

Inside: Brian Van Bower on Lighting

# WATER SHAPES

Design • Engineering • Construction

Volume 5  
Number 11  
November 2003  
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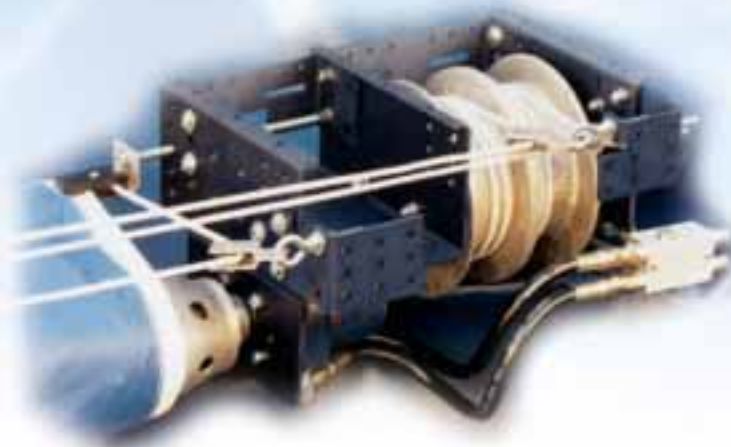
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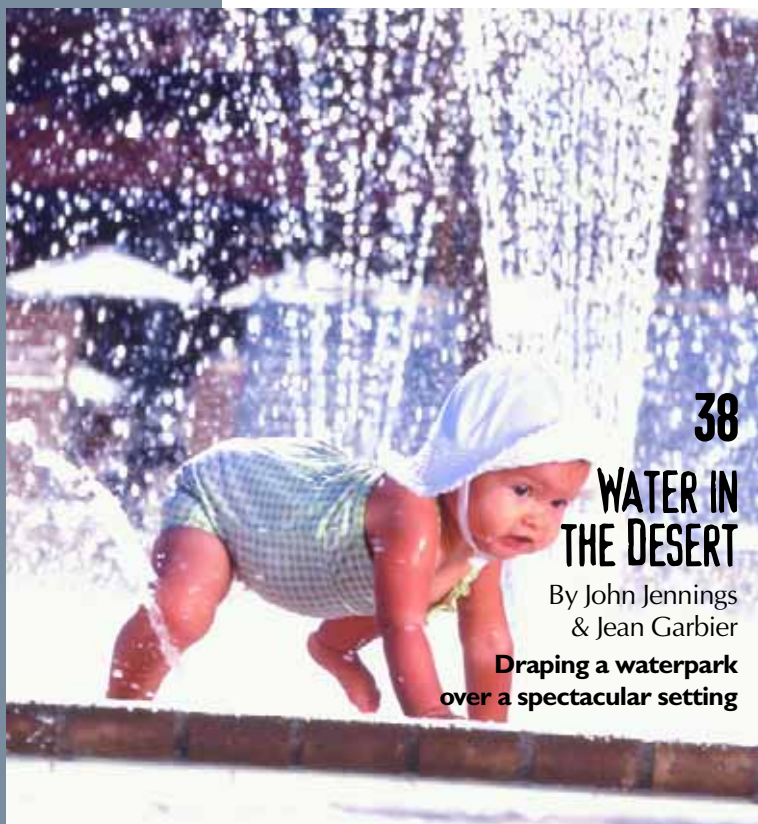


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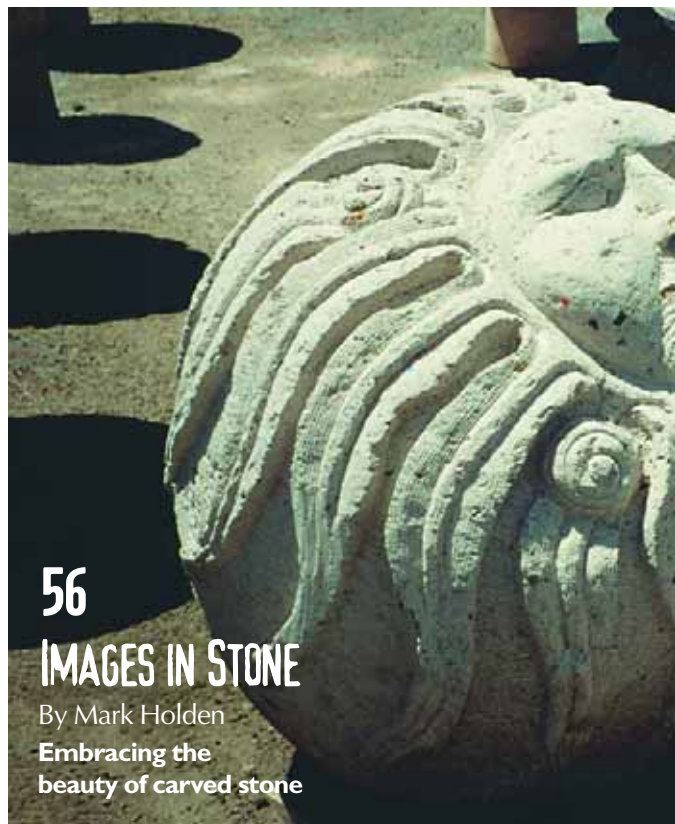


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**On the cover:**

**Photo courtesy Vanasse Hangen Brustlin, Inc., Watertown, Mass.**

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## Information Access

*"The way a team plays as a whole determines its success. You may have the greatest bunch of individual stars in the world, but if they don't play together, the club won't be worth a dime."*

— **Babe Ruth**

How many watershaping projects are completed by just one person – no laborers, no help in moving materials, no extra backs or pairs of hands at all? If you set aside the assortment of do-it-yourself kits for inexpensive pools, off-the-shelf ponds and streams or small decorative fountains, my suspicion is that watershaping, as practiced by professionals, is almost invariably a team effort.

I suspect further that this is why there are so many specialists who collaborate with watershapers, including landscape architects, landscape designers and pool-design consultants as well as structural engineers, geologists, nursery consultants, arborists, contractors, subcontractors, product manufacturers and distributors. And there are, quite often, other "team members" in the decision-making chain, among them home-builders, architects, developers, property managers, interior designers, fine artists and, lest we forget the most important of them all, the clients.

Given that few projects could ever have a scale or scope so small that an army of one might get the job done, you'd think teamwork would be a natural way of life for watershapers – but that's not always the case. Indeed, I've found in my years of talking with professionals at all levels of the watershaping trades that working as part of a team is often much easier said than done.

No doubt part of that aversion to ready cooperation results from the rugged individualism that characterizes so many of you: After all, making allowances for other people similarly inclined to do things their own ways is often not easy. The other factor that makes working on a team so tough is that being a good team member is, in many respects, a separate expertise – yet another skill that needs to be understood, embraced and practiced.

As is often the case with features we present in the magazine, the teamwork concept surfaces as a recurring theme in otherwise unrelated stories in this issue, and it won't take much concentration on your part to pick up those threads and follow them through. In one case, however – "Role Players" by Dominic Shaw (page 48) – the article is specifically about teamwork, how a task is defined and how players are assembled to bring a vision to life.

Along the way, Shaw offers razor-sharp insights into the distinctions that should be weighed in assembling a team, specifically in this case for design and construction of high-end fountain projects. As a former consultant who has also spent time as a supplier and design/build expert and now works for EDAW, a giant landscape-architecture firm that assembles ad-hoc teams for specific projects, he has tremendous, first-hand experience of team dynamics from top to bottom.

His article is interesting not just for defining the nature of watershape consultancy, but also for how much light he sheds on the importance of understanding the skills and motivations of a project's team members in helping a team work together to get the job done to its fullest possible potential.



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**JENNINGS**

**John Jennings** leads the land-development group for Vanasse Hangen Brustlin, Inc., an engineering, planning and applied-sciences firm based in Watertown, Mass. A registered landscape architect who specializes in planning and design services for resort, public and institutional clients, he has 32 years' experience in leading multidisciplinary teams of designers, planners and engineers for everything from concept through implementation in projects for resort/entertainment facilities, campus master plans and Fortune 500 corporate facilities. **Jean Garbier** is a senior landscape architect for Vanasse Hangen Brustlin. A registered landscape architect, she has 20 years' experience in landscape architecture and urban design, including project management, planning

and design for resort/entertainment, institutional and public- and private-sector clients.

**Dominic Shaw** is a principal and director of waterfeature design for EDAW, Inc., a 900-person landscape architecture, planning and environmental resource firm with 23 offices worldwide. Shaw, who works out of the firm's office in Fort Collins, Colo., joined the firm in 1997 to lead its waterfeature design studio. This group works on EDAW projects and also serves the greater architect/developer community as a consultant for waterfeatures, swimming pools, ponds and constructed wetlands. In the 23 years before he joined EDAW, he worked variously as a product manager for a fountain manufacturer, owned and operated a fountain installa-



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tion/maintenance company and worked as an independent fountain consultant.

**Mark Holden** is a landscape architect, contractor, writer and educator specializing in watershapes and their environments. He has been designing and building watershapes for more than 15 years and currently owns several companies, including Fullerton, Calif.-based Holdenwater, which focuses his passion for water. His own businesses combine his interests in architecture and construction, and he believes firmly that it is important to restore the age of Master Builders and thereby elevate the standards in both trades. One way he furthers that goal is as an instructor for Genesis 3 Design Schools and also as an instructor in landscape architecture at California

State Polytechnic University in Pomona and for Cal Poly's Italy Program. He can be reached at [mark@waterarchitecture.com](mailto:mark@waterarchitecture.com).

**George Forni** is president of Aquatic Environments, an Alamo, Calif.-based design, installation and service firm specializing in lakes, ponds and other large waterfeatures. He started his career in the waste- and reclaimed-water industry in the mid 1980s. Before long, he became project manager for an aquatic service firm, for which he managed a number of projects in conjunction with the U.S. Army Corps of Engineers as well as in other regulatory agency-controlled jobs. His company now focuses mostly on the needs of large commercial clients in the Western United States.



