

# Bevin's Skiff Building Manual

## Building Manual Introduction

### Capacity

The recommended capacity of Bevin's Skiff is 450 lbs (the capacity with 8" of freeboard) equivalent to 3, 150lb people.

### A Word on Safety-

- You're brought into this world with two eyes, two ears, ten fingers and ten toes, make sure you keep them.
- When you are using a tool, keep your hands behind the cutting edge of the blade.
- Use safety glasses, hearing protection and nitrile gloves.
- Most importantly, use common sense.
- It is your responsibility to know how to use your tools. If you don't know how to do something, ask someone who does.

This boat is designed to be easy to build, but nails can fly through the air when you try to hammer them. Hammering is noisy and polyurethane adhesive (e.g. Sikaflex or 3M 4200/5200) is not totally benign. Epoxy can sensitize your skin and cause a rash. So be smart. Also be neat! Clean up squeezed out adhesive before it dries! Life (and painting) will be easier.

### A Word About This Manual

The tone of this manual reflects the importance we put on safety.

- When we say, "Don't Be Stupid!", we mean it (and we're talking from personal experience...)
- Read the directions all the way through before you start.
- Familiarize yourself with the pictures, drawings, parts list and tools/ supplies list.
- Read the directions for each step all the way through- before you mark or cut the wood.
- These instructions are written to be used as you build this boat. If something is unclear, think about how the piece will fit in the boat.
- Build the cardstock model first. It's a good introduction to how the boat parts fit together. It's available at both [www.alexandriaseaport.org](http://www.alexandriaseaport.org) and the *Building To Teach* training website, where there is also access to hands on math training materials. To learn more

## Bevin's Skiff Building Manual

about *Building To Teach*, go to [www.buildingtoteach.com](http://www.buildingtoteach.com).

You might read these instructions all the way through at the beginning and say, "I have no idea what he's talking about. I'll never be able to build this. This isn't simple." Believe us, it is simple. A wonderful boat builder, Pete Culler, used to say, "Experience starts when you begin." So don't be afraid to get started. Remember, it's only a boat. A journey of 1,000 miles starts with one step.

### **Videos**

Videos showing how to build a Bevin's skiff and teach math are available at [www.maritimetv.com](http://www.maritimetv.com). Look for "Building To Teach." Even if you're not teaching math, the videos take you through the boat building process.

### **Building Technical Support**

We are available to answer questions about these boats, but remember, we're a small outfit! The best way is via E-Mail. Our address is [asoffice@alexandriaseaport.org](mailto:asoffice@alexandriaseaport.org). You can reach us by phone, during US East Coast work hours, at 703 549 7078.

### **Kit Builders vs. Plan Builders**

Kit builders receive everything they need to build the boat when they buy a kit from the Alexandria Seaport Foundation. Plan builders need to obtain all the materials and make all the boat parts. There are tools, materials list and material suppliers lists at the end of this Manual. Kit builders should also familiarize themselves with all the pieces before they get started. There will be several places in the building process where plan builders will need to fabricate pieces and kit builders won't.

### **Math Guide v. Building Instructions**

Bevin's Skiff was originally designed as a teaching tool. These instructions are also used for a Math Instructors' Guide. Each step is numbered with the Unit number first and the building step number second, i.e. 2.3

The order of the building steps reflects the optimum method of teaching math while building the boat. So, laying out and cutting the boat parts is the last unit. If you're a plan builder, you'll be doing that work first.

## Bevin's Skiff Building Manual

### **Epoxy and Polyurethane Adhesive**

You will be using two types of glue. Epoxy (e.g. MAS) and a polyurethane adhesive (e.g. Sikaflex) . Neither likes to come out of clothes. There are golden rules for both.

#### **Epoxy**

- Use in a warm place, 40 degrees F, or over
- Measure your resin and hardener accurately. The ratio must be correct.
- Stir the resin/ hardener mix well for at least a minute before you add wood flour filler. Mix in the filler well for at least a minute.
- Don't mix until you need it and only mix a little more than you think you'll need.
- Read the manufacturer's instructions.
- You can clean up wet epoxy from your hands and tools with ordinary household “white” vinegar or "GOJO" hand cleaner.

