNWALES

The fastest way to cut the rib and deck beam mortises is with a plunge router. Using guide blocks and a drill is a less expensive option, but slower. On the F1 the rib mortises should be centered on the gunwale and cut $\frac{1}{2}$ inches long and $\frac{1}{2}$ inches deep. Deck beams #1, 2, and 3 are cut with a straight through mortise 1 inch long, the top edge located $\frac{1}{2}$ inch down from the top of the gunwale. Deck beams #4, 5, and 6 are cut with a 45° degree angle through mortise 1 inch long, the top edge is also located $\frac{1}{2}$ inch down from the top of the gunwale, this will be the inside edge of the gunwale, so orientation is important on the angle mortises. Gunwales must mirror each other. If using a drill, a series of overlapping holes cuts the mortise easily, backing the workpiece will prevent tear out. If using a router, carbide spiral upcut bits work best.



Sample Deck Layout

Shown for a 150lb person



FORM LOCATIONS BASED ON PADDLER WEIGHT

measured from forward end of gunwale

Weight	Form 1 (inches)	Form 2 (inches)
100		
125		
150		
175		
200		
225		
250		

STRAPS AND CAPTURE FORMS

WIDTH BEHIND DECK BEAM 3 AND IN FRONT OF DECK BEAM 4 AS DETERMINED BY PADDLER WEIGHT

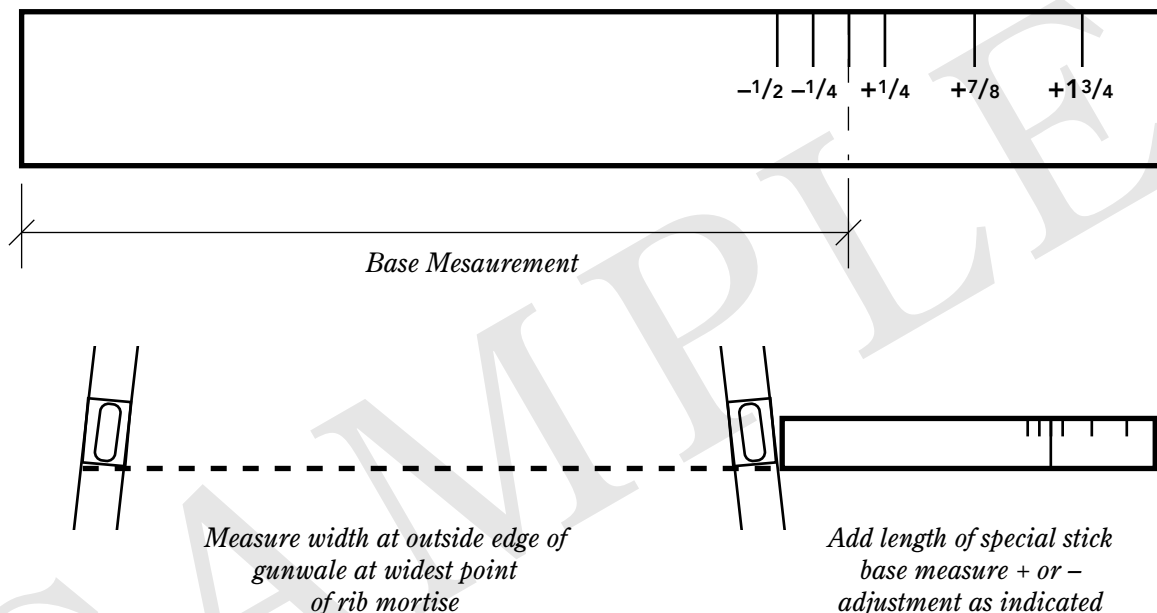
Weight (lbs)	Behind Deck beam 3	In front of Deck beam 4
100		
125		
150		
175		
200		
225*		
250*		

**Note: Gunwales are made 3 inches longer on either end for the 225 and 250lb paddler.*

Understanding the F1 Rib Measuring System

To make the F1 scalable we use a variation of a rib measuring system seen on some traditional kayaks, simply taking the width of the kayak at the mortise and adding a length to it. There is some indication this may have been done with handspans, fingers, etc. In the case of the F1 we use inches based on weight and then add or subtract a small adjustment to make sure everything comes out right in the end. It's very important to note that the width is always measured at the widest point of the gunwales at that mortise location. For instance, the measurements will be taken from the back of the mortise at the front of the boat, and the front of the mortise at the back of the boat.

