

# Cougar DIY Dock And Boat Lift Piling ©

## Installation Instructions

**As with most any type of construction, it's always best to read the instructions thoroughly a couple of times before undertaking the actual construction process.**

**CAUTION!!!** Before ordering anything you first need to make sure of what the subsurface material is made up of and that it is of a sufficient depth for your particular piling installation. You sure don't want to find out that you'll hit bedrock or large boulders a couple of feet under the surface. So it's best to pre-water jet the area first.

Typically, the average boat lift installation for a 3,000 to 8,000 pound rated lift will require that the pilings be installed a minimum of 8 feet into the subsurface material, deeper if the subsurface material is soft mud. For large dock and boat house pilings we strongly recommend that you consult an engineer or an experienced dock or boat house installer.

The easiest way to test the depth and type of subsurface material is with a water pump and a long piece of pipe. Typically a good water pump for this and the actual piling installation is a 2.5 to 7 HP, 2" discharge or trash pump that produces at least 150 gallons per minute with a reducer down to fit 3/4" PVC. Remember, water volume is more important than PSI. To maintain the best pressure it's best to use two intake holes as a regular discharge hose tends to expand and loses pressure. To regulate the water flow and pressure a valve can be installed inline on the discharge hose (not the pump). Start with 35 psi of water pressure. If the pipe goes down very easily without any force or additional water pressure, the bottom is very soft and you should consider setting the pilings deeper. On the other hand, if a higher water pressure up to a maximum of 65 psi is required, the bottom is firm. If over 65 psi is needed, but less than 100 psi, this is most likely a very hard sand or clay bottom and it will be a little more difficult to set the pilings into.

In the case of harder sand or clay you may want to water jet a full length starter hole before installing the piling.

A good rule of thumb regarding how deep a piling needs to be set in a soft to semi-firm bottom is that for the first 20 feet of piling it needs to be 8 feet (40%) into the subsurface. For each additional 10 feet of piling add 2 additional feet (20%) into the subsurface.

**KNOW WHAT YOU'RE GOING TO DO BEFORE YOU START!!!** There are two items that need to be thought out in advance of starting your piling project.

The first is the length of the piling needed. Since most freshwater and saltwater coastal installations close to a shoreline are in relatively shallow water a 20 foot piling is normally sufficient. In this situation it is best to purchase the Cougar piling shell in two 10 foot sections, one with the cone nozzle end, for ease of installation. Our 20 foot piling shells should only be used for deeper installations or where there is easy access to the top of the 20 foot piling when the tip of the piling is resting in place on the bottom.

Secondly, there are only three ways to get concrete to the piling. Hand mix on-site with a concrete mixer; a ready mix truck or the combination of a concrete pump truck and a ready mix cement truck.

If there is no easy access for a ready mix truck to get close to the installation site, using a portable cement mixer is best since the concrete can be mixed in small batches. If using a ready mix truck, keep in mind that a 20 foot piling only requires about  $\frac{3}{4}$ 's of a yard of concrete and manually taking it to the installation area takes time, time that could cause the concrete to harden or too much time for the truck to stay on-site.

In some locations, where there is a home or other obstruction between the installation area and the street, a concrete pump truck may be ideal and much faster despite the added cost. The drawbacks to a pump truck is that you will need to purchase more concrete than required because some stays in the boom and ultimately is wasted.

Just keep in mind that whichever method you use that the concrete cannot be allowed to cure inside the piling shell and more concrete added later. This will result in a serious loss of strength of the piling and a potential failure or collapse.

#### MATERIALS AND TOOLS NEEDED

Depending on the piling installation location, how the concrete will be delivered to the piling shell and the length of the piling, some or all of the following may be required.

Materials: (assumes "typical" 20' piling installation)

QTY: 2, 10' Cougar fiberglass piling sections, one with the built-in cone water jet nozzle; per piling.

OR

QTY: 1, 20' long 12" diameter white PVC drain pipe (cut in half) and one coupler; per piling.

QTY: 2,  $\frac{3}{4}$ " PVC connectors from the reduced pump discharge to connect to the piling water jet PVC, per piling.

QTY: 4,  $\frac{5}{8}$ " rebar 20' long, preferably epoxy coated for saltwater applications.

QTY: 1,  $\frac{1}{4}$ " rebar 20' long.

QTY: 40+, rebar wire ties.

QTY: 3/4 to 1 yard 3500 to 5000 psi concrete with 3/8 to 5/8 pea gravel per piling. (if hand mixing, do not exceed 3/4" gravel and it takes about 30 bags of 80 pound concrete per piling)

QTY: 2 bags concrete or cement mix (for ballast) per piling.

QTY: 2x2x8' wood or 1 1/2" PVC pipe with end cap for tamping of concrete by hand.

