



taking on large scale projects



The reason you're reading this chapter says it all; you're either curious and want to learn more, you've been approached about a large project, or you see the opportunities around you. Whatever the case, maybe it will be education and understanding that will get you on the path to success with larger features.

Our Construction crew and Technical specialists are available to assist you on all aspects of water features from design to sales and installations. Our commitment to "ponds done right and customers served right" says it all as we continue to create products and programs designed to support this mission.

We can truly say that your success is our success and we will support, train, and lead you on the path of success with water features of all sizes. In theory, large features are no different than their smaller counterparts other than the size or quantities of materials. The same goes for any problems or challenges that you may encoun-

ter – the size and quantity of those challenges increases at an equal rate. Trust me, you will have challenges, but with the right training and support, any problem can be overcome.

This chapter is just an overview of the key points with larger scale construction projects for more detailed training attend one of our extreme advanced classes that are held only a couple times a year at different locations around the country. Contact your local distributor for more information regarding large project training.

Ed Beaulieu
Vice President
of Field Research





Why Take Them On?

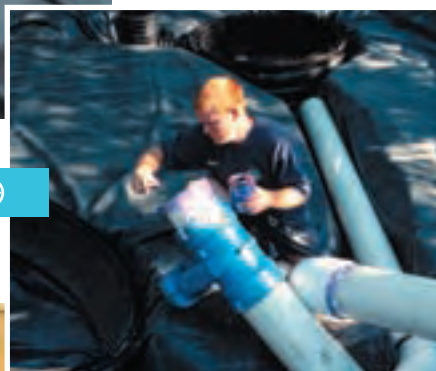
During our travels around the country, everyone asks us about large scale pond installation. We only install about three large projects per year on average, but they account for as much as a third of the annual gross income for our construction department. These projects also give our construction division (Aquascape's Research and Development team) the opportunity to develop wetland filters, and pump and piping flow rates necessary for bidding large scale jobs.

In theory, installing these monsters are no different than installing a standard size pond. There are a few special considerations in the quantity and sizes of the different components, and because of the large scale, commercial sized projects usually involve an architect or designer. If this is the case, we like to go over the design with the architect and the clients to ensure that the pond functions as planned.



Some prototype filter systems for large pumps.

Do big jobs the same way you do small ones.



The Virtues of the Dingo



The Dingo compact utility loader, by Toro, is perfect for almost any pond building application. We use it to move large rocks, scoop buckets of gravel or soil, lift heavy items like liners, or dig out a pond. It runs on either tracks or wheels, and has no cab—so you don't sit in it, you control it from the back with handle bars. The gas or diesel base model can be purchased with a bucket or any of the other 35-plus attachments that will cover just about any project.



Lightweight and small, it can be used in tight spaces with minimal damage to the existing landscape, and the whole thing, including attachments, fits easily onto a 12' trailer... with room to spare.

Its versatility allows you and your crew to complete a lot of work in less time, with less back-breaking labor. There are just so many uses that make it perfect for the pond building contractor. The drawbacks? I have yet to see any.

Ed Beaulieu, Vice President of Field Research

To find your nearest rental location, visit Toro's rental locator at www.toro.com/dingo. Or, call 1-800-Dig-Toro (1-800-344-8676), or e-mail Dingo@Toro.com.



Construction Contract for Water Feature

This Construction Contract is entered into this _____ day of _____, 20____ by and between
AquaScape, Inc. an Illinois corporation (hereafter referred to as "AquaScape") and _____ of _____,
_____ (hereafter referred to as the "Customer")