The Special Stick



BASE MEASURE DETERMINED BY PADDLER WEIGHT

Weight (lbs)	Measurement (inches)
100	
125	
150	
175	
200	
225	
250	

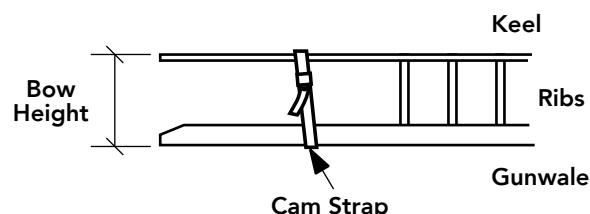
RIB ADJUSTMENTS

Rib	Adjustment (inches)
1	
2	
3	
8 – 12	
14 – 15	
16 – 18	
19	
20	

Keel and Stringer Heights

KEEL HEIGHT: BOW

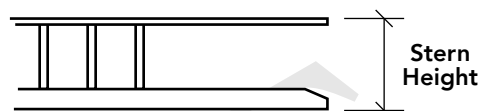
The depth of the keel in the bow is set by using a cam strap near the bow to squeeze it down to the indicated height AFTER the keel is tied to the ribs. The strap is left on until the bow stem is tied firmly in place.



Weight (lbs)	Bow height (inches)
100	
125	
150	
175	
200	
225	
250	

KEEL HEIGHT: STERN

The depth of the keel in the stern is set by either shimming or trimming the last ribs BEFORE the keel is tied on so that when the keel rests naturally across the ribs it sits at the indicated height based on paddler size.