QTY: 1, 16oz tube of silicone caulk/sealant per piling (for fiberglass & PVC piling shell).

QTY: PVC cleaner and glue (for PVC piling shell)

QTY: 12, 1" long #10 screws per piling seam (any type metal will be fine).

Miscellaneous 2x4 wood, screws/nails to make dock mounted piling guide (optional).

Heavy duty painter's plastic tarp to cover dock during concrete application.

Small lengths of PVC pipe the diameter of any mounting bolts required and a hole saw.

Tools & Equipment: (varies depending on installation)

To cut the rebar, a torch, grinder with cut-off wheel or a reciprocating saw.

Pliers to attach rebar wire ties.

Concrete mixer, shovel, several 2 1/2 gallon plastic buckets, hand trowel.

Power or cordless drill with 1/8" drill bit and screw driver tip.

Ladder or scaffold to reach top of piling shell before inserting into bottom subsurface.

Miscellaneous 2x4 or 2x6 wood to use as braces to hold open gap between piling sections while tying sections of rebar together.

2" Water pump with regulator or valve for 35-65 psi and coupler to attach to 3/4" schedule 80 PVC.

Measuring tape, level (2' or longer recommended).

Hole saw the size of any PVC pipe used to form mounting holes.

Hammer, 3# sledge hammer.

### **STEP 1: PRE-ASSEMBLY**

The first step is to add ballast to the lower piling cone water jet nozzle. Without weight, the piling shell will tend to float, possibly out of position. However, the ballast can be added with the piling floating, just be careful when dumping the buckets of concrete in as it tends to bounce back upward.

For PVC piling shells you'll need to cut the 20' pipe into two 10' long sections. Next, using PVC cleaner and glue bond a 10' long piece of 3/4" schedule 80 PVC pipe to the cone water jet nozzle PVC end. Then install a 10' length of the PVC shell onto the cone nose using an ample amount of silicone caulk/adhesive, and screw together with 12, #10x1" screws evenly spaced and allow to cure. This will prevent unwanted water entering the piling nose and shell.

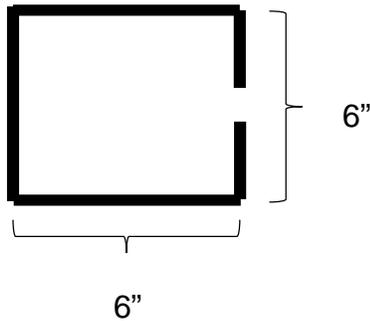
For both the Cougar fiberglass piling and PVC piling shells, mix 2 bags of cement/concrete according to their directions and with the 10' piling standing upright on land, not in the water, pour the concrete ballast mixture into the piling and nose and

shake/twist lightly to even and level out the concrete ballast. Allow to cure fully. If you choose to add the ballast to a floating piling add up to 5 or 6 bags of concrete until the nose of the piling is resting on the bottom. Using this method you do not need to wait for the concrete to cure before adding the rebar, just be careful not to allow the rebar to sink into the concrete and that it is about 5 inches higher than the shell.

**STEP 2: REBAR ASSEMBLY**

While the concrete ballast is curing is an ideal time to assemble the rebar sections so that they are ready to install.

You'll want to cut the 5/8" epoxy coated rebar into eight 10' lengths. You'll also need to cut the 1/4" rebar into nine 24" lengths. Bend the 1/4" rebar lengths into a 6" outside dimension square. It doesn't matter if the square is a little larger or that the ends don't meet, so long as each square is the same size. {see diagram 'A' below}