- 1) AquaScape hereby agrees to construct a Water Feature on the premises commonly known as _____ (hereafter referred to as the "Premises")
 - 2) The Water Feature will be constructed in accordance with the Customer's plans and specifications (hereafter referred to as the "Water Feature" or the "Project") attached hereto as Exhibit A.
 - 3) AquaScape will furnish all labor and materials necessary to complete the Water Feature; however, unless this Contract specifically states otherwise, the Customer acknowledges that the Contract does not include:
 - a) The cost of bringing electricity to the Water Feature. Electricity is required to run the pump and to provide power for the lights in the Water Feature. The Customer is responsible to arrange for and pay the cost of bringing electricity to the Water Feature site.
 - b) The cost of bringing a water source to the Water Feature.
 - c) Vegetation.
 - d) Fish/Wildlife.
 - e) Landscaping around the Water Feature.
 - f) The cost of correcting existing drainage problems or dealing with other unforeseen problems such as moving buried irrigation lines, drainage tile, utilities, etc.
 - g) If building or construction permits are required, it is the Customer's responsibility to obtain and pay for all such permits.
 - 4) The Customer represents:
 - a) That the Customer is the owner of the Premises and has authority to enter into this Contract; or
 - b) The Customer represents that the Customer is the General Contractor for the owner, the owner being _____ whose office is located at _____.
 - c) The Customer, at the Customer's expense, has taken out all necessary permits for the construction provided under this Contract, or if the Customer wishes the Contractor to take out all necessary permits, the Customer shall reimburse AquaScape for the cost of all permits.
 - d) The Customer acknowledges that AquaScape is a non-union shop and agrees to hold harmless and indemnify AquaScape against actions of any unions.
 - 5) The total Contract price for all services to be provided by AquaScape shall be \$_____ payable as follows:
 - a) $33\frac{1}{3}\%$ upon the signing of this Contract;
 - b) $33\frac{1}{3}\%$ when the job is 50% complete; and
 - c) The balance of the Contract price payable in full upon substantial completion of the work.
- AquaScape shall provide in a form reasonably acceptable to the Customer and the Customer's title company and lender, if applicable, Partial Wavers of Lien upon the first two payments, and a Final Mechanic's Lien Waiver upon the receipt of final payment.

901 Aqualand Way
St. Charles, IL 60174
ph 630.659.2000
fax 630.659.2101
www.aquascapeinc.com

The most important part of any contract is to spell out exactly what everyone's role is and what "is" included and more importantly what "is not" included in the project.



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Construction Contract for Water Feature cont.

- 6) There shall be no verbal change orders to the Project. If the Customer desires a change in the scope of the work, the Customer and Aquascape shall execute a written Change Order, which both shall sign, and said Change Order shall be considered as a Rider to this Contract. Unless Aquascape agrees otherwise, the cost of all extras shall be paid for in full at the time the extra is approved by Aquascape.
- 7) In the event that payment 5B above is not made within 5 business days from the date said payment is due, Aquascape shall have the right to stop all work with the respect to this Project until said payment is received by Aquascape, and if Aquascape deems appropriate, require the Customer to provide such additional assurances for the final payment as Aquascape and its attorney deem reasonable.
- 8) Aquascape agrees that the construction of the Project will be substantially in accordance with the plans and specifications attached hereto. The Customer acknowledges that due to the fact that the Project consists largely of natural materials such as boulders, rocks and earth, that for some variation may exist between the complete Project and the plans and specifications attached hereto.
- 9) Aquascape warrants its workmanship and the CleanSweep Skimmer, if applicable, and the BIOFALLS® Filter, if applicable, for one year from the date of completion. The pump and the liner are warranted by their manufacturers, and while Aquascape does not warrant the pump and liner, Aquascape will provide reasonable assistance in the event of failure of either prior to one year. The above warranties are rendered null and void in the event of misuse or abuse of the Water Feature, or use of the Water Feature for other than its intended use, or by defects caused by the Customer's failure to properly repair or maintain the waterscape as set forth in the Water Garden Owners Manual which the Customer acknowledges receiving at the time the Contract is entered into. If the Customer is a General Contractor, the General Contractor agrees to deliver said Water Garden Owners Manual to the owner of the Premises.
- 10) Aquascape's warranty is limited to the repair of the Water Feature upon notice of the Customer or the owner of disrepair. Aquascape shall not be responsible for any incidental or consequential damages associated with any warranty made by Aquascape.
- 11) Aquascape shall commence construction upon notification of the Customer. Aquascape will use all reasonable efforts to commence construction within 10 business days of the date of notification. Once Aquascape has commenced the job, Aquascape will use all reasonable efforts to complete the construction as quickly and efficiently as possible. However, Aquascape shall not be responsible for strikes, acts of war, material shortages, labor disputes, and other acts and circumstances beyond their control. In the event of such acts and circumstances beyond their control, Aquascape will use reasonable efforts to complete the Project as soon as possible. If Aquascape is required to hire an attorney to enforce the terms of the Contract, Aquascape shall be entitled to recover attorney's fees, court costs, and all other reasonable costs expended in the enforcement of this Contract.
- 12) Aquascape represents and warrants that all of its employees who will be performing services on the job site will be covered by Worker's Compensation Insurance. However, the Customer shall be responsible for purchasing and maintaining the Customer's usual Liability Insurance and usual Hazard Insurance.
- 13) This contract shall be governed by the laws of the State of Illinois and any lawsuit filed by either party with respect to enforcement of the Contract shall be filed in a court of competent jurisdiction in DuPage County, Illinois.
- 14) This Contract shall not be modified or amended except by another writing signed by both parties to this contract.
- 15) This Contract represents the entire understanding of the parties and supersedes all previous and contemporaneous oral understandings and agreements.