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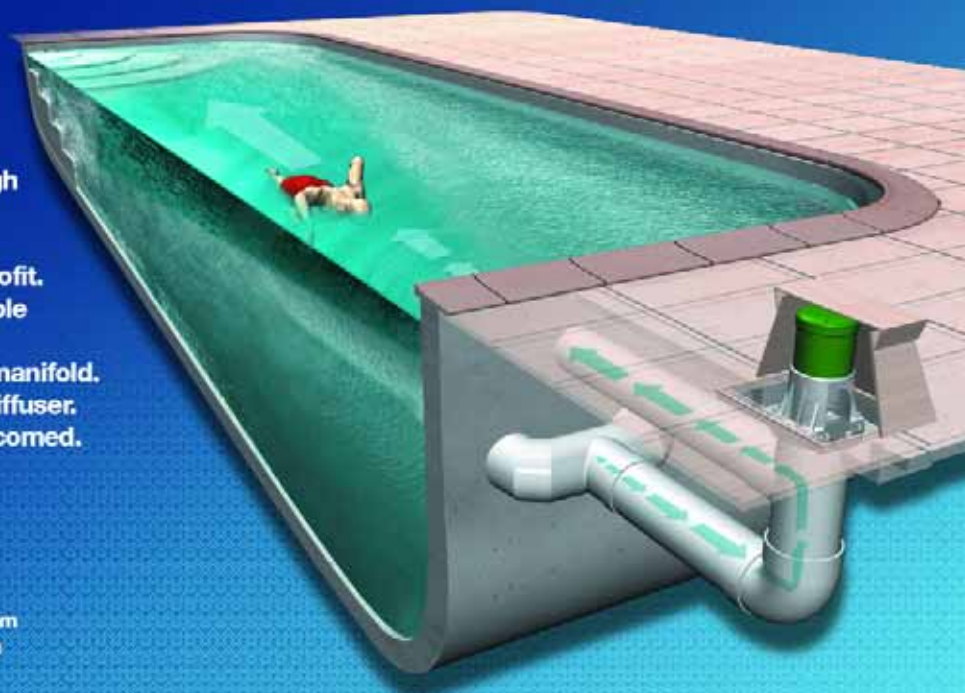
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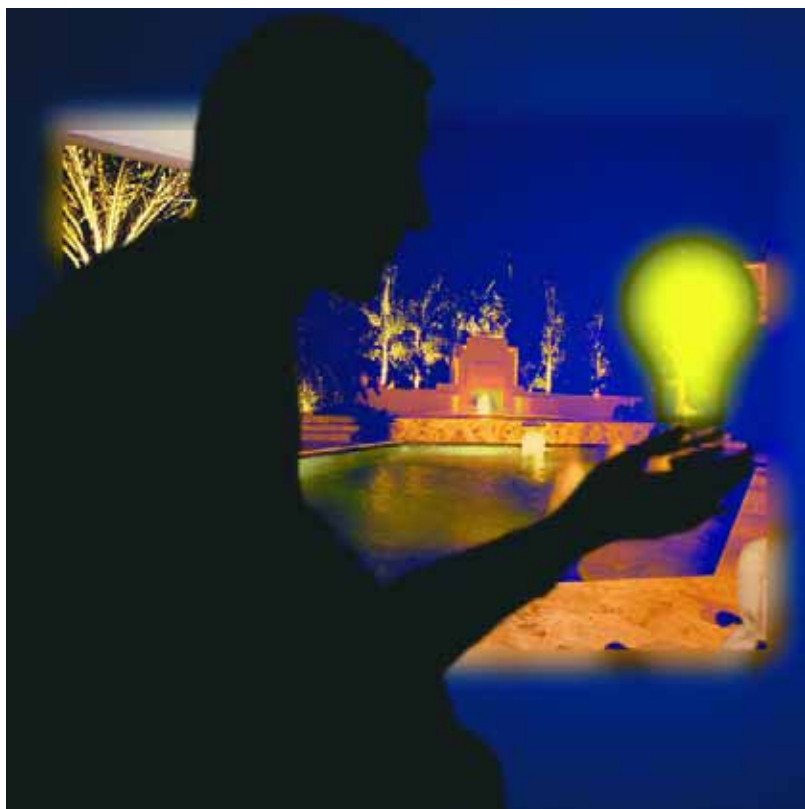
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## Bright Ideas

When we think about how the environments we create are used, the first image that probably comes to mind is one of people enjoying themselves in or near the water on a beautiful, warm afternoon. That's natural – and a vision that's a big part of the watershape experience we set up for our clients – but it ignores the other half of the day when our clients are left to themselves with our work.

The fact is that watershape owners are mostly working people who spend their days away from home earning their daily bread. So despite the fact that we build these things in daylight and seldom have the occasion to see them after hours ourselves, we can assume that there are going to be long stretches when the *only* time our clients see their watershapes will be at night.

That's why I'm so often startled to hear about projects where nobody – landscape architect or designer, general contractor or watershaper – has given any thought at all to how their work will appear once the sun goes down. And I'm open to confessing the fact that, up until just a few years ago, I was one of those thoughtless people.

### SHEDDING SOME LIGHT

I know it's been discussed more than once in the pages of *WaterShapes*, but judging by what I see in the field, it's a subject that bears mentioning from time to time: For whatever reason, lighting has been almost completely ignored when, in fact, it should be considered as a primary design element to be discussed

I'M OFTEN STARTLED TO HEAR ABOUT PROJECTS WHERE NOBODY – LANDSCAPE ARCHITECT OR DESIGNER, GENERAL CONTRACTOR OR WATERSHAPER – HAS GIVEN ANY THOUGHT AT ALL TO HOW THEIR WORK WILL APPEAR ONCE THE SUN GOES DOWN.

with our clients from the very start of a project.

But in so many situations, lighting is obviously an afterthought, and it's clear that nobody's thinking about ways of maximizing the visual potential of a given space once the sun goes down. That's a shame, because when you *do* see a space that's thoughtfully lit, it takes on aesthetic values that simply cannot be achieved in full sun. And I can only believe that wrapping ourselves around some basic lighting techniques will be good both for the aesthetics of what we do as well as for our bottom lines.

Indeed, I see no downside at all to embracing lighting possibilities early in the design process and offering a broad range of options to the client. Yes, developing competence with lighting technology and techniques takes some time, but the simple truth is that we can use it to extend dramatically the amount of time a space can be used. It's also true that we can create nighttime spaces that are even more inspiring and moving than their daylight counterparts.

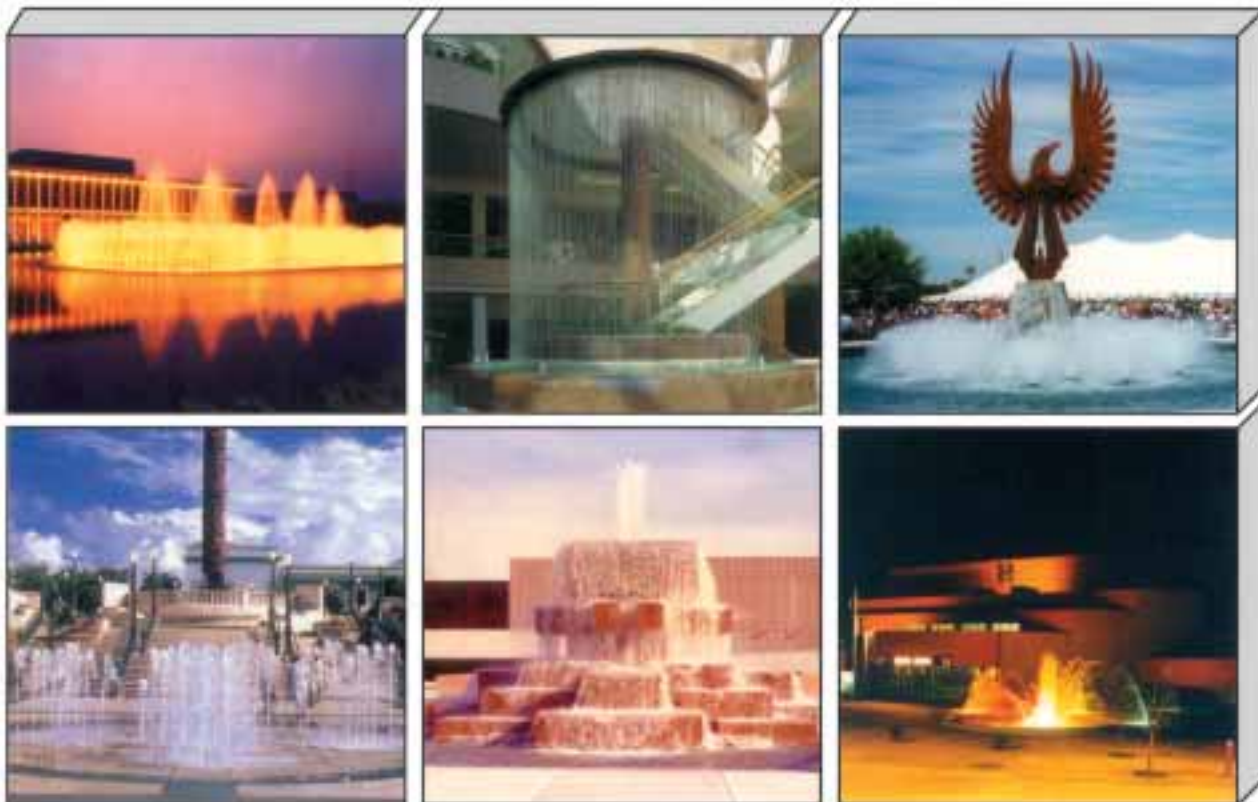
We're not on our own here. We've learned through our experience in setting up courses for Genesis 3 that there are a number of resources for information about lighting. Hadco, for one among many, offers seminars at its facility in Texas, and we've staged sessions with well-known lighting designer and author Janet Lennox Moyer. These are wonderful resources, and I know from my own explorations that there are *many* others out there.

What I've learned in familiarizing myself with this corner of the design process is that I can approach the task of working with lighting much the same way I do the design of a pool or any other type of watershape: It all begins with a fact-finding mission to obtain important information from clients about how they plan to use the space and what's most important to them.

If, for example, you know the environment is going to be used extensively for nighttime en-

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tertaining, you would likely approach things in a different way than if they say they merely wanted to add visual interest to a space that might occasionally be seen from inside the home at night.

## SEEKING ILLUMINATION

Given the tendency for lighting to be a late consideration in outdoor design,

I now make it a practice as early in the process as possible to determine who is going to be responsible for the landscape illumination. As I mentioned above, it's amazing to be working on a project with several participants only to find blank stares when I raise the issue. To be sure, I've occasionally been pleasantly surprised to find that someone's on top of

things and that lighting is an integral part of the plan, but that's a rare occurrence.

This is why I now take it upon myself, whenever necessary, to raise these issues and make sure they're part of the design mix. I also think that all watershapers should ask the question, even if you're not prepared to step in and take up the task yourself.

Let's assume for the moment that you're willing to step up and embrace lighting considerations: What you'll find is a veritable design bonanza in which you can use lighting to set up focal points and create specific effects having to do with depth, ambiance and contours or with highlighting shapes, colors, textures, planted materials and the reflective quality of water.

This is a step beyond what most of us consider, and I think I know the reason why: We may meet with our clients in the evening for an introductory discussion, but after that, we're on the job site in daylight hours doing what it takes to pull a project together. If our "schedules" were different, we might see things differently.

I frequently walk around my own neighborhood in the evening, and it's an interesting experience. There are some very nice homes hereabouts, but the landscape lighting for most of them is, at best, unimaginative: perhaps a bit of path lighting, maybe some up-lighting of a tree or two, and, among the more paranoid of Miami residents, an amazing urge to rekindle daylight in the darkness with flood-lighting so overpowering that it would confuse chickens.

When I do see a property that's thoughtfully and tastefully lit, it's always striking how much more interesting the yards and structures become. This leads me to think about ways I can capture similar effects in my own design work to sculpt and define a setting.

There are, of course, two sides to lighting — design and aesthetics on the one hand and technology and techniques on the other. To work effectively with lighting, you need to understand both. None of it is all that complicated: You just need to expose yourself to the possibilities and experiment a bit with the effects you learn to create.