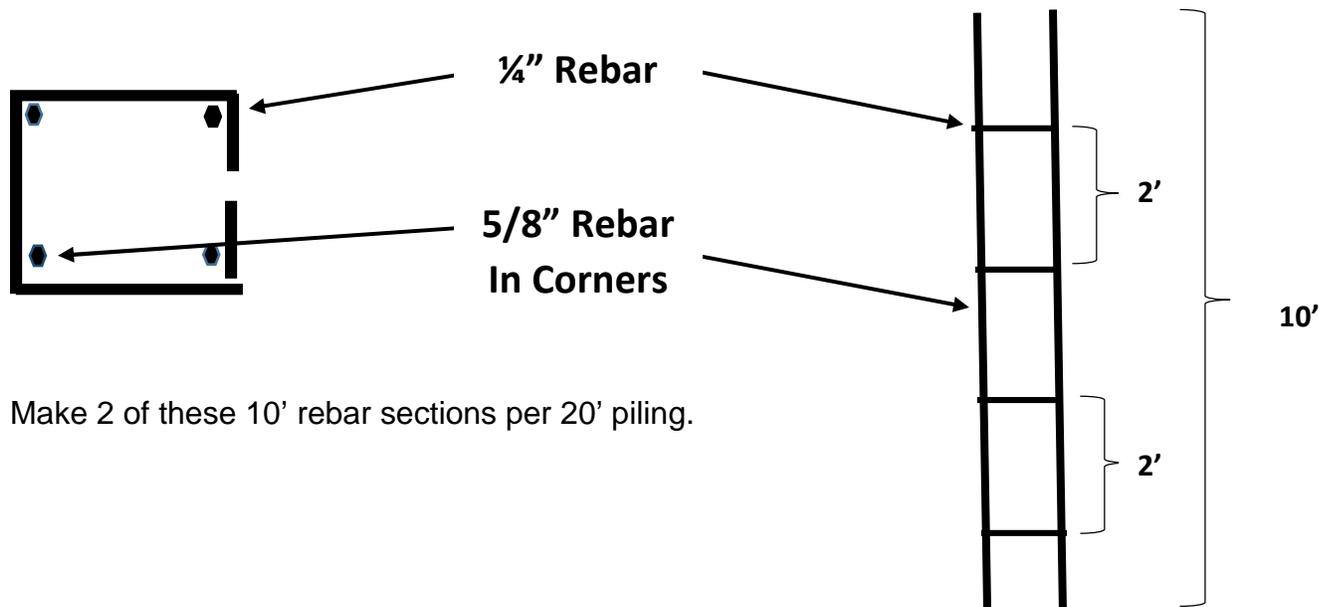
**DIAGRAM 'A'**

1/4" rebar bent into 6" OD squares.

9 required for 20' piling.

Next you'll want to mark each of the 5/8" rebar every 2 feet. Using rebar wire ties tie off the 5/8" rebar to the inside corner of the 1/4" rebar squares every 2 feet, but not at the top or bottom, only in-between. {see diagram 'B' below}

**DIAGRAM 'B'**

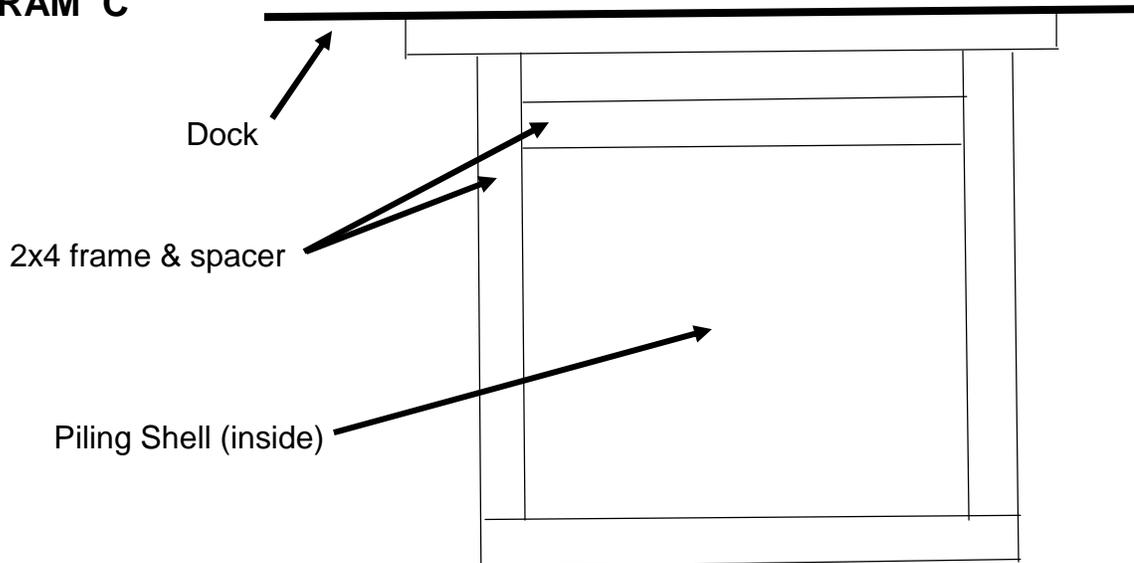


Make 2 of these 10' rebar sections per 20' piling.

### **STEP 3: PILING ASSEMBLY**

Mark out on the dock the spacing required for each piling (i.e. many lifts are on 9' centers). It is advisable to make a piling guide using 2x4's attached to the dock temporarily (see Diagram 'C'). For sloped bottoms you may want to install guides both high and low to keep the piling from sliding down the slope. Make the spacer and guide about 1/4" larger than the piling's outside dimension in order for the piling to slide through easily, but without moving off to one side or another.

#### **DIAGRAM 'C'**



Here's a photo of our piling guides. They're 4' high and have a 13x13 ID opening.



Next, if the bottom has a steep slope, oyster shells or gravel, it's best to use a water jet PVC pipe to get a starter hole made for the piling to go into. A 2 to 3 foot deep starter hole should be sufficient in softer bottoms, but for harder sands and clays make a full depth starter hole about 6 to 12" in diameter. When making a full depth starter hole you may want to use a couple sections of steel pipe instead of PVC which might wander off center and cause the piling to lean and not be plumb.