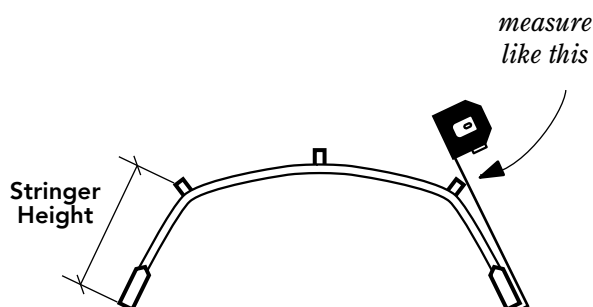


Weight (lbs)	Stern height (inches)
100	
125	
150	
175	
200	
225	
250	

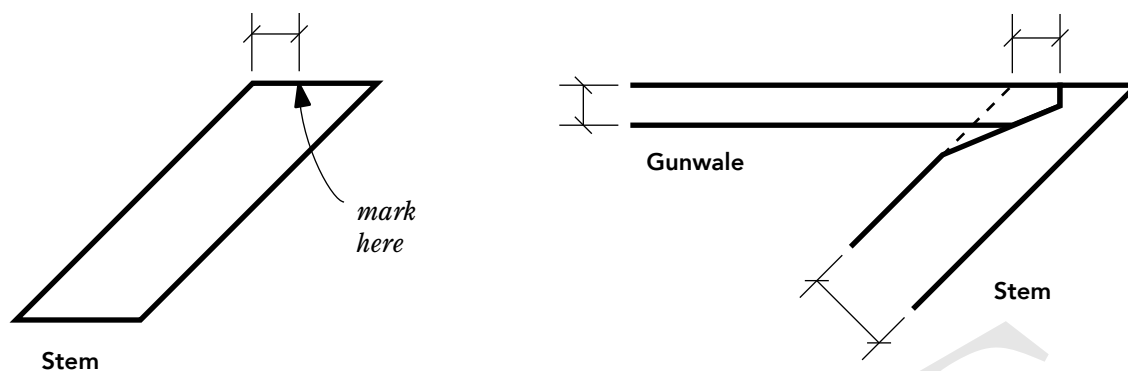
STRINGER HEIGHTS AND PEG LOCATIONS

After adjusting for keel height, ribs are pegged with $\frac{1}{8}$ " dowel at the following locations. Stringers are measured and clamped at these same locations. The stringers sit vertically, (rectangle sitting with its skinniest side on the rib) with the rolling bevels cut on the ends mating to the stems. Stringer height notes the outside edge of the stringer as measured from the top of the gunwale at Ribs # 1, 6, 11, 15, 20. Heights will vary based on paddler weight.

Weight (lbs)	Stringer height (inches) at Rib #				
	1	6	11	15	20
100					
125					
150					
175					
200					
225					
250					



Bow and Stern Stem Detail



Mark forward of the obtuse angle (portion of stem toward the center of the kayak) and align that mark with the end of the gunwale. Clamp and scribe the gunwale end shape onto the stem and then cut out with band saw. The stem goes at the bow, the stem at the stern.



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BUILDING THE F1 KAYAK

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Deck Lines, Toggles and Rub Strips

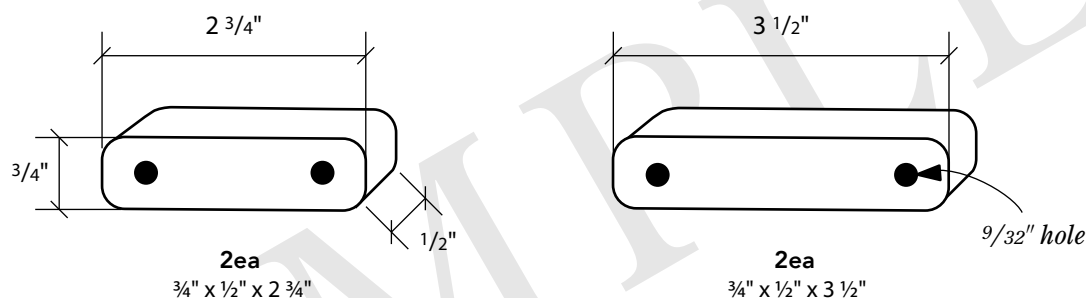
DECK LINES

4 ea $\frac{5}{16}$ " 6-foot oil tanned latigo strips.

Locate deck line locations as shown on drawing then drill as per video instruction *before* skinning boat.

TOGGLES

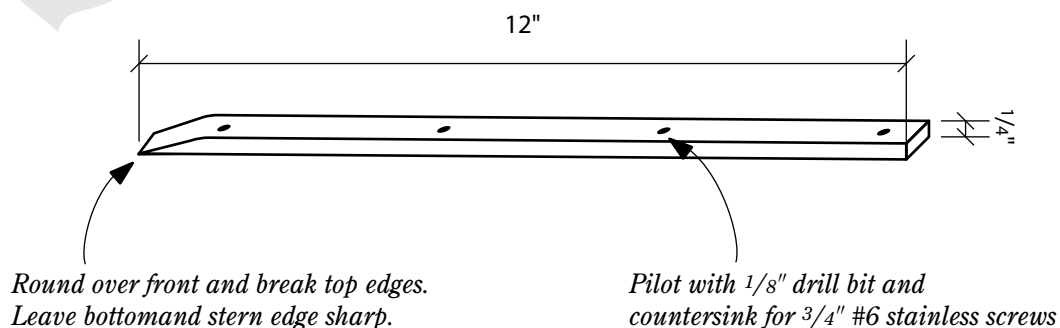
Toggles are $\frac{1}{2}$ " HDPE. Bevel edges and round ends.