Continued on page 14

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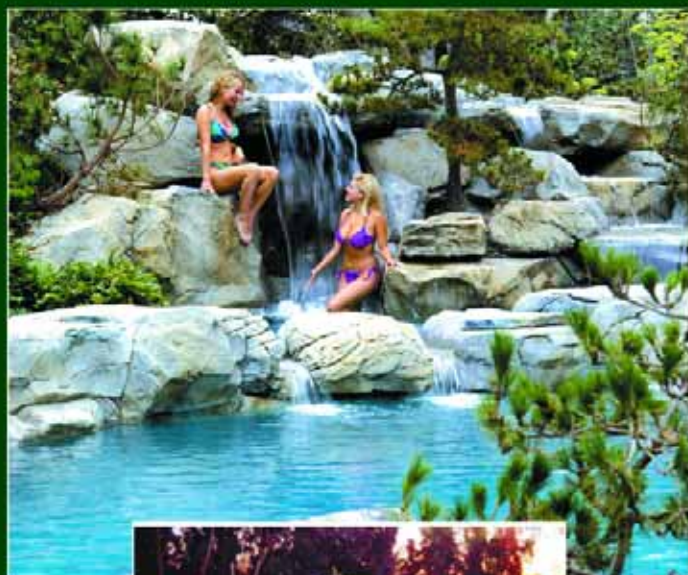


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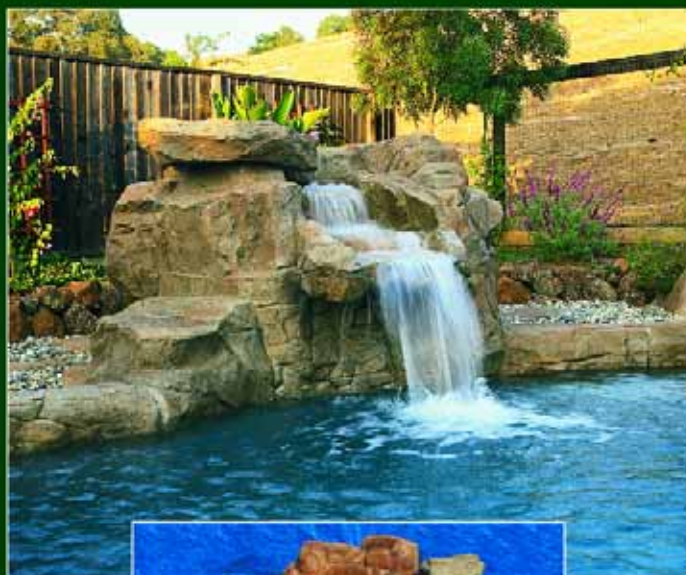
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## REVISITING THE BASICS

This magazine has done a great job through the years of exposing water-shapers to the fundamentals of lighting, so I won't go into great depth here. What follows is intended to give you the vocabulary and perspective you need to seek more information and to converse intelligently and insightfully with profession-

als who can help you define and achieve your design goals.

I've also learned as I've dug more deeply into the subject that lighting effects are sometimes quite subtle and difficult to describe. In other words, you have no option: You need to get out in the field, pick up some fixtures and begin exploring this subject on your own, even if it's in your

own backyard. Education is an important first step, but practical exercise is the key to real learning!

What I'll cover here has mainly to do with techniques you can use around water, and some of it is fairly obvious. (There are also issues of safety and security wrapped up in the discussion somewhere, but I won't focus too much on them here.)

► **Spotlighting:** We've all heard this term and probably have a general idea of what it's about based on the familiar image of a performer standing on a stage and being lit by a single, tightly focused beam of light. In this classic case, you see the performer front-lit from above, with a strong shadow cast against the background—and the principle isn't much different in a landscape, where a focused beam of light illuminates an object, whether it's a specimen tree, a sculpture or a cascade.

In all cases, spotlighting is used to set up a dramatic focal point within a space. Doing it properly requires care when it comes to selecting and mounting the fixtures, with the avoidance of glare always being a priority. You can spotlight objects from below or above, depending on the site, and you can work from a point relatively close to the object to be spot lit, or from some distance away—again depending on the site.

I'm always impressed by the range of products available for this purpose, especially by fixtures that throw a focused beam over considerable distances. Also surprising is how great a range you'll find when it comes to scale: There are systems designed to highlight very large objects, such as trees, but there are also tiny spotlights that work in confined spaces to highlight a single small plant or maybe just the face on a small statue.

► **Silhouetting:** With this technique, you cast light on a vertical surface to show off an unlit object that stands in front of that surface, thereby drawing attention to the dark silhouette of the unlit object. This technique is *not* about showing off the color or texture of the object. Rather, it's about taking the dramatic outline of a tree, sculpture or rock structure and amplifying its most distinctive qualities.

The key to silhouetting is effective backlighting on (usually) a wall of some kind

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that stands behind the object, and it's usually done with a floodlight that disperses light evenly over a large space. In effect, you look "through" the unlit object to find the light, creating a dramatic contrast and the silhouetted image.

This technique works with large objects – artworks or trees with dramatic trunks or branches – but it also works on

smaller scales with simple plants and garden statuary. And silhouetting sometimes happens inadvertently, usually as a result of path lighting bleeding onto surrounding surfaces. Even this accidental form of silhouetting conjures interest, so imagine what you can do with it when you deliberately work with this technique.

► **Shadowing:** This technique works

in much the same way as silhouetting, but to a completely different effect. Here, you set up an object in front of a wall, but instead of washing the wall behind it with light, you set the fixture out in front of the object so a large shadow is cast on the surface behind it.

I like this technique for the way you can take small objects that might get lost in daylight hours and give them huge, distorted shadows that can be quite visually compelling. It's a great way to accentuate unusual branch structures in trees, or small contours in sculptural or architectural elements.


► **Grazing:** This is another simple technique, one accomplished by placing a light source just a few inches from the base of a façade of some kind and aiming its beam straight up, just skimming the surface. This works wonderfully with textured surfaces such as brick or with stonework that has a sculpted quality. As the name implies, the light grazes the surface, creating tiny shadows that accentuate and deepen recesses and makes the high points stand out.

► **Contrasting:** This technique is best explained with an anecdote about the Washington Monument told by Hadco's Bud Austin at one of his company's lighting schools. According to Bud, who's probably forgotten more about lighting than most people will ever know, when the obelisk was first built, they lit all four sides equally from the bottom up with a series of powerful floodlights. What they found was that because the entire object was being lit to the same intensity, the drama of its form was being lost.

After much study and consideration, it was determined that they would light two of the four sides with lower-intensity lights, thereby creating a visual contrast that sharpened the edges between the planes. So now when you see the great tower at night, you can notice that two of the sides are dimmer than the others and that you can appreciate the beauty of the simple form from miles away.

That same principle can be applied in lighting any number of vertical structures, including pedestals on a deck or pots holding plants: If you light these objects equally all the way around, they won't "pop" as much as they would if

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you lit their surfaces with lights of varying intensities.

► **Moonlighting:** We all like the softness of moonlight, and you can achieve a similar effect by placing soft lights in or above the branches of a tree and letting the glow filter down through the branches – another remarkably simple technique that can pay big dividends when it comes to setting an ambiance or mood.

This effect can be combined with other simple effects to create visual layers. For example, while the branches of the tree are lit with moonlighting, the trunk of the tree might be highlighted with a small, upturned floodlight at its base.

► **Path lighting:** This is one of the most familiar forms of landscape lighting and is usually done with a series of shielded or capped lights mounted at regular intervals along the sides of a path. The safety and utility aspects of this lighting are self-evident – and pretty much essential when you have changes of elevation, winding passages or uneven surface materials.

I also believe that, in well-designed spaces, a thoughtful array of path lights will invite

homeowners and their guests out into the yard and encourage them to explore the environment you've developed. This is especially true if the path takes a turn and beckons observers to find a "hidden" space.

► **Spread lighting:** As the name implies, this is the opposite of spotlighting. Instead of highlighting a single object within a space, with spread lighting you cast a general light that doesn't highlight anything in particular. In some cases, it's accomplished with floodlights; in others, the technique uses the same sorts of fixtures designed for path lighting, just dispersed over a larger area.

► **Step/deck lighting:** As with path lighting, there are obvious safety issues involved in the lighting of steps. The trick here is to light the elevation changes evenly, but to do so without creating glare.

Step lighting often differs from path lighting in that it's frequently done with recessed lights (in step risers or on stairwell walls) or with fixtures that have some sort of hood or shield that sends the beam downward rather than up into your eyes. Many of the same sorts of fixtures are

## PALM HIGHLIGHTS

One of my recent projects includes a variety of design elements, including (among others) a fireplace, a waterfall, and a large Egyptian Date Palm located in a raised, circular planter. That tall, regal tree seemed a natural candidate for some distinctive sort of lighting. In particular, I wanted to highlight the rough texture of the palm's trunk with a lighting technique known as grazing (discussed briefly in the accompanying text).

By washing the trunk with soft up-lighting, we were able to draw attention to the palm in a way that's not possible in the full light of day. The effect is particularly dramatic when viewed from across the water's surface, where the reflection of the illuminated palm dances on the dark water.

During the planning phase, the homeowners didn't fully understand or appreciate



just how dramatic this effect would be. But when the project was completed and the area lit up, they were thoroughly impressed by the sight of the majestic tree and particularly enjoyed the way their view of it is essentially mirrored and distorted on the surface of the water.

— B.V.B.

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used to light decks, either in walls, pilasters or columns or set up underneath benches or other low structures.

► **Water surfaces:** Capturing the ever-changing textures of a water surface with light is something with which every watershaper should be well versed. There are different ways to do this, however, and doing it well often requires ingenu-

ity and creativity.

As an example, I'm currently working on a pond that's 50 feet long and has two bridges crossing over it. The owner wanted to do something with submersible lights, but I advised against it because watershapes that house fish and plants, even properly maintained, can appear murky when lit from below the

surface as a result of turbidity. Instead, we'll spread a soft light on the light-colored undersides of the bridges, bathing the surface and edges of the pond in a warm, gentle glow.

In other cases, I've recognized that the big trick to lighting the surface of water is all about avoiding glare: The instant a hot light shines up into someone's eyes, the entire effect is ruined. As with lighting dry horizontal surfaces, you need to find ways to shield the light source so it doesn't create glare. The added challenge with water is avoiding additional glare reflecting off the water as well.

► **Mirror lighting:** I'll conclude our discussion with this technique, which is a truly wonderful addition to the watershaper's bag of tricks. The effect is about lighting a background scene so that it will be reflected on the water's surface.

Typically, this involves placing light sources at low levels between the water's edge and the vertical objects you wish to light beyond. This will create a dramatic view looking across the watershape at the lit objects; in addition, it creates a strong reflection across the water. (Glare is undesirable here, so path lights are not recommended for these applications.)