Aquascape, Inc.

An Illinois Corporation

By: _____

Printed Name: _____

Date: _____

Customer

By: _____

Printed Name: _____

Date: _____

Getting Started

- Calculate the size liner needed. This helps calculate the amount of soil that will need to be excavated, how much of it will be used on site, and how much will be hauled away.
- Determine whether the pond will have a skimmer or wet well.
- Calculate the tonnage and type of stone.
- Determine the amount of filtration necessary.
- Discuss the size of the waterfalls and or stream.
- Calculate the required pumping volume and piping sizes.
- Specify the quantities and species of aquatic plants.

The Excavation

We subcontract all of our excavation work to one person. This enables us to develop a good working relationship and an understanding of each other's expectations. While the excavator is doing his thing, we set the BIOFALLS® filter and run the pipe. We make the decisions, and he executes them. After the rough excavation work is done, we clean up the little stuff by hand.



Installing a Skimmer or a Wet Well

The skimmer or wet well should be excavated at this point. On very large ponds that require really big (i.e. 500 pound) pumps you'll need a wet well rather than a skimmer. A typical wet well is made from a 30 to 48" ADS drain pipe. We usually set the intake into the wet well at least 2' under the surface of the water. This allows ample water to be fed into the pump.

Excavating the area for the pump intake is critical to insure ample water flow to the pump. The intake should be 2' below the normal water level.



The Underlayment

The next step is to set the underlayment. It comes in 15' wide pieces that are 300' long. The underlayment is rolled out and the joints are overlapped. If the ground is very rocky, a layer of sand will be needed. We may even use sand under the areas where very large rocks are set.



Laying the Liner

Laying a large liner is somewhat of a trick. Remember, because of the large size, it is likely that you will be working with a polyethylene or polypropylene liner, instead of EPDM. (See chapter 6 for more information on liners and underlayment.) The preparation of the liner is very important—if the liner is positioned properly from the start, you'll be in good shape.

The hardest part is getting the final position right. These liners aren't very forgiving, and they can develop some pretty large folds that are hard to get out. Having extra liner will make the job much easier. It helps if you add five feet to the size liner that you order. It'll cost you a little more, but you'll make it up in the ease of installation.

CONSTRUCTION GUIDELINES

The 30 or 40 mil liner comes with an installation sheet that shows how the liner will unroll. Align the roll so it goes parallel to the edge of the pond. Once it's unrolled, take the time to reposition it so the ends of the liner are equal on each end of the pond.

