



# Pond Armor<sup>®</sup>

Non Toxic Epoxy & Polyurea Pond Sealers

## 101 Pond Tips & Tricks

**Everything you should consider before building your pond**

So, you've decided to build a pond. With the wealth of information out there that you may have come into contact with, your head may be spinning right now. That's OK, because this report is designed to help you sift through all of that and get yourself organized for your project.



### Pond Design

#### 1. Fish or no fish?

This might sound like a funny question to ask but it's also one of the more important questions to ask prior to construction. You see, if you plan to have fish, then you're going to need certain equipment installed in order to keep your fish environment clean and healthy. Fish need a certain amount of water circulation and filtration in order to survive, where a typical fountain might only require a pump to keep the water flowing. In fact any water feature that plants and fish will not be housed in will probably be chlorinated to keep it clean. You cannot do that in a water feature where you plan to house fish or plants.

#### 2. Structured or liner pond?

This is one of those questions that most people think can be answered based upon the current budget for the pond. In reality, thought should be given to the longevity of the ponds life as well. You don't want to budget your cash to build a pond today that will be prone to failure a year or so from now. This does not mean that a structured pond will last longer than a liner pond, but does mean that the proper use of materials will ensure long, virtually maintenance free pond life. Look at your budget for your pond project and amortize that cost along with maintenance over the next two decades. Will your pond even last two decades? What happens if I develop a leak? Who will do the repairs? Some of these questions can be answered very easily if you use Pond Armor<sup>®</sup> products because we have designed our products with questions like these in mind.

For instance, if you use a rubber liner and develop a leak, you may end up having to remove and replace the complete liner in order to correct the problem. However, if your pond is a structured type using concrete coated with Pond Shield<sup>®</sup> Epoxy, the repair is simple and even someone with minimal skills can most likely render a repair.

### **3. Children**

Children are fascinated by ponds and fish. They love to be right by the edge in order to see everything and in some cases; they'll even try and interact with the fish by touching them. The only harm that usually comes from this is when they are unsupervised and accidents happen. If you have children, plan ahead and make sure your pond is constructed safely and can be enjoyed by them as well.

### **4. Spraying fountains**

If you plan to have some sort of spraying feature in your pond or fountain, make sure that wind that moves through your yard is not going to affect the features end result. Water meant to spray up and fall back into the pond looks pretty funny spraying up and blowing off to the outside of the pond. It's also a waste of water.

### **5. Pond Placement**

Keep in mind that where you place your pond can directly affect it later. For instance, a pond placed at a low point in your yard can be subject to runoff rainwater. Runoff rain water can carry contaminants right into your pond where they can poison your fish.

Plan ahead!

### **6. Wooden ponds**

Ponds can be made from a variety of different materials including wood. With wood though you have to expect that there will be a lot more movement than with other ponds constructed of materials like concrete or stone. In these cases there are varying methods that can be used to seal them up that includes Pond Shield<sup>®</sup> Epoxy. If done properly can seal your wooden pond and give you years of reliable service.

### **7. Scaling**

Take a long hard look at your pond project. If for whatever reason you think your project has quickly left the realm of being within budget, consider scaling it down instead of abandoning it. You will find that the grand scheme you originally planned that you no longer can afford can easily be achieved just by making it a little smaller.

### **8. Color choices**

In a world where so many things are evolving, the products you choose to use for your pond are as well. Ponds used to be lined in black because that was all that was available. Today, products like Pond Shield<sup>®</sup> Epoxy can be purchased in almost any color you desire. If your architecture revolves around a specific look, then be sure to pick a color that compliments it. You'll find that the finished project looks a lot better.

### **9. Curves or right angles?**

When designing your pond, keep in mind those right angles, while they may present a certain architectural flair, they may also create dead spots in the circulation of your pond. These dead spots can end up collecting debris and such that might never get to the filter properly. Curving your corners or installing jets that make the water flow correctly will eliminate those dead spots.

### **10. Dimensions**

Never "eyeball" your pond dimensions. You're going to have to calculate dimensions and quantities for all sorts of reasons and guessing will almost always have you missing your

budget. Your ponds dimensions bear weight for all of the materials you will end up using and the last thing you need it to run short on any of these materials, especially at the time they are being installed. The materials needed to finish the task at hand may not be readily available and cause undo delays in the over-all project.

### **11. Sketching a plan**

Making a sketch of your yard and the pond in relationship to it will always make your job easier during construction. Sketch were all of your existing yard accoutrements will be as well as any others you plan to add as part of the project.

### **12. Calculating square footage**

You're going to have to calculate square footage for many reasons. When you do so, be sure to calculate the floor and any walls that your pond may have. For stream beds, keep in mind that your stream will have depth. Even if it's only a couple of inches in depth, a stream bed that runs a couple hundred feet and is several feet wide changes the square footage calculation quite a bit. Missing that depth can throw your square footage completely off.

### **13. Outline your pond**

Give your pond a sort of test run by outlining it with some garden hose or something similar. You can easily adjust the shape of the pond at this early stage if it turns out your original plan does not work. Walk around it from different angles to make sure you like the feel of the shape.