#### **Polyurethane**

- Use in a warm place, 40 degrees F and over.
- Make sure you remove the metal cap from the rear of the tube, if there is one, and cut the nozzle and punch a hole in the nozzle seal with a 16d nail, or other long pointed object.
- Release the pressure in the calking gun after each use. Otherwise more adhesive will end up on the floor than in the boat.

**Let's Get To It!**

### Glossary

#### Tool Terms

Bevel Board	A board on which needed angles, or bevels, are marked
Bevel Gauge	A tool with a body and a movable blade that usually can be locked into position. It's used to transfer angles from one object to another, i.e. from the boat to a piece of wood. Also known as a sliding tee bevel
Bucking Iron	A small heavy mass, usually a big hammerhead, used to support a piece as it is being nailed
Carpenter's Scribes	A simple compass. Used for "scribing" – marking a piece of wood to fit it against another surface. Similar to a compass used for drafting and mechanical drawing
Carpenter's Square	A flat 90 degree square with ruler scales on each edge of both sides. The scales can include 1/8ths", 1/16ths", 1/12ths", 1/10 <sup>th</sup> " and 1/100ths". The long leg , 24" x 2" ,is the body. The shorter leg , 16 x 1 1/2", is the tongue. The front surface is the "face." The opposite surface is the "back." Most squares have tables printed on the face and back that can be used to calculate rafter lengths, board footage, brace lengths and measurements necessary to eight side a timber. Square features vary by manufacturer and model. Also known as a framing square. Stanley 45-011 or Empire e1190 are typical complete squares.
Clamping Pad	Disposable piece of wood used to spread the clamping pressure and protect the finished wood
Combination Square	A square with a 12" sliding ruler, level and usually a scribe for scratching marks. Can be used to create either 90 degree or 45 degree angles. Can also be used as a depth, or marking, gauge.
Hand Saw	You want to use a cross cut saw, rather than a rip saw. There are two styles, Western and Japanese. Both styles work well- when sharp. Japanese saws are

## Bevin's Skiff Building Manual

thinner and cut on the “pull” stroke. They cut faster, but can be bent easier than a Western blade.

Hand Plane

You'll be using either block planes, or bench planes. The major difference that affects this project is that block planes are smaller. Which style you pick depends mainly upon your builders. Small hands like small tools... Make sure the tools are sharp. Sharpening a plane is a great example of practical geometry. The bevel and the back of the iron (blade) are planes that intersect in a straight line, which is the cutting edge.

Finger/

Feeler Gauge

A marking gauge with two parallel fingers that can reach around a protruding piece of wood (or other material.)

Saw Horse

A movable support with a cross piece and legs.

Scribers

A simple compass. Used for “scribing” – marking a piece of wood to fit it against another surface. Similar to a compass used for drafting and mechanical drawing

Toe Nail

To nail through the inside corner of one board in order to fasten it to another

### Boat Terms

Aft

Towards the back of the boat

Bow

The front of the boat

Center Frame

The boat component that is placed near the mid-point of the boat which helps define the shape of the boat and allows the boat to be built without building molds.

Chine

1) The corner between the side of a flat, or vee-bottomed, boat and its bottom. 2) The piece of wood that allows the bottom to be nailed to the sides and reinforces this joint.

Deck Beam

A beam that runs across the boat and supports the deck

Fair Line

A curved line without humps, or bumps. It doesn't have to be constant, or regular, just smooth and usually pleasing to the eye.