Depending on the size of the liner, you may need additional help for the next step. When the pond is larger than 100' x 100', position the extra work force along the edge of the pond. Cut some hand holds in the edge of the liner by making a slit about a foot in from the edge and about 8 to 10" long. Have everyone grab the liner and start pulling. The liner will unfold like an accordion.

esp El liner de 30 o 40 milímetros viene con una hoja de instalación que le enseña como desenrollar el liner apropiadamente. Alinee el rollo para que corra paralelo a la orilla del estanque. Una vez que ha sido desenrollado, tome un poco de tiempo y reposiciónelo para que las orillas estén equivalentes con cada orilla del estanque.

Dependiendo del tamaño del liner, Ud. necesitará ayuda adicional para completar el próximo paso. Cuando el liner mide mas que 100' x 100', posicione a varias personas a lo largo de las orillas del estanque. Corte varias aberturas a un pie de la orilla que mide entre 8 y 10 pulgadas de largo. Que todos agarren una parte del liner y empiecen a jalar. El liner se va a desdoblar como un acordeón.



Position the liner so it's parallel to the pond.



Start pulling!

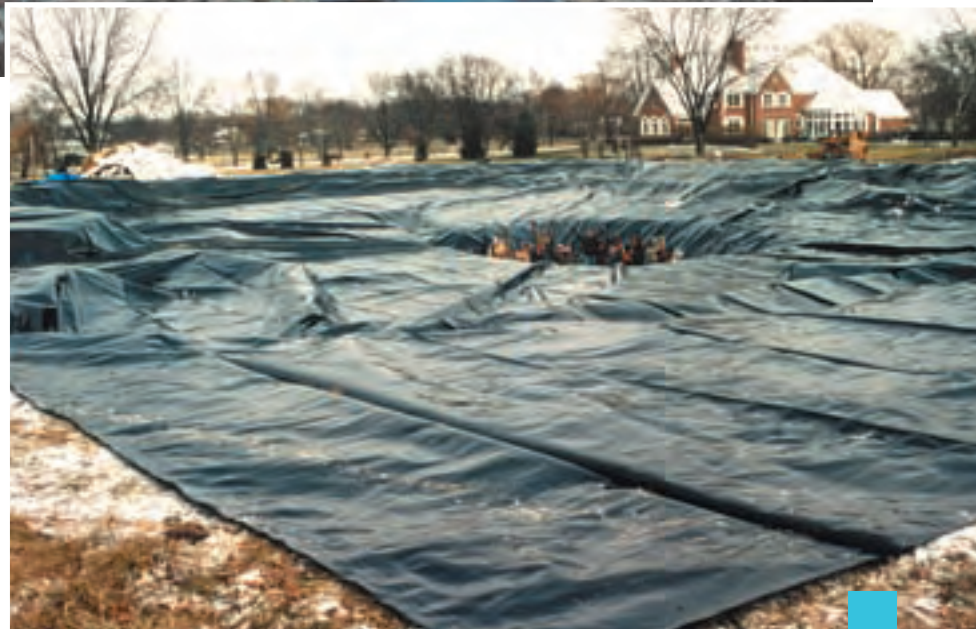


Is Adam pulling his own weight?



Continue pulling until it's all the way across the pond. Go around to all sides and pull the folds out as much as possible. Make sure you leave enough liner above the waterline to allow for changes later on. Starting from the bottom and working your way up, ease the liner into the shelves as you would a regular 11' x 16' pond liner.

esp *Continúen jalando el liner hasta que cubra todo el área del estanque. Camine alrededor del estanque y jale las aberturas hacia fuera lo más que se puedan. Manténgase seguro de que Ud. ha dejado bastante liner sobre la línea del agua para permitir cambios mas adelante. Empezando desde abajo y trabajando hacia arriba, use el mismo proceso que usaria con un estanque chico.*



Two hours with 20 men and a skid steer.