When this technique works, the results are spectacular. The Taj Mahal at night is one example, where the beautiful spires shimmer on the surface of the structure's long reflecting ponds. The Washington Monument and Lincoln Memorial are similarly reflected on the glassy surface of the pond that separates them. The best thing is that this technique works on a small scale as well and is equally effective in a typical backyard with much smaller object and spaces. **WS**

*Next time: more on types of lighting fixtures and applications.*

**Brian Van Bower** runs Aquatic Consultants and is a partner in Van Bower & Wiren, a pool-construction firm in Miami. He is also a co-founder of Genesis 3, A Design Group; dedicated to top-of-the-line performance in aquatic design and construction, this organization conducts schools for like-minded pool designers and builders. He can be reached at [bvanbower@aol.com](mailto:bvanbower@aol.com).

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## It's Always Something!

In all my years as a landscape designer, I've always told my clients that nobody can know ahead of time how a plant will adapt to or behave in any given situation. "Each place on this earth has its own microclimate," I tell them. "Trying to foresee how a plant will grow is like trying to predict when the earth will end."

Most plants, of course, really are somewhat predictable when you place them in a client's yard. As long as you pay attention and use those that are typically considered to be noninvasive, for example, you're generally safe in planting them and needn't spend time worrying about their futures. By contrast, plants that are considered invasive — whether it's all the time or only some of the time — should, under any and every circumstance, be considered invasive and managed as such.

Case in point: A client of mine wanted a somewhat Asian landscape, with minimal planting and lots of manicuring, pebbles and massed plants as well as a strong hedge to provide privacy for his

PLANTS THAT ARE CONSIDERED INVASIVE — WHETHER IT'S ALL THE TIME OR ONLY SOME OF THE TIME — SHOULD, UNDER ANY AND EVERY CIRCUMSTANCE, BE CONSIDERED INVASIVE AND MANAGED AS SUCH.

### BY THE BOOK

Yes, Black Bamboo is considered by the *Sunset Western Garden Guide* and bamboo authorities to be a running bamboo, but my client had a Black Bamboo specimen in his front yard that had been planted many years before I arrived. Without any root barrier and with plenty of direct, full sun and ample water, it had not trailed or run more than a few inches in any direction.

My contractor and I took this as a sign that we could be reasonably confident that the Black Bamboo we wanted to plant in the back would stay contained. And just to be sure, we set up root barriers for the new planting. (We took other precautions as well, planting the bamboo a good three to five feet away from any of the neighboring yards to give ourselves room enough to contain it over time if it somehow managed to escape the root barrier.)

We were lucky enough to find specimens that were ten to twelve feet high and quite thick. This gave my client the instant screen he wanted — important to blocking out a neighbor who had become difficult during the lengthy process of installing a lap pool in the small yard. Well before we arrived with the bamboo, in other words, things were on edge in the neighborhood.

When we left after the garden installation was complete, my client was thrilled to have a very private backyard.

Fast forward four years: Although I had periodically stopped by to check on the landscaping and had never spotted anything out of line, I was surprised one afternoon to receive a letter from my client's lawyer. The letter noted that the bamboo had run into two out of the four neighboring yards and demanded that we immediately remove the bamboo and replace it with a mature bamboo hedge — this one of a clumping variety.

After an anxious call to the client to reassure him that we would remedy the situation one way or another, we met to





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## NATURAL COMPANIONS

assess the situation and decide what to do. Upon inspection, we discovered that the bamboo had indeed sent a few shoots into a sloping ivy area in one of the neighbors' yards; in this case, there was little threat to their landscaping. One of the other neighbors, however, had been chopping down bamboo shoots as they came up through his lawn for more than two years; this was worrisome, as we didn't know how far the problem could go.

### COOLER HEADS

No matter who was responsible, my feeling was that we all needed to work together to correct the problem.

At that point, it didn't much matter that I had informed the client of the nature of the bamboo before we planted it. We'd also covered the hopeful fact that this kind of bamboo tended to behave in a clumping manner; that this was clearly the growth pattern with the Black Bamboo he had in his front yard; and that Black Bamboo is normally one of the easiest of the bamboos to contain if it starts to run.

To make certain we were all operating with good information, I brought in a bamboo expert to assess the situation. I showed him the specimen in the front yard, which he noted had only spread a few inches in the ten years or so it had been around.

When he looked at the backyard bamboo, by contrast, he was *amazed* to see how well it had grown, saying he thought it was the best-looking grove of Black Bamboo he'd ever seen in Southern California while estimating its height at between 20 and 25 feet.

After much discussion, we made some basic observations:

► **The root barriers hadn't held.** The bamboo had been installed using 15-gallon containers with their bottoms cut off as root barriers. This offered a stronger barrier than most commercial root barriers and provided a continuous barrier as opposed to those that are pieced together – and, in my contractor's experience, was an approach that worked quite well. But obviously, the bamboo had not been held in check, meaning it was a more vigorous grower than normal.

► **The watering system was highly effective.** We'd installed a microspray-irrigation system on the bamboo because it was at the top of a steep slope and would require considerable water to look its best. The microspray technique delivers more water to the soil by applying it slowly over a long period – and in this case it had clearly worked well in promoting the bamboo's growth.

► **The neighbor's lawn was a bamboo magnet.** The slope's steep angle, coupled with the fact that the neighbor with the lawn was watering every day and quite thoroughly and the lawn's position above the bamboo, made the well-watered, up-slope space a natural outlet for the bamboo's runners. The two yards on either side had much drier plantings and thus didn't attract the runners in the same way.

► **The bamboo had been well maintained.** My client's diligence in maintaining his garden seemed to have become a negative by encouraging the Black Bamboo's growth habits.

Basically, we determined that because the bamboo was so healthy

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and the slope was so steep, even the addition of another root barrier would not be able to contain the bamboo in this setting for long. As a result, we concluded that it needed to be removed and replaced.

## SILVER LINING

Not all stories have a happy ending, but, fortunately, this one does.

The bamboo expert was so taken by the quality of the bamboo that he offered – at my request – to remove the Black Bamboo and replace it with *Bambusa multiplex* 'Alphonse Karr,' a hearty, clumping variety. This didn't give my client the immediate, mature hedge he wanted, and the exchange process will take two to three months during the cooler season, but he was pleased

that he won't have neighbors angry at him any longer or threatening to sue.

So what can we take away from this? Here are a few points to consider:

► It's important to consider not only the plants you're installing, but the surrounding neighbors and their gardens. Take a peek over the fence and see what types of plants they have and what type of irrigation they're using. Can anything in these yards in any way affect your plantings – or vice versa?

► Is there any possibility that maintaining the plantings properly and efficiently – in other words, giving them perfect conditions for bountiful growth – will invite problems down the road? If so, what steps can you take now to anticipate that growth?

► If you believe the plants your client wants may prove to be invasive but your client wants them anyway, get it down in writing that any problems will be worked out amicably or get your client to assume full liability if he or she is comfortable with it. If this isn't acceptable, consider planting something else. It's a useful precaution: As the bamboo expert told me, in most cases the courts will rule against installers.

► Maintain some level of communication with your clients after you've completed the installation. They might not notice something that might signal trouble to you, sooner or later. By visiting past projects from time to time, you're in a far better position to assess what's going on.

Above all else, it pays to remember that every plant behaves differently in every situation. You might be lucky enough to get a hedge to grow evenly or an invasive plant to stay contained, but it can't hurt to err on the side of caution, consider contingencies and plan accordingly. **WS**

**Stephanie Rose** runs Stephanie Rose Landscape Design in Encino, Calif. A specialist in residential garden design, her projects often include collaboration with custom pool builders. If you have a specific question about landscaping (or simply want to exchange ideas), e-mail her at [sroseld@earthlink.net](mailto:sroseld@earthlink.net). She also can be seen this season in six new episodes of "The Surprise Gardener," airing Tuesday evenings on HGTV.

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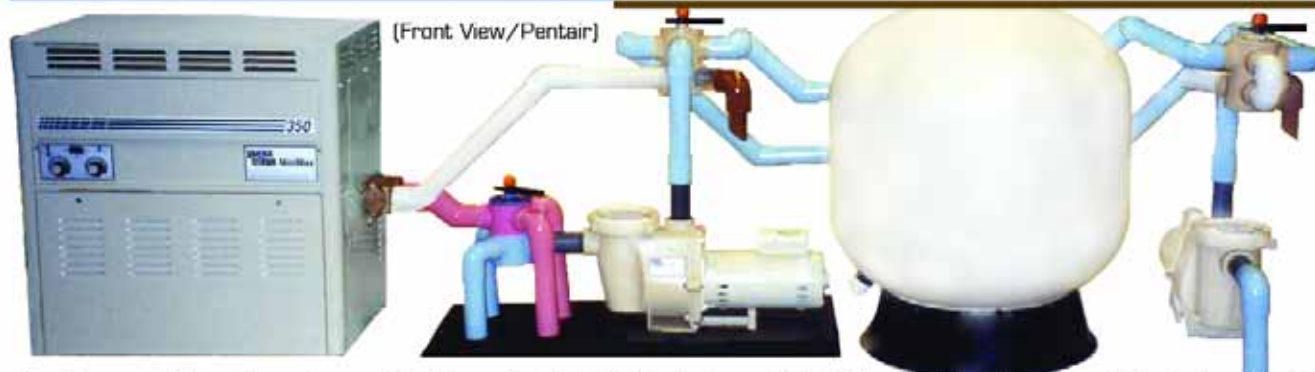
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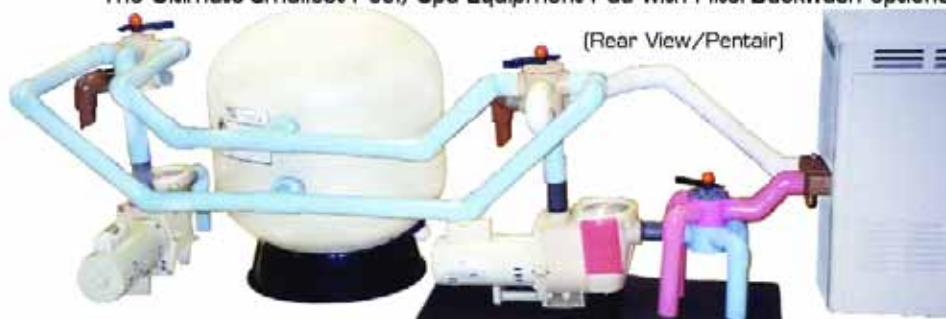
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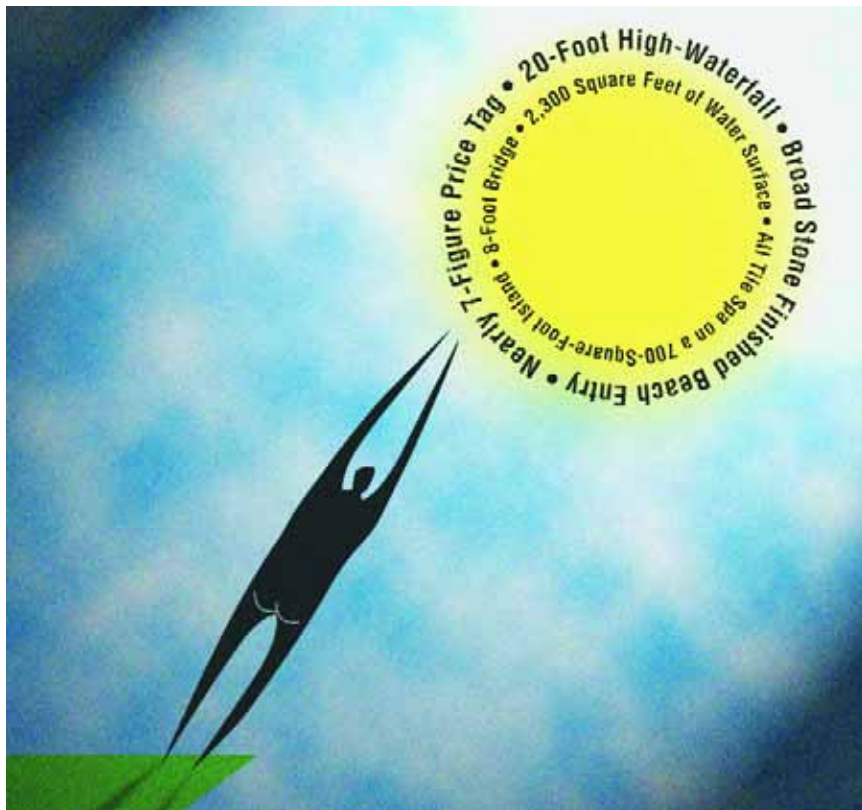
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## Reaching for the Ultimate