### **14. Research the help you plan to hire**

There are a lot of professional installers out there that would be willing to install your pond, but you must carefully evaluate each one of them before making your choice. You should ask for references from the installer and dutifully check them. Check with your local Better Business Bureau to see if any complaints have been made about this business. Some States have a Consumer Affairs department that can also shed some light. You might also check to see if the installer belongs to any professional organizations. This might indicate the installer's willingness to conform to certain rules in regards to pond construction. Also make sure you have all of the details regarding your pond in contract form. This is one of the best ways to be sure that everything you require in your pond is accomplished.

### **15. Delivery surcharges**

When having materials delivered to your pond location you may be subject to delivery surcharges if the access to the location is poor. You may want to find a suitable location where the main bulk of your materials can be dropped that you can move later as you need them.

### **16. Colder climates**

If you live in an area where the climate gets colder in the winter, you may have to consider bringing the fish in during that time. If this is the case, you'll need to plan on some sort of housing for them that mimics the pond in regards to water circulation, filtration and so on. Some people settle for a large aquarium that can temporarily house their fish, while others build an indoor pond that is just a water feature in the summer when their fish are out in the main pond.



## Landscaping

### **17. Use your current landscaping**

You should give thought to your current landscape and try to use it to enhance your pond or water feature. For instance a sloping hillside in your backyard would be the ideal place to create a waterfall into your main portion of your pond. Likewise, be sure not to place a stream that divides your backyard where you are unable to get simple tools like lawn mowers into areas that need maintenance.

### **18. Trees**

A pond sure can look great all tucked up under a small grove of trees. But with trees come extra maintenance. You'll have to make sure your pond is capable of handling the leaves that will almost assuredly end up in the water. You'll also have to make sure any of those thirsty trees are not looking at your pond as a great source of food. Trees that push up through the bottom of a pond are always difficult to correct and the damage caused always hard to fix.

### **19. Unstable soil**

If you are in an area where the soil is usually unstable, you will have to consider your construction method. The last thing you want to do is create a pond that can potentially harm you if the soil suddenly erodes or gives way. In cases of unstable soil, a more solid construction method is necessary. This usually means stone work or concrete as the medium.

### **20. Lawn and dirt**

Once you decide where to put your pond, you may end up removing parts of perfectly good lawn. This sod can definitely be used in other places where needed, so plan ahead and use them as needed. You might also check with your neighbors to see if they'd like any of the unused sod and dirt you accumulate from the hole you are digging. You may find that what you once thought would be a chore to get rid of actually disappears before your eyes.

### **21. Lighting your pond**

There are many different types of lighting you might want to integrate into your pond. You should try and keep the power usage as low as possible so that your electrical bill does not work its way out of your budget. Using low voltage lighting will help and is very easy to install yourself. You might also think about solar lighting. A small solar panel hidden in such a way as to blend in with the surroundings can power several items for your pond and save you some cash. LED lighting uses virtually no power at all and can outlast conventional lighting by far.

## **22. Edging your pond**

If you plan to build a pond that utilizes some sort of rock edging, you'll want to make sure that the construction is solid. You wouldn't want to step on an edging rock only to have it give way causing you to fall and injure yourself. This edging is best utilized with a structured concrete pond but in the case of a pond utilizing a material like a rubber pond liner, it is best to create a footing that the edging can sit upon. This will make for a more solid structure that will bear more weight.

## **23. Bridges**

Your plans might include a bridge of some sort to go over your pond. If they do, your bridge should be set onto its own concrete footing. This will stabilize the bridge and keep it strong enough to handle varying weights applied upon it. If you think it is required, you can install railings to assist with your security in crossing the bridge.

## **24. Decoys**

Using a predator decoy in your pond to scare away another predator may actually invite more of the predator decoy type. For instance, having a heron decoy in your pond may actually attract more herons who will undoubtedly fish your pond for food.

## **25. Predator protection**

Sometimes the depth of your pond can be regulated by local building codes. As such, the smaller depth is an open invitation to predators. If this is the case with your pond, you can cover the pond with netting of some sort and if you're clever enough, you can devise ways to make the netting pleasant to look at. A dome for instance, covered in netting may look pleasing. Another way might be some sort of decorative fencing made of iron or such. There are many ways to overcome this and all you have to do is get creative.

## **26. Providing shade**

If your pond is always in direct sunlight, it is important to provide your fish with some shade. Your fish can become sunburned and this can cause undue stress in them. A simple method of creating shade could be a small frame made of black ABS pipe that has polypropylene netting attached to it. Float this in the pond when the sun is directly over the pond and your fish will swim under it for protection. When there is natural shade in the pond again, just remove the frame and store for later use.

## **27. Floating leaves**

If you do not have a skimmer in your pond, it is important to remove floating leaves when you have them. These leaves will eventually sink to the bottom of the pond where they will decay and cause problems with your water chemistry.



## Pond Components

### 28. Get a thermometer

Water temperature is a very important but almost always overlooked aspect of a pond. Your Koi can only assimilate food when the water temperature is in the correct range. Feeding them when temperatures are lower than they are supposed to be can actually kill your fish. Even the warmer climatic areas like California experience temperatures cold enough to merit a stop in feeding habits.