CONSTRUCTION GUIDELINES



Installing the Wet Well

- Place several layers of underlayment on top of the liner where the wet well will be installed. Place the wet well and the intakes into position. Fill the area around the wet well with gravel, making sure it stays level.

esp Instalando el Poso

- *Posicione varias capas de underlayment encima del liner donde el poso va ser instalado. Posicione el poso y su tubería en su lugar. Llene el área alrededor del poso con grava, teniendo cuidado de que se mantenga plano.*

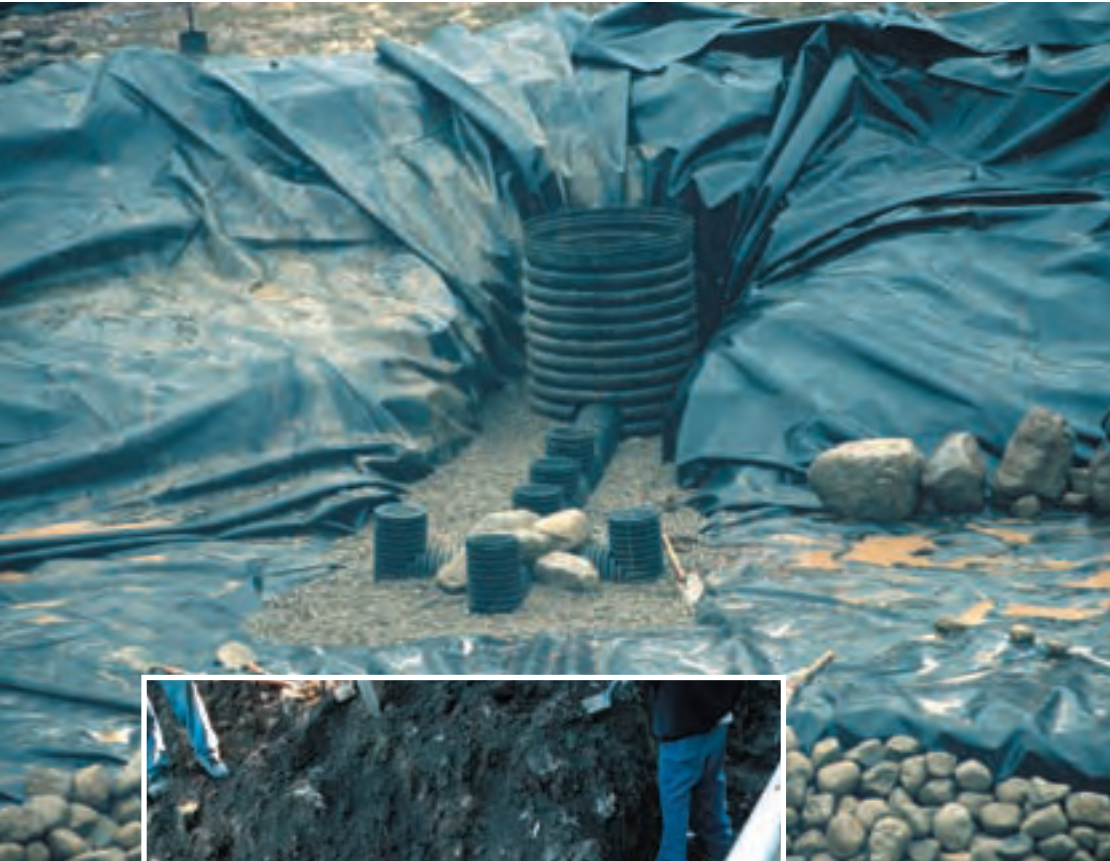
- Pour 4 to 6" of concrete on the bottom of the well to support the pumps.

esp *Llene la parte de abajo del poso con 4 a 6 pulgadas de concreto para soportar las pompas.*