*The renovation project I've been discussing for the past couple of issues will be on hold for a few weeks as we await the arrival of a shipment of custom tile from Italy. We'll pick up with that project once work resumes. In the meantime, let's begin coverage of what would have been the next project for "Details" – discussions that will carry us through a good part of the year to come.*

Everything about this Pennsylvania watershape has been impressive, right from the start. Simply put, it's one of the biggest and most elaborate projects I've ever tackled.

As designed, the watershape will feature 2,300 square feet of water surface; a big, all-tile spa perched on a 700-square-foot island; an 8-foot bridge; a glass-tiled, grotto-like, partially domed structure with a fireplace inside; a broad stone-finished beach entry; a 20-foot-high waterfall featuring a variety of cascades, ponds and landscaping pockets; an array of thermal ledges and benches; a custom stone/pebble interior finish; and a roster of other details too numerous to list.

All told, the budget for the watershape stands at close to seven figures – just the ticket for an estate covering 200 acres of rolling, wooded terrain in Hanover, Pa., not far from Gettysburg. I designed the pool, which is now being built by Liquid

ALL TOLD, THE BUDGET FOR THE WATERSHAPE STANDS AT CLOSE TO SEVEN FIGURES — JUST THE TICKET FOR AN ESTATE COVERING 200 ACRES OF ROLLING, WOODED TERRAIN.

Designs, the Cherry Hill, N.J.-based design/construction firm I operate with my friend and colleague, Kevin Fleming.

### GRILLED TO PERFECTION

We were initially contacted by the senior architect on the project, Paul Kiss of Oliveri & Associates in Collingswood, N.J. We'd worked with him before, and he invited us to attend a meeting with the owners, the general contractor and several other key members of a team involved in the construction of the estate.

Unfamiliar with the roads of south-central Pennsylvania, Kevin got lost on the way and arrived about four hours late – not the way you want to get started on *any* project, let alone one of such magnitude and sophistication. Once we arrived, we were greeted by about 20 people who fired questions at me in rapid succession for several hours. Through it all, it was clear that their goal was to make certain I knew what I was talking about.

They spent time reviewing my portfolio, and we discussed a range of possible details, with everything leading in turn to additional series of questions. When the barrage of questions finally abated, I stood up and began describing my preliminary thoughts and ideas on the project at hand – "Here's what you should have, and here's why."

The main task, I explained, had to do with fitting our work within the grand-scale surroundings and managing scale, proportion and the dynamics of shape and line in appropriate ways. At that point, the home was in active design/build mode and constantly growing and changing. In addition, a system of retaining walls had been



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
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set up in the assumed pool area. Beyond that, there wasn't much to go on, so I led them on a voyage of pure imagination and visualization and had a good time of it.

After hours of free-wheeling conceptualization and narrowing in on things that captured their interest, the owner finally piped up with the magic question: "How much is this going to cost?"

I explained that it all depended on how far they wanted to go. The owner looked at me and said that he wanted it all, at which point I offered a rough guess that the cost of the project we'd been visualizing would be somewhere in the neighborhood of a million dollars.

Before we left, I requested a soils report, the plans and details for the house, a site

plan for the property and more. A few days later, we visited the site for the first time and met up again with the project manager, Dave Robbins of Glyndon, Md.-based C.E. Wheeler, the general contractor. Dave's truly knowledgeable, a real professional.

## SITE SPECIFIC

Once on site, we had to begin working through what I saw as a substantial problem: They'd built a series of retaining walls that were intended to form the back portion of waterfall and pond features that would flow into the pool. I observed that the retaining walls had been built incorrectly and that water containment could not be associated structurally with the walls because of differential settlement and soil expansion and contraction.

Rather than try to work around the problem as a way to control costs – a compromise made all too often by pool contractors – Robbins and his staff proved to be interested in addressing the real problem and in putting the project on the right track. The walls, they said, would be rebuilt and integrated into my plans as needed.

I was impressed: From those very first contacts, it's been obvious to me that these people are all interested in assembling the best of the best for every aspect of the project. What's most encouraging is that everyone at C.E. Wheeler actually listens to the experts they've brought in and actually takes their recommendations seriously instead of looking the other way and asking consultants and subcontractors to execute ideas that may or may not work. I don't often get to say something like this, but I believe these people are working hard to do things 100% the right way.

I responded with a design proposal that covered the design and specification of the project from front to back. This included not only the basic design and aesthetics of the pool, but also detailed specifications for all of the water effects, hydraulics, electrical systems and finishes as well as architectural sections and delineations. (I did everything but the soils reports and structural engineering, which I turned over to experts in those fields at the appropriate time.)

This depth and detail gave the other key players on the project an opportunity to see what should be included in the design

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of a quality watershape. To that point, they had mostly been exposed, as are many who go in search of watershape consultation and design, to an industry that does not present itself well.

As we say in our Genesis 3 presentations, "Take what the industry usually does and do the opposite." In this case, that meant applying my design education; generating drawings that were in scale, in proper perspective and filled with details; and demonstrating to the design team that they were working with a contractor who knew about aesthetics.

Energized by the task at hand and out to impress the project team, I prepared for a presentation to the owners and key team members in January 2003. In contrast to the first meeting, this time I was given the floor and held it throughout with only a smattering of questions.

## ON STAGE

It really was quite a show, if I do say so myself.

I offered visuals and explanations of a range of details and spent a lot of time defining specific ways that scale and perspective played into the use of boulders and the directional qualities of the overall layout. I delved deeply into consideration of

such small details as the use of interstitial planters in the waterfalls and ponds and made certain they all saw how realistic and eye-catching the results would be. We also discussed how the glass-tile interior of the grotto-like structure would be washed in

## DRAWN IN

This project illustrates like none other I can imagine the full value of knowing how to draw – and draw well.

Nothing about what I prepared for presentation was haphazard or incomplete: The scale was true, perspectives were correct, details of joinery were rendered accurately. It was all done in such a way that the drawings could become working documents that would keep everyone participating in the project on target and out of trouble.

It's a key point I've made again and again: Good drawings do much more than offer a "general idea" of what's going on. They communicate underlying construction principles and can become the most important of the many tools used on a job site.

There's another point here that bears mentioning: Not every detail can be put down on paper, which is why I'm on site as often as possible to supervise what's actually happening. And when I'm not there, my partner Kevin Fleming is – and never, ever hesitates to call me so we can resolve whatever issues might arise. No guesswork!

– D.T.



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light courtesy of recessed floor fixtures.

The situation demanded detail, and I know confidently that I delivered.

I explained, for instance, how the free-form pool had been designed with grandkids in mind; how the beach entries and steps and benches would make it easy for people to get in and out of the water; how dry-stack ledger stone around the pool's interior perimeter would replace the usual waterline tile; and how we'd set up the island spa with its boulders and planters. We also covered the eight-foot bridge leading to the island and how people would move around the deck, gazebo and grotto-like areas adjacent to the pool.

It was a good day, and I enjoyed the opportunity to make my presentation to such conscientious homeowners and a fantastic project team. I left the room feeling satisfied—as though they had listened and now understood what it would take to create a watershape worthy of such a grand setting.

Three weeks later, I received a call from

the architect, who said that the homeowners wanted it all.

Upon receiving this news, Kevin Fleming and I immediately went to work—beginning, of course, with the soils report. We soon learned that the supporting material beneath the watershape was mostly rock, but mixed with areas of softer and less-stable loam. Given the basically rocky terrain, the structural engineers determined that we didn't need piles to support the pool—but that a system of grade beams would be needed to support the broad structural decks we'd be cantilevering off the pool.

We also had to accommodate prevailing freeze/thaw conditions, which meant sinking all of the grade beams to a depth below the existing grade of about three feet—a detail designed by the structural engineer.

## MATERIAL ISSUES

We also immediately began giving attention to all of the project's countless aesthetic details.

Consider, for example, the process of

stone selection: Ultimately, we'll be using more than 100 tons of boulders and 13,000 square feet of flat stone in and around the watershape, and I know the importance of having those imported stones blend in with the surrounding natural landscape as well as with the home and its landscaping. Lots of the boulders will fall into the one-to-five-ton range and will constitute many of the watershape's primary visual accents.


I brought samples from my studio in California, including one I particularly liked for this project—a sandstone known as Sweetwater. I also relayed a price for the flat stone of \$400,000 from my suppliers, Malibu Stone & Masonry Supply in Malibu, Calif., and, given the size of the order, gave the owners the option of contacting the supplier directly to see what they could work out. (I've done that on other jobs with tile, lighting fixtures and other items.) The owners loved the stone, but ultimately, the prospect of shipping all that tonnage across the continent made using it out of the question.

Continued on page 36


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## DETAIL 33

So we contacted a local supplier and found materials remarkably similar to the Santa Inez boulders and Sweetwater sandstone – not Sweetwater, but close. All the way around, this was the perfect solution – both practical and cost-effective – but it was the first of many cases in which selection processes took unusual time, care and consideration. By comparison, tile selection was a simpler process: I knew we wanted a Moreno glass, job-jointed tile from Italy – a silvery, iridescent tile with a full palette of available colors to work with.

I'm the first to admit I'm proud to be working on such a project – and to say that there's no way I'd be here without the benefit of my design education and my hard-won experience in major-league construction. It's certainly a point I've made before and one I'll make here again: To work at the highest possible level and to provide your clients with the best possible product, you need to understand both design and construction. And the only way you can do both is with education.

I can't begin to count the times I've met designers who have no clue about the practicalities of construction and contractors who haven't any foundation in design and design principles. I use the fact that I am a trained designer and my 25 years of on-site construction experience to great advantage, and I know that my background has given me the confidence to strive for the highest levels of artistic expression in this and many other projects.