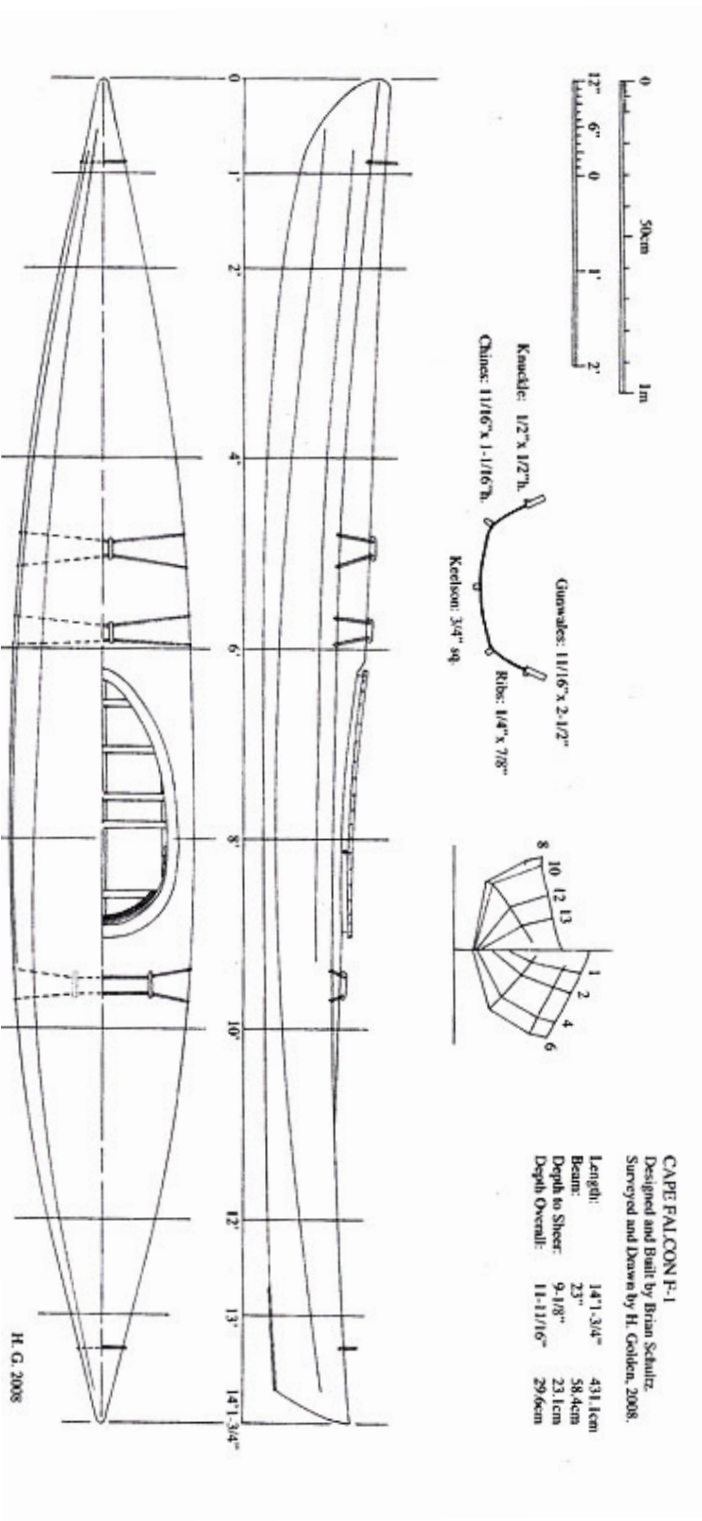


RUB STRIPS

2 ea $\frac{1}{4}$ " x $\frac{1}{2}$ " x 12"

Rub strips are $\frac{1}{2}$ " HDPE. Round over front and break top edges.
Pilot with $\frac{1}{8}$ " drill bit and countersink for $\frac{3}{4}$ " #6 stainless screws





CAPE FALCON F-1
Designed and Built by Brian Schultz.
Surveyed and Drawn by H. Golden, 2008.



CAPE FALCON KAYAK

The F1

BUILDING THE F1 KAYAK

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