*Angel gives it our seal,
"The Pond Guys™".*



CONSTRUCTION GUIDELINES



- Place a layer of gravel on the liner to support the pump intakes. Then install the intake pipes, and continue filling around them with gravel. They should be sitting just above the bottom of the pond and still 2' below the water.
- After the wet well is set, run the piping from the wet well to the BIOFALLS® filter or constructed wetland.
- Larger pumps will require larger piping. See the chart below for more information on pipe sizes and flow rates.

esp Tienda una capa de grava sobre el liner para soportar la tubería de la bomba. Después instale los tubos entre el pozo y el estanque, y continúe llenando alrededor de ellos con grava. Deberían de ser situados justamente arriba del piso del estanque y todavía 2 pies debajo del agua.

• Después de posicionar el pozo, conecte su tubería al BIOFALLS® o a terreno pantanoso.

• Pompas más grandes requieran tubería más grande. Refiera al diagrama para más información sobre los diferentes tamaños de tubería y velocidades de corriente.



Using a tee, we can split the water flow between the waterfalls or construction wetland filters.



Pipe Diameter in Inches	Surface Area of Pipe/in ²	1 Lineal Foot of Pipe Volume in Gallons
2	3.14	0.76
3	7.07	0.37
4	12.56	0.65
6	28.26	1.47
8	50.24	2.60
10	78.50	4.10
12	113.04	5.80

The target velocity of water travelling through PVC pipe is around 6' per second. According to this information, you can work through pump volumes to find the proper piping size.

Example: 60,000 GPH = 1,000 GPM or 16.6 GP Second.

$\frac{16.6 \text{ GPS}}{6 \text{ GPS max flow}} = 2.7$ - According to the chart, that's just above the rate of 8" piping. It should be safe.

CONSTRUCTION GUIDELINES

Rocking a Large Pond

Once the liner is laid, rocks to secure the liner should be put in place as soon as possible. The most important part is getting the bottom covered, and scattering some larger rocks along the edges to hold the liner down. You can also cut holes for the pressure relief valves at this point. (See chapter 8, page 140.)

esp Rocking a Large Pond

Una vez que el liner esté tendido, las piedras deben de ser puestas encima lo más pronto posible. La parte más importante es cubriendo la parte de abajo y colocando piedras en todas las orillas para mantener el liner abajo. También puede cortar hoyos para la válvula de presión en este momento.



Setting stone in a big pond is exactly the same as setting stone in a small pond. In fact, the only place we use large rocks is on the edges and in the waterfalls where the stones will be seen and appreciated.

esp *Colocando piedras en un estanque grande es exactamente lo mismo que colocando piedras en un estanque pequeño. El único tiempo en el cual colocamos piedras grandes en las orillas es cuando las piedras van a ser apresiadas.*

We usually use an inexpensive local stone for inside the pond, but on the outside edge and waterfalls, we'll use a variety of stone types. Often, the architect will determine the stone, otherwise we pick it. The use of large stones around a pond gives it a feeling of permanence.

Don't over-do it by covering the entire edge in large rocks. A well thought out placement of stones is much more effective. *Follow the same rules for edge treatments as described in chapter 13.*

esp *Generalmente usamos piedra barata cuando es colocada dentro del estanque, pero cuando está colocada fuera y alrededor del estanque usamos una variedad de piedras. Seguido, el arquitecto determina que tipo de piedra usamos, sino nosotros elegimos la piedra. El uso de las piedras grandes le da una sensación de permanencia.*

No lo sobre haga, y cubra todas las orillas con piedras grandes. Teniendo un plan en donde las piedras serán colocadas será mucho más efectivo.

Here we're using a pallet to set the rocks; then we position them by hand into the final location.





Achieving the Effect

Many commercial, or large residential ponds are viewed from great distances, so the waterfalls must be large and loud so they can be seen and heard from all viewing areas. This will require large volumes of water to make the falls run properly. In the waterfall chapter, we spoke about flow rates in residential ponds, but on these large waterfalls the flow rate will need to be doubled to achieve the desired effect.