I spend a lot of time challenging designers and contractors to wake up, smell the coffee and see the potential inherent in the fine art of watershaping. As we move through this project during the next several months, I trust you'll see why I keep banging away at these points and will make the decision to come along for a beautiful ride. **WS**

*David Tisherman is the principal in two design/construction firms: David Tisherman's Visuals of Manhattan Beach, Calif., and Liquid Design of Cherry Hill, N.J. He is also co-founder and principal instructor for Genesis 3, A Design Group, which offers education aimed at top-of-the-line performance in aquatic design and construction.*



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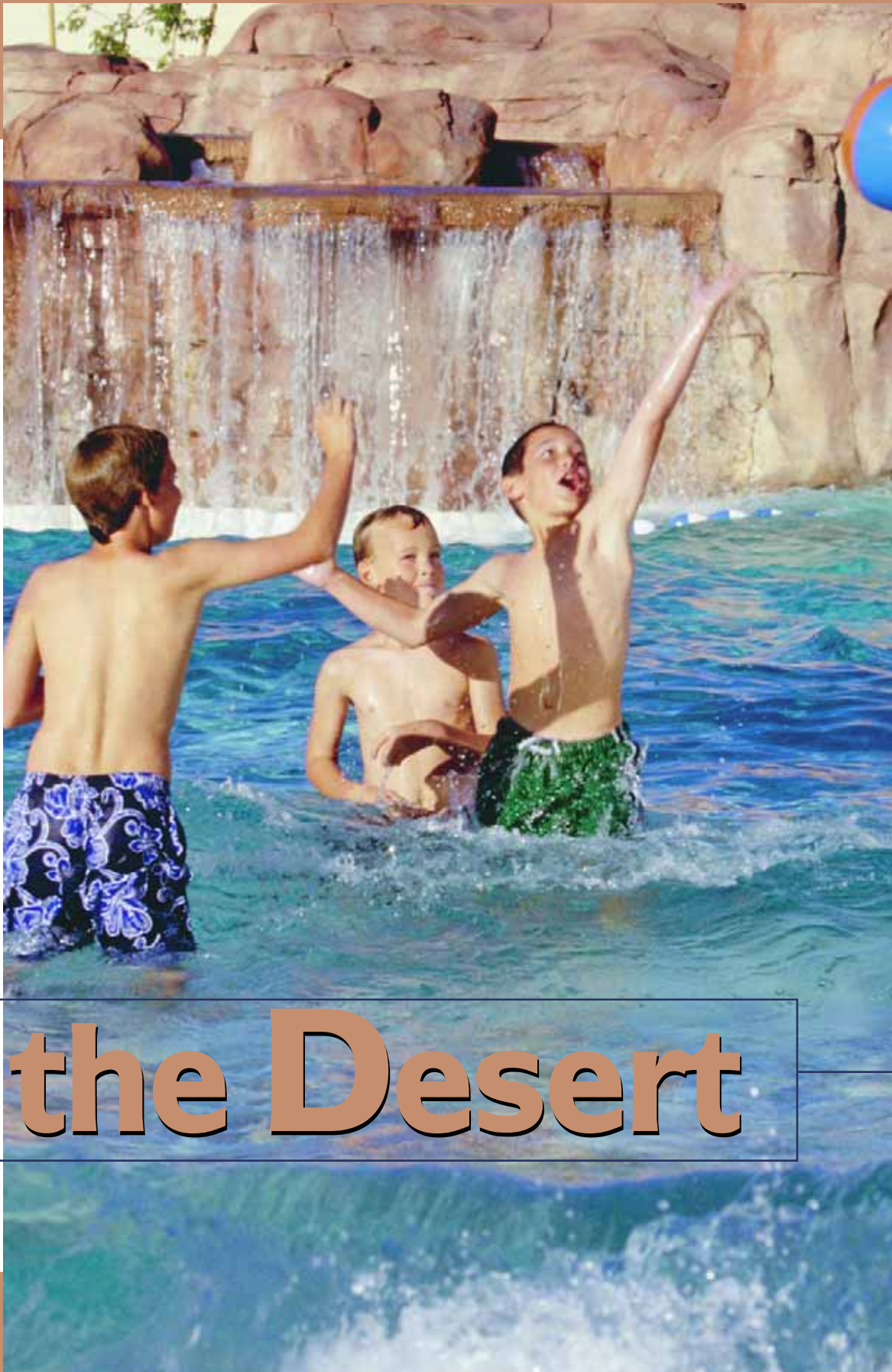


# Water

# in

# the Desert

By John Jennings  
& Jean Garbier







Inspired by the unique relationship between the Arizona landscape and the water that shapes it, The Oasis waterpark in Phoenix is unusual for the fact that it was designed to blend in seamlessly with the desert that surrounds it as well as the luxurious resort of which it's a part. As John Jennings and Jean Garbier explain, the challenge was linking a theme-park spirit to the resort's desire for complete visual integration and high standards for aesthetics.

It's striking and even awe-inspiring to observe the ways in which water can shape a desert. Probably the most spectacular example of this phenomenon to be found anywhere on the planet – and unquestionably the most prominent hydrological feature of Arizona's landscape – is the winding course the Colorado River takes through the Grand Canyon it created.

The terrain surrounding Pointe South Mountain Resort in Phoenix is another special creation that draws much of its character and interest from the presence of water, both natural and artificial. In the former category are the spectacular system of cascades known as the Mongollon, along with the rivulets that come with summer monsoons and flash floods to form vast networks of arroyos, alluvial fans and flood plains. Among the man-made features are the ancient canal systems crafted by the Hohokam tribe and the modern region's system of interconnected reservoirs and lakes.

These watercourses lend visual richness in and of themselves, but they also give Arizona's deserts the ability to sustain natural flora and fauna right alongside the sprawl of modern civilization. From the standpoint of watershape design for a high-end resort property, the presence of this water in the desert has also provided a wonderful opportunity to tie recreational spaces into natural surroundings in unique and unusual ways.

### Design Time

That opportunity came with development of The Oasis waterpark as part of Pointe South Mountain Resort. The resort has been one of Arizona's most popular business and vacation destinations, but its owners wanted to upgrade its property in a way that would set it apart from other facilities and greatly increase its family-oriented leisure business.



The project team started its work in an area that offered a wide-open canvas, and we ultimately created a substantial waterpark at the heart of the resort. Within that large, active space, however, are areas that allow for more intimate experiences of local Arizona textures, cultures and colors.



It was an ambitious plan, even for a facility that features 115,000 square feet of meeting and function space and offers one of the largest ballrooms in the state. Indeed, for all of its 15 years, the facility has been a popular resort, conference, golf and spa facility and has been listed as one of *Fortune* magazine's preferred destinations.

The owners' idea was to redefine the facility's use of the land and reposition the property as a first-class, family-friendly destination. Setting their sights at that level required discarding the current model of themed resorts and, in this case, defining a unique attraction that would take its cue from the arid beauty all around.

To begin the process, Pointe South Mountain's management team turned to our firm, Vanasse Hangen Brustlin of Watertown, Mass. We were named pro-

ject manager and quickly went to work assembling a design team that included the "aquitecture" consultants at EDSA Cloward, TenEyck Landscape Architects, Rock & Waterscape Systems and Synectic Design, among others. Together with the resort's team and owners, we collaborated on visualizing, developing and drawing up a master plan for site redevelopment that would completely transform the property.

What emerged from our creative interplay is a themed business and recreational resort that celebrates Arizona's climate, culture and native landscapes. At the inspirational core of the redevelopment was the idea to build the refreshing, fun-filled, multi-use waterpark seen on these pages.

All told, The Oasis includes six acres of aquatic entertainment embodying the unique relationship between Arizona's

landscape and its water.

The waterpark replaced little-used parking areas with the desired "total resort experience" and provides a connection between the resort's facilities and available recreational outlets. The new waterpark supports group functions with 24,500 feet of deck and function space, 8,700 feet of lawn/garden function space, The Oasis Bar & Grill, restroom facilities and retail space as well as service and utility facilities. In addition to being fully functional, it's also great fun.

The entertainment experience starts in the 10,000-square-foot, zero-depth-entry wave pool and continues with a children's pool and a hot tub that holds 25 bathers. For the more adventurous, there's a triple-slide tower (one of the tallest in the country) featuring a pair of thrill-drop speed slides and a mellower but equally satisfying serpentine slide. There's also a





950-foot river course complete with bubbling rapids and an active river. Finally, more traditional games of basketball and volleyball are accommodated in a large recreational pool.

### A Mountain High

The resort is situated at the foot of the 16,000-acre South Mountain Desert Preserve and is silhouetted against the mountain backdrop. All in all, it is the perfect setting for a waterpark that would be rich in visuals, forms, textures, colors and experiences – something special that hadn't been attempted in Phoenix before.

Typical of Arizona resorts, Pointe South Mountain previously featured its swimming pools, six in all, located within various residential courtyards in a traditional fashion. In a decided change from this pattern, the waterpark functions as a central recreational gathering place for guests.

But where some other resorts feature water slides, our charge was to ramp up the experience by creating an attractive, watergarden atmosphere.

The design team saw a need to synchronize three basic components: water recreation in an integrated, themed environment; flexible resort-function space; and reliable operations. EDSA Cloward led the way in defining the core components of the waterpark, including technical and engineering details required to meet the vision and make it work. For their parts, Rock & Waterscape Systems and TenEyck Landscape Architects focused on aesthetics and in making certain the framing features would interface effectively with the aquatic engineering.

Vegetation is zoned throughout the six-acre environment to reflect the state's various biomes. Rock formations are based on geological replications of the Lake

Out of view of anyone playing in the water at The Oasis, custom-designed digital-control panels show the whole interconnected water system at a glance and keep track of functionality so that the operational log is accessible at all times.

Stark high-end sand filters are used on all four of the waterpark's separate systems, with circulation driven by ITT Marlow's pumps. Chemtrol provided the chemical controllers that manage all 662,000 gallons of water that move through the six-acre waterpark.

– J.J. & J.G.

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The children's pool is separated from the rowdier play spaces and offers little ones a place to cool off and enjoy the water in a (relatively) peaceful setting.



Powell region and have been color-washed to exemplify the rich, red rock colors of Sedona.

In addition – and reflecting a practice seen throughout the resort – the space provides touchstone educational experiences commemorating the Native American traditions that influence life in the region. For example, a “spiral garden” reminiscent of those created by many tribes is centrally situated on an island in the midst of the waterways and is accessible by a rock footbridge to accommodate casual functions.

The resort itself is set up in a Spanish Colonial/Mediterranean style, with village-like suites connected by covered open-air walkways and outdoor paths to convention facilities, restaurants and recreation areas set around the property. Stone pavers and landscape plantings are scattered throughout and are carried into common spaces to provide a sense of continuity and to enhance awareness of the resort's surroundings.

### Flowing Features

The Oasis is designed to accommodate up to 2,900 people at a time, with spaces flowing from one water-recreation modality to the next and linked by interconnected water events, outdoor lounging areas, planted oases and meeting areas. Our aim was to create a facility that feels like it was naturally all part of the same water system, with each of the features flowing into the next – even though the four main systems are, in fact, primarily functionally separate.