### 29. Pond jets

Installing pond jets are a great way to increase water flow through your pond, but keep in mind that they also promote extra swimming from your fish. While this may be an ok routine for them during the day, your fish will eventually need a break from the current being created in the pond. Turn the jets off at night so that your fish can relax and not expend excessive energy when they are naturally supposed to be in a settled down state.

### 30. Oxygenating your pond

If you're going to have fish in your pond, you really should consider adding oxygen to it. A simple air pump with a nice air size air stone will help make sure your fish always have as much oxygen as possible. If not, you run the risk of your fish working too hard to assimilate what oxygen is in the water. Don't make them work for it.

### 31. Mechanical and biological filtration

There are two basic types of filtration, mechanical and biological. Keep this in mind when selecting the filtration system for your pond. Mechanical filtration will remove the large waste particles that are produced where biological filtration will neutralize unseen waste such as ammonia, nitrates and nitrites. All of which are deadly to your fish.

### 32. Wall fountains

Sometimes a wall fountain is utilized in some way to return water back to the pond. There's nothing like a large lion head spouting water back into your pond. The problem is your wall. If the wall is not properly sealed, you may find water getting onto it and seeping through to the other side, thereby eroding your wall. Pond Shield<sup>®</sup> can be used as a water barrier in these instances, either by applying it directly to the wall or as a barrier underneath stone or brick applied to the wall.

### 33. Float valves

Float valves are great for maintaining the water level in your pond, but do have a price. If you allow them to automatically fill your pond you also allow them to inject chlorine and possibly chloramines into the water and these two chemicals though not harmful to use are very harmful to fish. This can be over come by installing a de-chlorinator device before the float valve. These devices will eventually become used up, so you'll need to make sure to install them in a fashion that allows you to replace them over time.

### **34. Pump head**

You're more than likely going to install a pump in your pond in order to circulate water. It is important to know how that pump will react to the location you plan put it in. For instance, if you plan to return water to your pond via a waterfall, the height on the water fall will play an important part in choosing the correct pump. Your pump will lose pressure with the added height that it needs to move water. This vertical distance to which the pump will deliver water is called the pump head. Be sure to choose a pump that will overcome this and still be able to supply your pond with the circulation needed.

### **35. Ultraviolet filters**

Your ponds water will turn green and mucky with algae if you do not use an ultraviolet (UV) filter. Formal ponds or natural ponds just always look better with clear water. Be sure to investigate the proper size UV filter for your ponds size.

### **36. Magnetic drive pumps**

You might consider a magnetic drive pump to circulate your ponds water. These types of pumps are sealed in such a way that the impeller is driven magnetically and any of the lubricants that keep the pump in good working order are outside of the actual impeller area. This means that if the pump wears in such a manner as to leak any lubricant, the lubricant will not be able to contaminate your water for your pond.

### **37. Deicers**

If you plan to keep your fish in their pond through the winter season, you might consider a deicer for the surface of your pond. This device will essentially keep a portion of the surface free from ice and allow the exchange of gases from within the pond to take place with the outside.



## Construction Materials

### 38. Wiring

Whenever possible, instead of just running a simple extension cord to your water feature, you should have electricity brought to it. This keeps you from running the risk of accidental electrocution or any other hazard. It is always best to hire a professional electrician to handle these portions of the job.

### 39. Toxic construction materials

This is probably one of the most overlooked areas of pond construction. The materials you use will directly affect the life you plan to house in your pond. Be sure to choose materials that will not harm the fish or plants you plan to keep. Products like Pond Armor<sup>®</sup> products are always tested for toxicity and safe for both fish and plants. Pond Armor<sup>®</sup> specifically tests their products in both their cured and un cured states to ensure this. A lot of other products can often leech off toxins even after they are cured and cause damage to aquatic life.

### 40. Concrete

Concrete is simple, just pour it into the shape you want and you're good to go. Wrong! Some of the most common mistakes that are made in regards to concrete relate directly to the final strength properties. You cannot just grab a bag of mortar mix and spread it out into your hole and expect it to give you years of service. Many different components have to be considered like rebar reinforcement, varying mesh reinforcements, the size rock in your concrete as well as the proper thickness. If you're not sure about any of these things always check with your local concrete companies and tell them what you're planning. They will be more than happy to calculate the proper mix of sand, rock and cement for the strength needed in your project. They'll also recommend the best usage of rebar and mesh reinforcements.

### 41. Shotcrete and Gunitite

Either of these two concretes are sprayed in and always done by a company that specializes in the procedure. What you need to keep in mind with these procedures is not only having the proper reinforcement like specified above, but how your finished surface will turn out. In some cases the finished surface can be so rough that the cost of sealing your pond with Pond Shield<sup>®</sup> Epoxy increases. If you communicate with the company spraying in your concrete and tell them you plan to seal the surface with Pond Shield<sup>®</sup> Epoxy, they will generally take care to make sure the surface area is as smooth as it can be.