SDR 21 piping (large 6 and 8" pipe) is time-consuming to install. It comes in 20' sections, and we prefer the type with a bell end to eliminate couplings. To keep the head pressure down, keep the elbows to a minimum, the pipe running straight, and back fill with pea gravel first, then soil. It takes three people to set 8" pipe because it's so heavy, and it needs to line up perfectly to allow it to seat properly. Otherwise it's just like running any other type of rigid piping.



TIP from TEAM
AQUASCAPE

For a solid welded joint, flood the joints with PVC primer then apply the glue, allowing it to penetrate into the pipe. The thickness of the pipe allows us to do this.



We prefer to use SDR 21 piping because it's heavy duty, it can take lots of abuse, and it can handle the required water volumes with ease. From the main water lines, use a series of tees and valves to distribute the water to the BIOFALLS® filters and constructed wetlands.

The Pumps

To feed the waterfalls, we use large submersible pumps that can handle large solids. Once these pumps are installed, we don't want to take them out until they need to be serviced. They're usually 230 volts or more, and very large and heavy. We're talking about some serious power and it's exciting to turn one of these big powerhouses on and watch 'em go.



Water Quality

We expect these large water features to have the same water quality as the smaller ponds we build. The only way to make this happen is by using a constructed wetlands for the main filtration, and a Grande BIOFALLS® filter for creating the waterfalls. They should be used together for the best results. The interesting thing about ponds is that the larger they get, the less filtration they need. That means you need a greater flow rate, and a greater filter to pond water ratio in a small pond, than you do in a large pond, or a lake.

Building the Waterfalls

Large commercial waterfalls are built on the same principles as a small pond waterfalls, except for the fact you will need heavy equipment to set the boulders. The concepts are the same. We still hand-carve the soil to accommodate the individual rocks. But because of the sheer weight of the stones, the soil needs to be compacted and stabilized in order to handle them. If in doubt, consult a local expert on what the soil can handle.



A 25' wide waterfall,
180,000 gph!



The trickiest part of working with large rocks is picking them out and strapping them up to the machinery. This takes a little practice. Here are photos of a few of our projects.

When bidding these larger projects, we figure it will take ½ hour for a machine operator and two other

people to move each large stone. Some rocks will take a small portion of the allotted time, while others may take up to an hour. It really depends on the choice of stones and how close they are to the work site. *(See chapter 12 for information on waterfall construction.)*

Don't Let It Get Out of Hand

Large ponds should really be left to contractors who have sufficient experience. Although we've said they're basically like small ponds, if you have a problem or get stuck with some bad weather, the project could easily get out of control. If you're willing to tackle it, be sure you double check every aspect of it. The last place you want to be is stuck with \$100,000 in product, tying up all your cash, while you're unable to finish the project due to unforeseen circumstances.

We've heard horror stories from contractors who have been put out of business because of a large project gone wrong. The bottom line is, be careful if you're new at it. On the other hand, if everything goes well, it'll be one of your greatest accomplishments, it will give you tons of credibility, and set you apart from your peers. Good luck.

Large Project Workbook

Ever wish you had a checklist of sorts that would help you out when going to bid out a large project? Aquascape is here to help. Call or e-mail out technical department and they'd be happy to send you a "Large Project Workbook" that contains virtually everything you need to get info on when checking out that big project. **Wish you would have written down what kind of pump you think was needed? There's a spot for that in this workbook. Wish you had your rock and gravel calculations on hand? They're in there! The workbook even comes with a site evaluation checklist.** And the workbook was created by Ed Beaulieu, based on his experiences when bidding a large project, so you know it's good!

*Forget pinching a finger.
A rock this big will pinch you.*



The ultimate
Koi pond.



The ultimate koi pond
during construction.