The slide towers are located at the highest elevation in the waterpark and appear to feed into the river, which in turn connects to the main Oasis pool area. The main pool area features the most open and spacious deck space. The rockwork between the river and the pool makes it seem as though the water comes through the rocks; functionally speaking, however, the rockwork's main duty is to retain the rolling water in the wave pool.

Other waterfeature highlights include:

► **Slide Canyon:** The highest slide tower in Arizona at 83 feet high, the structure houses three water slides. The 225-foot Free Fall and the 220-foot Roadrunner slides are of the quick-drop variety; the





**The wave pool is the main gathering place in the waterpark, with generous decks for parental relaxation and supervision as well as plenty of play space for those who want to bob in the waves or swim or play volleyball or basketball. Above the waterfall is the resort's spa, patterned on a desert hot spring.**











third, the 300-foot Sidewinder slide, offers a twisting drop at a more gradual angle – a slower, longer ride.

► **The Zuni Active River:** This long, re-circulating watercourse invites guests to drift throughout the Oasis in inner-tubed leisure as they pass canyon walls. With ample and varied river widths, rafters can ride side-by-side along the 950 feet of moving water, which mimics a river-rafting experience with churning rapids, stretches of slow-moving currents, arcing water jets, mist and a back eddy.

► **The Wave Pool:** This watershape features a zero-depth entry point that offers a friendly beach environment for smaller children as well as easy access to a five-foot deep, 10,000-square-foot wave pool that operates on an easy, ten-minute cycle. Divided by a peninsula, the big pool doubles as a recreational vessel for water sports and lap swimming. At one end, atop the cascading waterfall, sits a large hot tub designed to resemble a desert hot spring.

► **Wildcat Springs:** This 800-square-foot watershape is designed as a place where children can cool off as well as frolic among the many water jets that spray the adjacent deck area.

► **The Spiral Garden:** This 10,000-square-foot island features traditional plantings as well as a large flagstone patio, a fire pit surrounded by red rocks and views of the Zuni Active River. The intention here was to provide a function space for the resort that had as much flexibility as possible.

## Technical Ecstasy

As might be expected, making this elab-

orate vision into a working reality meant we had to cross a number of technical hurdles. The need for synchronization and coordination was particularly great in the slide tower's construction, where the team needed to mesh technical specifications with the architectural design and site plan – not something any of us are normally required to do with such precision in a waterpark project.

The river also offered its share of challenges, mostly having to do with our desire to make it long and wide enough to feel as though there was something to discover at every turn. Accordingly, we manipulated the design to vary its dimensions and have it bow and curve where a river naturally would. The circulation was metered and the height of the rock outcroppings varied so that inner tubers couldn't see everything all at once and would feel more secluded than they actually are from the surrounding deck and garden areas.

Five pumps keep the 270,000-gallon river flowing at a speed of 3.5 feet per second (2 miles per hour). Five large bottom drains, each measuring four by 12 feet, let water fall into a big sump from which the water is pumped back into the river through multiple four-inch jets mounted at 30-degree downstream angles to mimic the flow of an authentic river. With widths ranging from 12 to 20 feet, the 12,000-square-foot river is the widest in the Valley and easily accommodates side-by-side floaters.

Additional river features include arcing Polaris mini-jets, misting systems and flows designed to seem like smaller streams joining up with the big river.

The river system loops around the waterpark through a variety of typical Arizona scenery. We also spiced things up in a few places – in one area adding water jets to cool off bathers, in another borrowing air power from the wave pool to create a distinctive white-water effect.

The transformation of Pointe South Mountain Resort's central outdoor spaces and the creation of The Oasis all started with an earlier endeavor. Known as the Paseo project, it involved turning a utilitarian outdoor parking and service space into 53,000 square feet of landscaped outdoor terraces and courtyard facilities.

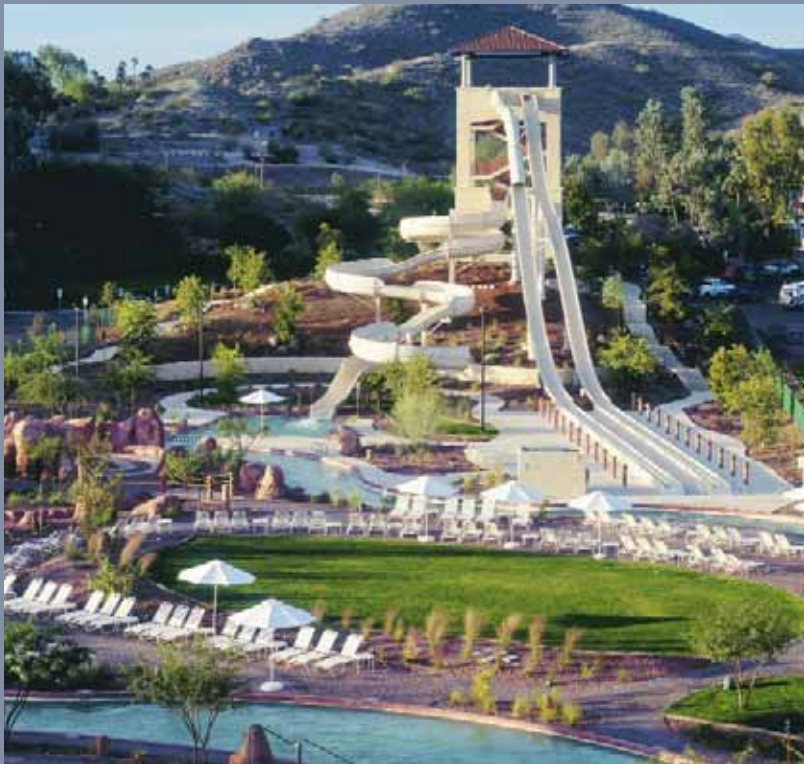
Lush garden pathways integrate the conference facility with surrounding guest suites and effectively blend interior and exterior environments with terraces, courtyards, fountains, flexible function spaces and botanical collections, all supported by state-of-the-art fiberoptic lighting and sound systems.

The owners' experience with this high-toned project gave them the experience they needed to pursue The Oasis with an eye toward aesthetics as well as function.

– J.J. & J.G.







**A prime view of one of Arizona's tallest slide towers fits the structure within a far grander setting, while views from closer angles are eased by generous use of trees, landscape contours and artificial rockwork. The enclosure at its peak also integrates the look of the tower with the architecture of the rest of the resort.**

There are also many points of entry and exit from the river, with wider access at slower parts of the flow. Where the river leaves the rock canyon and sweeps past the three big slides, there's a narrow opening that lets guests move directly into the river from the splash pools.

Another challenging feature was the wave pool. The wave generator consists of four large air chambers that let the water in and out at 10-minute intervals. In those intervals, we wanted to "borrow" the power of the generator to infuse the river's rapids with air via bubblers we set up in the floor of the river. This adds a nice visual touch to the sensations of speed and excitement created in this "whitewater" passage. (The wave interval of 10 minutes, by the way, is a matter of county code and is intended to give bathers predictable relief from the choppy waters.)

aesthetic terms has to do with the way the watershapes are surrounded and set into place. The reason for this is usually economic: Most waterparks focus on the bottom line rather than on a theme in any sort of authentic sense; as a consequence, the visuals often are "value engineered" right off the budget.

By contrast, the owners of Pointe South Mountain Resort were willing to invest \$12.3 million into making The Oasis a standout attraction not only with respect to functionality and fun, but also in ways having to do with ambiance and details. (They had success using this integrated approach in previous projects at the resort, as is related in the sidebar on page 45.)

So the Arizona landscape theme was with us always, and the landscape design and rockwork construction steadily carried that theme into the space. Where we often worked with historic traditions and

shaped to match selected contours drawn from scale models and photographs. The frames are encased in two coats of shotcrete and have been finished with paint washes and stains. The rockwork adds particularly to the feel of the waterfall end of the wave pool and to the hot tub area.

## Practical Fun

Wanting the landscaping to be people-friendly, we avoided the typical thorny-desert-growth approach and focused instead on other indigenous desert plants such as sage and deer grass. We also focused on smooth transitions from native to non-native plantings. In the northeast corner of The Oasis, for example, we blurred borders by continuing a line of palm trees approaching the pool area into a space that featured lush plantings of native grasses and flowering plants.

The landscaping was designed to rep-

**The owners were willing to invest \$12.3 million into making The Oasis a standout attraction not only with respect to functionality and fun, but also in ways having to do with ambiance and details.**

The four-chamber wave generator is contained within a large concrete bunker hidden behind the waterfall at the far end of the pool. As air moves into these pressurized water chambers, two chambers at a time, it forces the water out and into the pool and causes wave-like motions in the main body of water. The air is then released, and water flows back into the chambers. The system is capable of generating five-foot waves, but it's normally set to kick up a two-foot surf.

Designed with a zero-depth entry for family fun, the 256,000-gallon main pool also features a play area designed for bigger kids that's separate from the kids' pool and areas set aside for guests who crave a less-active entertainment area. The large peninsula dividing the two pool areas created an integrated solution – the same body of water used for different functions, with the wave pool for family fun and the recreational pool for sporting activities.

## Landscape and Rockwork

Where most waterparks fall short in

flora drawn from Arizona's key biomes, we also took cues from modern Arizona tastes, in one area planting stately (but non-native) date palms that add a luxurious tropical feel to the water recreation area and are found so often these days in the state's developed areas.

More frequently, however, we kept with the classic natural look and feel, especially in rockwork designs that were intended initially to replicate the various geologies of Arizona, but for practical reasons took on a more generic look featuring desert shapes, textures, heights and colors that's more of a blending of local geology – mostly formations found near Lake Powell and colors found near Sedona. The canyon area of the Zuni Active River, for example, was molded from rock formations to simulate the effect of floating into Glen Canyon at the base of the Hoover Dam.

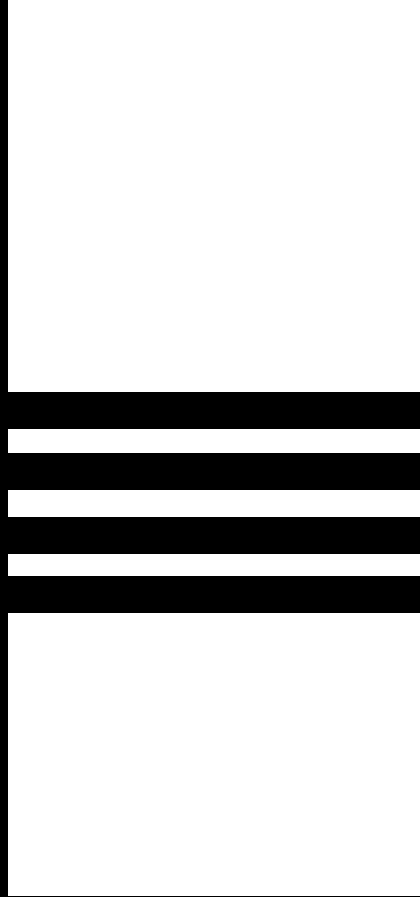
Real rock was also used in the project, but other than the red native sandstone pavers, all the rock formations themselves are artificial. For durability, the formations are framed with #3 rebar hand-bent and

resent the various Arizona climates and biomes. There were, of course, some native trees we would have liked to have planted but couldn't, including Aspens and Ponderosa pines. The resort is at too low an elevation, so we compromised by planting Aleppo pines that, although they are not native, capably represented the pine family. We also used *Delbargia Sisso* to offer the same feel as Aspens.