## **42. Rubber liners**

Rubber liners might be cheap but also come with some hidden costs. The first and foremost being the virtual inability to repair the liner if it is punctured. Most patch kits do not work or fail quickly after installed. If the puncture takes place under a large boulder or the like, you may cause even more damage trying to get at the area to be repaired. The folds and creases that are created as a rubber liner is installed are a haven for bad bacteria and other muck. Things like this can be overcome if you use a material like Pond Shield<sup>®</sup>-non toxic epoxy over a structured surface like concrete, wood stone, steel for example. It is fish safe and because it is a coating, it will form fit to the surface applied to.

## **43. Wood choices**

There are a great many ways to utilize wood in your pond project. Bridges, trim, boxes and such all look great but one should take care in their choice of wood. You should avoid any pressure treated wood and they are laced with toxins that will harm your fish. Also keep in mind that to preserve wood, sealers have to be used as well. These sealers need to be non toxic so that they do not harm the fish either. Products like Pond Shield<sup>®</sup> clear epoxy can be used to seal wood where it comes into contact with your pond. Again, avoid pressure treated wood.



## Pond Construction

### **44. DIY or hire a Professional Installer?**

Again, another funny question, but equally as important. If you have general handyman skills, you might be able to handle a lot of the work yourself, but keep in mind that some of the work can be done by a professional where you can rely on a good warranty. For instance, if you plan to have lighting in your pond, you might hire an electrician to handle that portion so that you can feel comfortable with the installation afterwards. The last thing you should do is work your way through any phase of your construction where you are not fully knowledgeable because it will only cost you time and cash in the end. If you're a "do it yourselfer", do the things you are sure you are knowledgeable about and then either properly learn the new skill or get a professional's assistance.

### **45. Rendering rough concrete to smooth it out**

Sometimes, your concrete has turned out so rough that you need to smooth it out prior to applying Pond Shield<sup>®</sup> Epoxy. The problem is that if rendered incorrectly, the smooth concrete that was just applied may pop off and take the new coating with it. There are materials available called bonding agents that should be applied to the concrete prior to applying the smooth render. These bonding agents promote the adhesion of your new smooth concrete to your original concrete surface. Your local concrete store will have them or you can also ask any of the plastering companies in your area what they recommend. After all is done, then you can apply Pond Shield<sup>®</sup> Epoxy and waterproof your pond.

### **46. Acid etching masonry**

A lot of people think that acid etching is just to make your surface are just rough enough for a coating application. While this is one of the reasons, the most important reason is to remove the calcium deposits that naturally form on concrete as it hydrates. During this hydration process, these deposits will form on the surface and will, in most cases, fall off. If you have not acid etched prior to applying any coating, you run the risk of them falling off and the new coating coming off with them. Acid etching is cheap insurance.

### **47. Benching the pond floor**

Benching is a term used to describe angling your pond floor. For instance, if you have a drain plumbed into your pond floor, your floor should angle down towards the drain. This will ensure that your water flow towards the drain is positive and will assist in causing solid waste to get to the drain where it can eventually be filtered out of the pond.

#### **48. Local building codes**

Check with your local building department to make sure your pond will meet the local building codes. If you do not and the building department finds out about your pond later, they can request that your pond be deconstructed and then reconstructed to meet their codes. If you have hired an installer to do the work, they are supposed to know what is expected of them. Be sure to ask plenty of questions prior to starting work.

#### **49. Building permits**

Just like building codes, building permits may also be required. Hired installers usually handle this but it is ultimately your pond and your responsibility to make sure you are properly permitted. Not having the proper permits can mean delays in completion dates and such should the local building department decide to halt the process of your project. Remember, your local building department is not there to harass you, but to bring you and your project into compliance. Work with them and they'll work with you.

#### **50. Concrete is like a sponge**

Concrete can allow moisture and water to seep in or out of a pond. Water seeping out obviously means that you'll spend a lot of cash filling your pond back up on a regular basis. Water seeping in means that it may be carrying toxins into your pond where they'll do damage to the aquatic life within. Toxins like motor oil, soap or fertilizers are unseen but very harmful. This can be corrected by coating your pond with a product like Pond Shield<sup>®</sup> Epoxy. Once bonded to your concrete or stone work, it will create a barrier that will not allow water to leak out or enter from the opposite side.

#### **51. Pond Depth**

If you plan to keep fish in your pond, you should consider an average depth of at least three to four feet. You need to give your fish a chance to evade any predators that may prey on them. If you do not plan to keep fish then a minimum depth of eighteen inches should suffice for keeping plants. If you plan a deep pond, you should consider some sort of ledge that makes it easier for anyone who accidentally falls in a way to exit the pond.

#### **52. Natural water sources**

Check with your local building department if you plan to tap into any natural water source. A creek that runs through your yard might provide a great way to keep your pond full, but may also not be allowed. If it is allowed, be sure to check the water for contaminants. Anything inserted into the water upstream will definitely have an effect on your pond as it passes through.

#### **53. Ground fault circuit interrupter**

Whenever you plan your ponds electrical needs, be sure that you have an electrician install ground fault circuit interrupter (GFCI) outlets. These are designed for your protection around any area that may be prone to short circuiting and will save lives.

## **54. Tools**

If you're the DIY type of person, you are going to need to do an inventory of the tools you'll need to accomplish the job. Make a list of all of the aspects of the project that need to be done and then a sub list of the tools involved with each aspect. You may find that you'll need to rent a few tools here or there during the process. You should try and reserve those tools a few days in advance so that your project schedule does not suffer due to the inability to get what you need.