To make a 6 to 12 inch wide starter hole with a steel water jet pipe, you may want to install a steel cap on the bottom of the pipe and drill a 1/2" hole in the end of it. Then, just above the cap on the pipe, drill 3/8" holes at a 45 degree downward angle staggered on all four sides of the pipe. By turning the water jet pipe a little as it is lowered will normally create the desired diameter hole that you want.

Then, lower the bottom piling shell into the water through the frame until it rests on the bottom. Check that it is plumb and level. Carefully lower and center the rebar frame into the piling shell until it rests on the ballast and is centered with the water jet PVC pipe inside the rebar frame. Repeat this with any other pilings to be installed.

#### **STEP 4: OPTIONAL MOUNTING HOLES**

Mounting holes for boat lifts and boat house rafters can easily be molded right into the piling as long as you know ahead of time the exact dimensions of the bolts and their spacing.

As an example, if you are installing a boat lift with 5/8" galvanized bolts on 36" centers and 4" from the top of the piling, here's how to do it.

1. Cut lengths of 1/2" PVC pipe at least 16" long which will make a 3/4" hole.
2. Mark each of the hole locations on the front and rear of the upper piling shell and drill with a 3/4" hole saw.
3. Insert the PVC through the holes and extending out both sides about 2". Use masking tape, plumbers wax or clay to seal it and hold it in place.
4. Once the concrete has cured, drive the PVC inserts out with a hammer and you'll have perfectly formed mounting holes.

#### **STEP 6: POURING THE CONCRETE**

By the time you've reached this step you should have your crew or friends on hand to assist and everyone knowing their part of the project. It's best to do a dry test run just to make sure everyone is on the same page, as concrete cannot be allowed to cure prematurely because of a delay.

Remember, even though you may have more than one piling to do and already setup ready to go, you will only be pouring concrete into one piling at a time until it is completed. If anyone needs a break, do it in-between pilings.

If you're not using a concrete pump truck or ready mix truck that means you'll be mixing the concrete in a mixer or by hand, preferably close to the piling installation. When hand mixing you'll need one person mixing, one but preferably two bringing buckets of concrete to the piling and one person on a ladder or scaffold pouring it into the piling shell and tamping it down every bucket or two. Water jet as needed to get the piling to go down. In some cases with harder bottom material you may need to water jet with a PVC/steel pipe from the outside close to the piling.

Once the first piling shell has gone down enough and a couple of feet is still above the water or dock, is when the next section of water jet PVC pipe, rebar section and the next piling shell needs to be installed. **However, in the event you are having difficulty jetting in the lower piling, do not waste time continuing to water jet it and risk the concrete curing. Instead immediately begin the next piling section following the steps below. Once the entire piling is completed (extra bracing is recommended) and cured, you can continue water jetting as needed.**

1. The trick to installing the second section of piling is that it, the rebar and PVC all need to be raised up at the same time together. A ladder and 3 guys will normally be needed. First, screw in a 2x4 stopper inside the piling guide about a foot above the bottom piling top. This will stop the piling shell from sliding down and allows room to tie the rebar together and attach the next PVC pipe. To keep the rebar from sliding through, loop a rope through it (do not tie off) and have someone hold both ends until the rebar is tied off.
2. Lower the shell, rebar and PVC into the guide.
3. Lower the rebar and with 4-6 inches of overlap tie off and remove the rope.
4. Install water jet PVC pipe to the lower one using a coupler and PVC cleaner and cement (glue).
5. Apply an ample amount of silicone to the inside of the coupler/flange of the upper piling section and carefully lower into place over the lower piling. Make sure the piling labels are on the same side. Secure the two piling shells with 12 screws, 3 per side evenly spaced around the piling shell about 1 ½" below the seam.
6. Continue pouring concrete as before, tamping and water jetting until the piling is at the desired height. Using a hand trowel, smooth out the concrete at the top of the piling.

7. Immediately install paper cups if the rebar is exposed over the top of each rebar and into the concrete about 1 inch deep and allow to cure. REPEAT THE ABOVE STEPS 1-6 WITH PILING #2, etcetera.



8. Once the piling concrete has cured, remove the paper cups and cut off the rebar as close to the bottom of the cup depression as possible and back fill with either silicone or a water-proof epoxy resin to seal the ends of the rebar. Cut off the PVC flush to the top and seal with silicone.
9. Allow a minimum of 7 days of good weather for the concrete to cure fully prior to any boat lift or boat house installations. Top caps should also be installed after 7 days of curing assuming sunny weather conditions.



**CONGRATULATIONS  
ON A JOB WELL  
DONE!**

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