## Bevin's Skiff Building Manual

Faying Surface	The common surface shared by two pieces of joining wood
Feather edge	A thin , fragile, edge of wood that (in this case) results from cutting the scarph joint
Foredeck	The small, triangular deck, that goes in the front of the boat
Gussets	Plywood corner braces
Keel	The timber that runs down the center of the boat, outside of the bottom
Layout	Draw
Line	Rope (on a boat)
Lofting	Drawing the boat at a large scale, usually full scale, 1:1.
Painter	The line that is fastened to the bow of the boat. It is used for towing the boat, or tying it up to a dock.
Pilot Hole	A hole drilled to allow a nail, or screw, to be driven without splitting the wood.
Marine Grade Plywood	Traditionally made out of veneers with no voids and waterproof glue. British Standard (BS)1088 is the good stuff
Quarter Knee	Serves as a corner brace between the side and transom
Rabbet	A groove cut into a piece of wood into which another piece of wood fits. The joint between the outside of the planking and the backbone of the boat –stem, keel, transom or sternpost
Sheer	The top edge, or line, of the boat. The “sweep” of the upper edge of the boat’s side.
Skeg	The “fin” that protrudes from the keel at the aft end of the boat. Provides directional stability
Station	The location of a cross section in the boat’s drawing- also the location of a building mold. Think of it as the location of a “slice” in a loaf of bread.
Stern	The back of the boat
Stem	The piece that forms the front of the boat
Thwart	Seat

## Bevin's Skiff Building Manual

Transom	The piece that forms the back of the boat
Pick up bevels	Measure angles. Usually using a bevel gauge
Scarf joint	A long, angled joint between two pieces of wood. The length of the joint is described as a ratio in relationship to the thicknesses of the joining pieces. In boat building, 12:1 is typical, 8:1 is used for plywood.
Flare	The angle between the side and bottom of a "Vee", or flat bottomed, boat
Stand Proud	Stick out

## Bevin's Skiff Building Manual

### Tools and Supplies Needed

For use with Bevin's Skiff plans and kits. Kits are available from the Alexandria Seaport Foundation, P.O. Box 25036, Alexandria, VA 22313 703-549-7078 [www.alexandriaseaport.org](http://www.alexandriaseaport.org)

#### 1. Basic Tools Needed

- Two Saw Horses 4' wide
- Claw Hammer
- Bucking Iron: four pound sledge hammer (preferably without the handle) or anything similarly massive (including rounded stones)
- Hand Saw
- Bevel Gauge
- Combination Square
- Pencils
- Chalk Line
- Screw driver that accepts a #2 square drive bit (the bit is included in the kit)
- Phillips head screw driver
- Hand Plane (and a way to keep it sharp)
- At least two 4" "C" Clamps
- Hand Drill with bits to drill pilot holes and countersinks for #8 and #10 screws, as well as 5/64", or 3/32" bits to pilot for nails.

#### 2. Optional but Recommended Tools if you are building from the ASF kit

- Battery Powered Drill (to drive screws and drill holes)
- Nail Set (to help remove bent nails)
- Pliers (to help remove bent nails)
- Router w/trim bit (to trim bottom panel)
- Disk/orbital sander (to clean and prep outside of hull for painting)

#### 3. Additional Tools Needed if you are building from the plans and didn't buy the kit

- Table Saw
- Band Saw or Good Orbital Jig Saw (recommended but not absolutely necessary)
- Hand Held Circular Saw



## Bevin's Skiff Building Manual

- 14'x 1/2"x 1/2"square Batten straight grained spruce or pine

### 4. Basic Supplies Needed if you are building from the ASF kit

- 4d finish nails
- One straight 2"x 4" x 8'
- Hand Cleaner
- White Vinegar
- Paint Thinner (for clean up of polyurethane adhesive)
- 4mil Plastic (for gluing)
- 1 5/8" Drywall Screws two dozen
- Nitrile gloves
- Paper Towels
- Spreading Sticks, spatulas, or plastic "Bondo Spreaders"

### 5. Additional Supplies Needed if you are building from the plans and didn't buy the kit

- 3 - 2"x 4"x 8' for making a work table with the saw horses
- 4'x8' sheet of 1/4" plywood for work table top
- 10d common nails for work table assembly
- 6d Finish Nails for batten