## **55. Mixing mortar**

You'll want to mix your mortar to the consistency of toothpaste for best results. It's always a good idea to mix small amounts of water into your mortar mix at a time to ensure that you do not make the mixture too runny. If you do, it's a good idea to have a second bag ready to add to the mixture in order to get it to the correct consistency.

## **56. Concrete block**

If you plan to use concrete block in your pond construction, only plan to lay about three to four courses per day. A course is one row of block. If you lay more than three or four courses in a day, you run the risk of the weight of the upper blocks squeezing the mortar out from in between the blocks in the lower courses. It is also recommended that you set your corner blocks and get them level, allowing them to set up at least a day before you start running your courses. This way the corners can act as your guide in getting the courses absolutely plumb and level. After all of your block has set up, you need to fill it with concrete to create one solid mass.

## **57. Rebar**

One of the most neglected structural reinforcements in concrete and concrete block is rebar. Rebar should be run at least every third course and it should also be run through the height of your finished block and down into your concrete slab if you're utilizing one. This will help to make the structure sound and keep your walls and floor tied together in such a manner as to minimize cracks at the joints.

## **58. Bottomless pond**

In some cases it is more cost effective to build your pond sides with concrete block and eliminate the concrete bottom. The problem that arises then is how to get your bottomless pond to hold water. It's simple. You can coat the entire solid wall surface with Pond Shield<sup>®</sup> non toxic epoxy and the physically attach the rubber liner folder over and sandwiched between a thin strip of stainless steel. Use red leg concrete anchors to attach the steel to the walls with the liner sandwiched in between.

## **59. Bottom drains**

In the case of constructing a pond using concrete, installing a bottom drain is simple. You just pour the concrete around the drain and then seal it with Pond Shield<sup>®</sup> Epoxy afterwards. You simply sand the -plastic drain, wipe clean, prime with PVC primer and coat with the epoxy.

## **60. Skimmer installation**

Skimmers are a very useful tool when it comes to ponds. They are designed to remove any floating debris and if installed properly, they will catch all of this material and effectively leave you with a clean surface on your pond. If you are constructing a structured pond, you'll need to be sure your skimmer is sealed in place. In a structured pond you can use Pond

Shield<sup>®</sup> Epoxy to glue to skimmer box into place. With its elongation break strength of 9,500 psi, you won't have to worry about the skimmer box coming loose.

## **61. Concrete curing**

Most concrete needs at least twenty eight days to cure properly. This curing process is called a hydration process. During this time, you need to keep the concrete damp so that it does not dry out and shrink. Shrinking can cause cracks. You should avoid the urge to move forward in your project until this process is complete. For instance, acid etching and coating your pond prior to this only means that more calcium deposits can form under your coating and push it off. Not to mention that if you have coated your pond, there will be no effective way of keeping it moist throughout the hydration process. You have waited this long, a couple of extra weeks will not make a difference now unless you skip them. Then you're just in for trouble. Be patient.

## **62. Calculations**

Knowing how to calculate the area and volume of your pond is important. For calculating rectangles and squares the formula is:

Area = Length x Width

For example 24 feet (L) x 10 feet (W) = 240 square feet (Area). For

calculating circles the formula is:

Area =  $r^2 \times \pi$  (r = the radius (radius =  $\frac{1}{2}$  the diameter across) and  $\pi = 3.14$ )

For instance if the diameter across of your pond is 10 feet, then the radius is 5 feet.

Therefore 5 feet (R) x 5 feet (R) x 3.14 ( $\pi$ ) = 78.5 square feet (Area).

Do not forget to calculate the sides of your pond as well. If your pond sides are rectangle or square, the area calculation for the sides will be the same as for calculating for a square or rectangle. If your pond is circular, then you need to calculate the circumference first. For calculating circumference the formula is:

Circumference =  $\pi \times$  Diameter

For instance if the diameter of your pond is 10 feet then 10 feet (D) x  $\pi = 31.4$  feet

(Circumference). Now you can multiply the Circumference by the average depth and get the total area of the walls of your pond. Calculating the volume of your pond is quite simple as well. The formula for that is:

Volume = Surface area x Depth

It is suggested that for ponds that have varying depths and shapes, to break these into smaller areas and calculate them separately. Then add all of the appropriate calculations together for final results. It is not advisable to try and calculate how many square feet your pond is by using the total number of gallons your pond is. This is very inaccurate as the total gallons can include pipes, filters, vortex chambers and such that are not needed in total square footage calculations. Calculating gallons can be done at fill up or at least estimated by the following calculation:

Length x Width x Depth = Volume in cubic feet. Cubic

Feet x 7.5 = Total gallons.

## **63. Strengthening additives for concrete**

We have talked about rebar and wire mesh for reinforcing concrete, but did you know you can also add special fibers to your concrete mix? Reinforcing fibers will add to the over-all strength of your concrete and make it less susceptible to cracking. You can pick this material up from almost any concrete supply store in your area.

## **64. Cold joints**

Sometime it is either necessary or attractive to utilize a portion of an already existing piece of construction. For instance, you may put your pond right next to your patio and decide to use a portion of the patio concrete and part of the pond. Because these two pieces of concrete have been poured at different times, this is referred to as a cold joint. A cold joint is susceptible to more movement than usual and when coating your pond, an extra step is necessary to overcome this. When applying Pond Shield<sup>®</sup> Epoxy, you'll want to coat the joint and then lay a one or two inch wide piece of fiberglass along the joint. Press the fiberglass right into the wet Pond Shield<sup>®</sup>. Once you have done this, apply another coat of Pond Shield<sup>®</sup> over the top of the fiberglass and thoroughly saturate the fiberglass. Once it has set up, continue coating the rest of your pond. The new joint, even though it is susceptible to moving will be even stronger with the added fiberglass.

## **65. Limestone**

Limestone is one of those types of rock that really look attractive in a pond, but its use comes with a price. Limestone can affect the pH readings in your pond and in some cases cause you to always have to add chemicals to counteract this. If you plan to use limestone, you might consider coating any submerged portion of it with Pond Shield<sup>®</sup> clear. The Pond Shield<sup>®</sup> Epoxy will seal the stone and effectively keep it from affecting your water chemistry.

## **66. Bottom drains**

It is advisable when installing a drain in your pond to make sure the drain has some sort of protective dome over it. This will prevent your fish from accidentally getting caught up in the drain. These domes are usually removable for ease of maintenance and once installed will almost disappear from view.

## **67. Designing your lighting system**

When you design your lighting system you should keep one very important thing in mind. Keep the lights aimed away from your observation area. This way the lights do not shine directly at you, keeping you from viewing your pond in the way you had intended.

## **68. Estimating pond material quantities**

When you are estimating the cost of materials, you should always stick with the proper calculations and then add ten percent. What you will usually find is that even though you may have been very thorough with your calculations, there may have been something you missed or did not think of. The time you usually find this out is when you are right in the middle of a specific phase and you run out of material. Having had the extra at the time of construction would have stopped any delays and kept your pond on schedule.

## **69. Backfilling**

After you have constructed your concrete pond, be sure to back fill the outside properly. Filling a small portion of the dirt and then tamping it will ensure that the soil does not sink later or erode from rainfalls and such. You should fill small portions and tamp and fill small portions and tamp. Continue this until the soil has been completely back filled.

## **70. Change in water flow**

If your pond has a waterfall, you can easily see if the water flow changes. These changes can be caused by a filter that need maintenance or piping that may have become partially clogged. If you do not have a water fall, you can install a water flow meter in the return line to your pond. Be sure to install on that is compatible with the maximum flow rate that your pump

creates. This way you can find a problem with your pond before it becomes damaging.

## **71. Digging**

If you must dig your pond by hand, be sure to wear gloves to prevent blisters and any other protective clothing to make the task easier. Make sure to shovel only small quantities at a time and give yourself frequent breaks as needed. You might also think about storing the vast quantity of dirt on a tarp that will aid in any future clean up. Once you have created enough room in the hole to stand in, work from there so as to not cause any undue bending. Protect your back and keep it straight. You might consider the use of a waist belt that is designed to support your lower back for this process.



## Pond Repairs

### 72. Patching concrete

In the event you must patch or repair concrete, you should avoid using any type of rubberized crack repair caulk. In using materials like this you are effectively allowing the concrete to continue moving in the manner in which caused the crack in the first place. You should clean the crack out and "V" it instead, then use Pond Shield® Epoxy to stitch the concrete back together. In some cases, using a one inch wide fiberglass strip over the crack with Pond Shield® will ensure a much stronger patch. Once the stitch has set up, you can sand it with 60-grit sandpaper and finish coating the entire pond with Pond Shield® Epoxy. Pond Shield® has a tensile bond strength that exceeds the internal strength of concrete. This means that once it has been applied properly, the concrete will break apart before the coating comes off. This type of strength will provide you with the assurance you need that the patch you just performed will last.

### 73. Repairing a preformed pond

Sometimes the plastic preformed pond you purchased years ago ends up with a crack or hole in it. The plastics that these are made from are not usually the types of plastics that can be repaired. The problem then becomes one of pulling the preformed shell out and replacing it. That coupled with trying to locate the same shape can become a real nightmare. There is a solution. If you clean the entire pond out, you can use a combination of Pond Shield® non toxic epoxy in conjunction with fiberglass matt to reline the entire surface to create a new interior shell.

### 74. Fiberglass ponds

Fiberglass ponds can easily be repair using Pond Shield® Epoxy. First clean and sand the area with 60-grit sandpaper. Remove any accumulated dust and apply Pond Shield® Epoxy. If the unit has a crack in it, simply cut away any fraying fiberglass and use Pond Shield® Epoxy in conjunction with fiberglass mat to render the repair.

### 75. Pools

Pools can also be coated with Pond Shield® Epoxy. Pond Shield® Epoxy is very You simply chemical resistant and is not bothered by chlorine. would apply it just as you onto any other water feature.

### 76. Stabilizing boulders

When large boulders are going to be used in a pond, you may consider stabilizing them by setting them in a small bed of mortar. Once set up, you should coat the bottom of the pond with Pond Shield® Epoxy to water proof it and use the Pond Shield® Epoxy to also cover the small mortar bed and any of the submerged boulder. A example might be your pond coated with Pond Shield® tan and then the bottom, submerged portion of the boulder coated with Pond Shield® clear to give a more natural looking appearance.



## Waterfalls and Streams

### **77. Water sounds**

Just about anyone would agree that a waterfall or spraying fountain is a really nice thing to watch and listen to. However, water does make a certain amount of noise that can be measured in decibels. You may find that the height of each tier in your waterfall or the height, in which your spray fountain pushes water into the air, creates a lot more disruptive noise than relaxing atmosphere.

### **78. Sealing a waterfall**

Sealing a waterfall use to be a chore. Now, however, sealing them can be very easy if you use Pond Shield<sup>®</sup> Epoxy. Pond Shield<sup>®</sup> Epoxy comes in clear so that you can maintain that natural look of the stone you have built your waterfall with. Once sealed, you can go back and look for any crack or crevice that was too wide to bridge and caulk them with clear aquarium grade silicone. Be sure to use the silicone last, as silicone readily sticks to things where things usually do not stick very well to silicone.

### **79. Sheeting water**

When constructing a waterfall that will essentially sheet water over into your pond, use a level to make sure the rock you use as a base is absolutely in the correct place. If the placement of this rock is off by just a small amount you may find that the water you are trying to flow only flows on one side or another of the rock and the sheeting action you were looking for has failed. Also pay close attention to the rock surface as well. Any small imperfection on a small water flow will almost assuredly be visible in the final result.



## Utilities

### **80. Monthly electric bill**

What is your current monthly electrical bill? Get used to the thought of that being anywhere from a little bit more, to a lot more. It all depends upon the equipment you choose to run your new pond. You need to make sure you choose equipment that will get the job done while not going completely overboard. Your equipment should be rated for your size pond or just a little bit bigger, but there's no reason to install a pump that is rated to circulate six thousand gallons per hour when you have a five hundred gallon pond. The electricity consumption would be a waste. This goes for any of your equipment. These devices will not be running like a television set – only on when you're watching it. They'll most likely be on twenty four hours a day, seven days per week. That is a lot of possible kilowatt hours.

### **81. Monthly water bill.**

Initially, you're going to see a spike in your water bill the month you fill your new pond up. Be prepared to have a little sticker shock in regards to this. But do not think it is over. Your pond, if you're housing fish, will need regular water changes that require replacement water. Some of these changes can be from twenty percent to forty percent of your total ponds capacity. In order to keep the water quality healthy for your fish, this is not an option. You must also consider that you'll loose water from evaporation on a daily basis as well. This does not mean you'll be filling your pond up every day, but it can require topping off on a regular basis as well. This will also add to your monthly water bill.

### **82. Utilities**

So now that you plan to build a pond, you're probably going to have to dig a hole. In doing so there are many hidden hazards under the ground that you should be aware of. Hazards like water pipes, sewage lines, gas pipes, and electrical can all be found right in your backyard. You should consult with your local utilities companies to find out exactly where these hazards might be in your back yard before you start.



## Stocking Your Pond

### 83. Snails

With every pond comes algae. Snails can be used to effectively remove algae but you should be cautioned that snails can carry parasites that are harmful to your fish. Be sure to purchase any stock for your pond from a dealer that you trust.

### 84. How many fish to start with?

Do not plan to add all of your fish to your pond at one time. Starting with one fish in order to get your pond established is important because more fish will create more toxins and waste. Without the proper amount of beneficial bacteria to take care of the toxins and waste, your fish will quickly poison themselves and can die. It is also recommended to stick with a reputable dealer that you trust to ensure that the fish you add are healthy and free of parasites.

### 85. Feeding

Feeding your fish is important, but care should be taken that they are not over fed. Fish do not have stomachs so their digestive system is much different than ours. They depend upon their metabolism to assist them with digestion. When their metabolism is peak, they digest food with ease. When their metabolism is slow, food does not digest as quickly. When this happens the food in your fish runs the risk of rotting and in turn causing internal problems for the fish. Temperature also plays a significant part in feeding. Colder temperatures force the fish into a sort of hibernation period where they cannot assimilate food at all. Feeding during those times can seriously damage the fish, if not kill them. Fish can also suffer damage if fed when the temperature is too hot as well. Be cognizant of the proper feeding requirements of your fish.

### 86. Adding fish to your pond

When the big day has come to add a new fish to your pond, you should acclimate that fish to your pond properly before just dumping him into the pond. In some cases, new arrivals are put into quarantine in order to prevent the introduction of parasites into your water. Once that has been done, you would take the fish inside its bag of water and set the bag into the pond. The bag should remain this way for about thirty minutes, allowing the water temperatures to equalize. Once this has been done, you should empty the bag and fish into a transfer container where it can be gently picked up and placed into the pond. You should avoid mixing the original water with your pond water so as to minimize the risk of introducing any new parasites.



## Plants in Your Pond

### **87. How many plants?**

Too many plants in your pond can block the exchange of gases in the water as well as block sunlight from getting through to the fish and oxygenating plants. It is very important to keep a good balance in your plant life so that they benefit your pond rather than hinder it. You'll want to keep up on the maintenance of the plants as they can quickly over run a pond and start to cause you troubles.

### **88. Plant shelves**

If your pond is to be constructed with plant shelves around the edges, make sure to completely stock the shelves with plants. In doing so, you'll effectively keep predators like raccoon from being able to find a foot hold to rest upon so they can catch your fish. With nowhere to stand, they'll usually move on.

### **89. Moss**

Moss that grows on certain water features can actually enhance the appearance of them. For instance a natural looking waterfall or stream can be enhanced by moss. If you plan to encourage moss growth keep this simple rule in mind. Moss will grow in slower moving water (fifty gallons per hour or less) and will usually not grow in any thing that is fast (one hundred and fifty gallons per hour).



## Water Quality

### **90. Test, test, test**

Be sure to pick a good water test kit. One that includes at least tests for ammonia, nitrates, nitrites, and pH are a must. It will usually take a month or so to establish a ponds water chemistry but you'll have to watch it closely afterwards to ensure that any of these toxins do not get out of hand and put your fish in jeopardy.

### **91. Salt in your pond**

If you're going to have fish in your pond, you'll have to keep the salt content up by a specific percentage. This salt content may not be a good thing for the plants you'll keep in your pond, should you decide to have both. Check into the possible choices of plant prior to purchase to ensure they are compatible with everything you might have in the pond.

### **92. Salt and evaporation**

Remember that a certain amount of salt is recommended to be added to any pond with fish. This does not mean that when water evaporates from your pond that the salt has been removed as well. When water evaporates from your pond the salt content remains the same. You should only add water to your pond to bring the level back up. Add salt again only after water changes and after testing the water to determine the current salt content.

### **93. Filtration maintenance**

From time to time your filtration system may need maintenance. It is important to remember that while removal of large solids is beneficial, removal of everything in the system is harmful. The beneficial bacteria in the filter are constantly working on removing waste from the pond. Large amounts of solid waste take enormous amounts of time to break down and can be removed, but if you remove the beneficial bacteria, there will be nothing left to contend with the waste produced by your fish and plants.

### **94. pH Levels**

If you plan to keep fish in your pond and you have hard water, you'll want to keep these pH ranges in mind and be prepared to adjust as needed as you add water to your pond. Proper pH levels are anywhere between 7.0 and 8.5 and you should test these levels any time you add water and adjust accordingly.



## Pond Clubs and Media

### **95. Koi clubs**

Koi clubs can be a great source of information as well as a great place to meet new friends that share in your pond passion. Look into any of the clubs in your area and see what they have to offer. The larger ones will usually have people who have been in the hobby for a great deal of time and can assist you with questions you might have when you can't find answers elsewhere.

### **96. Pond and Water Garden magazines**

Think about subscribing to a magazine or two, or more. Most of the pond and water garden magazines on market today offer a great way for you to start collecting information you would have otherwise never thought of before. You'll find articles on almost every aspect of the hobby as well as a plethora of retailers, installers and manufacturers that will gladly assist you with your needs.



## Odds N Ends

### **97. Entering your pond**

A lot of people plan to interact with their pond by entering it. They may wish to swim in their pond or be able to walk into it in order to perform maintenance. If before the Pond Shield<sup>®</sup> epoxy sets up, a small amount of sand is sprinkled onto the surface, this will give considerable non skid that allows you to walk on the surface without slipping.

### **98. Agricultural pond**

Some farms have bodies of water that are filled naturally by rain fall and such and these small bodies of water are used to supply drinking water to varying livestock. The problem is water retention. Water is likely to seep back into the ground and be lost. A retention pond coated with Pond Shield<sup>®</sup> epoxy can save you thousands of dollars in the long run.

### **99. Container ponds**

Sometimes containers can add a decorative touch to a pond by incorporating them into the water flow of the system. However, that does not mean that all containers can be used as is. Some of them may need to be sealed. Pond Shield<sup>®</sup> Epoxy will work on them just as well as it works on other masonry. If your container has a drain hole in the bottom of it, you can use Pond Shield<sup>®</sup> Epoxy in conjunction with fiberglass to seal the hole shut for your purposes.

### **100. Fountain without a fountain**

If your budget runs short and you could not install the fountain effect you had wanted, you can place your ponds inlet pipe close to the surface of the water and allow it to liven up the surface of the water.

### **101. Netting your fish**

In some cases you may need to remove a fish from you pond. One of the easiest ways to assist you in this task is to get them busy with some food. Sprinkle some food in a corner area of your pond and then slowly move the net under the distracted fish. With careful movement and practice you'll be able to bring your fish out with relative ease.



## Conclusion

We hope that this list of tips and tricks are of some use to you. It is a list that is by far in no way complete, but will at least get you into the thought processing mode needed to tackle your pond project. If you have any further questions in regards to the proper or possible usage of and Pond Armor<sup>®</sup> product, please visit our web site at [www.pondarmor.com](http://www.pondarmor.com) or contact us at 800-716-1545. We'll be more than happy to help you.