All of these plantings are sustained by an irrigation system that was designed into the system of rock formations – another instance where early and complete integration of project details was of paramount importance.

From the resort's perspective, the most important of all project outcomes is and will continue to be guest response. So far, the results are positive and respondents to hotel surveys credit the waterpark with making the difference. As Managing Director Ron Olstad puts it, there are a lot of water features in the Phoenix area, but those at The Oasis offer something truly special for vacationers and business guests as well as their families.





Where do high-end commercial clients turn for watershaping expertise? For the most part, observes Dominic Shaw of the landscape-architecture firm EDAW, they'll call in either consultants, manufacturers or design/build experts – all of which will work, he adds, although they work *best* when the decision maker fully understands the roles these service providers play and can effectively manage the possibilities as a concept comes to fruition.

# Role Players

By Dominic Shaw

For most watershape projects of above-average complexity, the clients – whether they are developers, architects, landscape architects or property owners – must choose how to execute their vision by deciding who they'll bring in to do the actual work with the water.

In my 23 years in the watershaping trades (in service and maintenance, as an installer, with an equipment manufacturer and as a consultant), I've observed dramatically varied levels of expertise on the provider side of that equation. These days, in my work for EDAW, a national landscape architecture firm, I'm now on the specifier side of the equation and, in an interesting reversal, very often find myself explaining to designers in my own company what their options are for getting a watershape designed and built.

In my lengthening career, I've seen the sets of strengths, backgrounds, abilities and limitations each category of service provider brings to the table – and seen clearly that an understanding of how all

the pieces fit together is useful for *every-one* involved, from the property owner and specifier to the consultants, suppliers, contractors and subcontractors who get the job done.

To build that understanding, let's pull apart the process of setting up a high-end watershape from start to finish and see how various roles intersect and interrelate. We'll focus on large commercial projects for purposes of illustration, but the fact is that the same principles apply just as well (if less formally) to sophisticated residential projects.

## Progress by Design

As a first step in the process, the owner typically hires a *prime consultant* – usually an architect or landscape architect – to produce the documents needed to start building. The prime consultant, in turn, hires the various necessary *sub-consultants*, including civil, structural, mechanical, electrical and plumbing engineers.

Now comes the Big Picture: a *master*

*plan* developed by an architect or landscape architect. This master plan usually takes a broad-brush approach – a quick treatment of site features that incorporates basic themes and goals established by collaboration of the owner and the master planner.

Once approved by the owner, the master plan is further developed through a process called *schematic design*. In this step, the master plan is broken down and the project's specific elements, including the watershapes, begin to take form. The client reviews and approves the progress, at which point the designers move on to more detailed designing of site elements.

This new phase is typically referred to as *design development*. Here, the design team takes various components of the plan and starts to define how they'll look, how they'll work and what material and/or techniques may be used to execute them. In a landscape plan, this would include elevations and grading, sidewalks and paths, planting and watershapes – a key stage that has a lot to do with estab-



**It's quite obvious that giving a watershape specialist a role sufficiently early in the process can circumvent some of the guessing problems that tend to arise during the budgeting process.**

lishing the scale, shape and “feel” of different elements in the plan.

The final design phase prior to bidding is known as *construction documentation*. Here, the work is defined with enough detail that various project parts can be put out for thorough and accurate bidding. This includes technical specifications that define *which* products are to be used, *where* they are to be used and, finally, *how* they are to be used.

The prime consultant can reach out for relevant assistance on any watershapes associated with the project as early as the design-development stage. Indeed, conversations with consultants, manufacturers or design/build contractors at this point will prove highly beneficial to the rest of the design process because comments provided by the experts can be weighed and considered before commencement of the construction-documentation phase.

In point of fact, however, designers usually complete the design-documentation phase *before* seeking the advice of any sort of watershape specialist. That's unfortunate, because the design documentation usually delineates plans for any watershapes along with simple sections through the basins. In other words, by the time real water-focused help arrives, the prime consultant often has already committed to a direction that may or may not represent the best of all practical possibilities.

### Finding the Right Expert

We've mentioned the three pools of expertise upon which owners and prime consultants can draw for assistance in designing a watershape. Let's say for

purposes of illustration that the interest is in a fountain, in which case fountain consultants, manufacturers or design/build contractors would be contacted.

Each of these options represents a different working relationship, all of them working under the professional ultimately responsible for the watershape. This professional is hired by the owner or prime consultant, who is now assembling a design team to provide a complete, biddable set of drawings for the project.

Generally, bids come in at fixed prices based on this set of drawings, so any missing details might be considered an “add service” by the bidder and could create substantial budget variances and scheduling issues. This is why, throughout the design-development and construction-documentation phases, cost estimates are revisited frequently and adjustments are made to the budget to accommodate elements that cost more or less than anticipated.

Given the fact that the experts generally get in on the act a bit late in the process, watershapes are high on the list of site amenities that consistently come in costing more than anticipated. This has given watershapes a spotty reputation in architectural circles, but it's quite obvious that giving a watershape specialist a role sufficiently early in the process can circumvent some of the guessing problems that tend to arise during the budgeting process.

Assuming such issues are under control, let's look at each level of watershaping support the owner or prime consultant has the opportunity to consider:

**w Fountain consultants:** Whenever they happen to be called to the project, fountain consultants become part of the design team and their work has been (or should be, at least) explicitly defined in their proposal for services. Each firm will differ in services offered – some might limit their scope to mechanical and electrical design, for instance, while others might also offer structural design, waterproofing or civil engineering – so the prime consultant must know enough about those selected to ensure that the services offered actually meet up with project requirements.

Once the consultants are engaged, they assume responsibility for their portion of the work and to producing a fountain that can be built for the budgeted dollars. (If the design or budget is still an open book, of course, fountain consultants have the opportunity to influence each in positive ways.) Their scope of work should include contacting other project engineers and coordinating the provision of power, water, sewer and storm-drainage services to the fountain equipment.

From a structural standpoint, they must also ensure that the intended routing of the piping does not interfere with any structural elements. Where interferences are identified, the fountain consultants must arrange for sleeving through beams, slabs or walls as needed and provide details for all of the fountain hardware where it intersects with final structures and in due consideration of finishes. (The use of custom fittings and piping arrangements to minimize the visual impact of hardware is not an uncommon focus of fountain consultants' drawings.)





Projects of all shapes and descriptions are included under the watershaping umbrella. There's work at all levels on everything from design to construction when it comes to such watershapes as the alcove fountain and reflecting pool at the Women in Military Service Memorial at Arlington National Cemetery (A). There are also renovation projects, such as the work undertaken at the historic Four Seasons Biltmore Hotel in Santa Barbara, Calif. (B).







The services of experts (whether consultants, manufacturers or design/build firms) are required in many cases to make unusual applications work as efficiently and cost-effectively as possible. It would require extraordinary expertise on staff, for instance, to set up the spray-activated sculptures found at Parc Diagonal Mar in Barcelona, Spain (C) and also be able to tackle the unique, proximity-switch-activated wind/fog effect experienced at the Hershey Children's Garden in Pennsylvania (D).



The fees charged by fountain consultants are in line with the defined levels of detail and coordination; as important, they're also intended to defray the costs of carrying errors-and-omissions insurance for the consultants' portion of the work.

**w Fountain manufacturers:** The participation of manufacturers in fountain

projects has been ongoing for at least the past 25 years. These arrangements started as a free service by suppliers interested in having their products specified by architects or landscape architects.

To start the process, specifiers submit design-development plans to equipment manufacturers for review, comment and adjustment. Working with that feedback,

the responsible designer would produce schematics (usually isometric views), a bill of materials (including the manufacturer's products) and a set of cut sheets for pool hardware. This sort of package was and still is provided as a courtesy to specifiers in exchange for specification of equipment.

The result has generally been sets of drawings that show fountains in plan and section with required pipe sizes, necessary equipment indicated at either end of those pipes and healthy sections filled with "by others" notes. How those pipes were to get from point A to point B becomes the responsibility of the specifier, who may or may not rely on a member of the engineering team to provide assistance and take responsibility, if so desired. The specifier is also responsible for coordinating the installation of details provided by the manufacturer into the structures being built and the finishes being applied.

Bottom line: While the manufacturer is providing a courtesy service to the specifier, it is ultimately the specifier who is responsible for all drawings and specifications that go to bid. Unless the specifier engages the manufacturer in a sub-consultant agreement (which is not very common), the manufacturer is only responsible for the performance of the equipment, not for its use or the issuance of drawings.

To be sure, the specifier wants free help in designing the fountain, and the manufacturer wants equipment specified and sold, so there's a mutual benefit here. But the specifier needs to know up front if the manufacturer in question guarantees the design if their equipment is installed properly, because for the most part manufacturers do not carry errors-and-omissions insurance and therefore cannot be held responsible for errors in design.

That said, I have found through the years that the majority of manufacturers will work with the specifier and owner if problems arise from equipment use or performance – even if the problems are not directly related to that equipment. On that level, the relationship really is a

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8:00 a.m. — 5:00 p.m.  
Genesis 3 All-Day Workshop

**Tuesday, Jan. 6**  
8:15 a.m. — 9:30 a.m.  
The Projects and Philosophies  
of Genesis 3 -  
Skip Phillips, David Tisherman  
and Brian Van Bower  
9:45 a.m. — 11:15 a.m.  
Job Costing for Profit vs.  
Existence - Brian Van Bower

**Wednesday, Jan. 7**  
8:15 a.m. — 9:30 a.m.  
You Are What You Think - Brian  
Van Bower  
9:45 a.m. — 11:00 a.m.  
The Art of Conquering Difficult  
and Unusual Projects - David  
Tisherman

11:15 a.m. — 12:30 p.m.  
Genesis Edge Program - Skip  
Phillips and Brian Van Bower

**Thursday, Jan. 8**  
8:15 a.m. — 9:30 a.m.  
Structural Engineering -  
Ron Lacher  
9:45 a.m. — 11:00 a.m.  
Basic Understanding Of Soil  
Conditions - Ron Lacher

**Thursday, Jan. 8**  
11:15 a.m. — 12:30 p.m.  
**AQUA EXTRA!** Hydraulics  
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**When entering into a project that will use design/build services, the role of the specifier is to develop a clear intent for the watershape by issuing drawings and performance specifications.**

two-way street, but with the specifier ultimately bearing liability for the design and equipment specifications.

**w Fountain designer/builders:** Design/build contractors bring a totally different type of relationship into play in building a fountain (or any other watershape, for that matter). As builders, they are engaged directly by the owner or the general contractor and their primary purpose is to get the fountain installed on budget, as specified.

Different contractors will assume different scopes of work in pursuing that purpose, but some are better suited than others to build particular watershapes. For instance, if the project is going to use artificial rock, then it is best to work with a contractor with strong credentials in that type of project.

When entering into a project that will use design/build services, the role of the specifier is to develop a clear intent for the watershape by issuing drawings and performance specifications. The contractor then takes those drawings and develops shop drawings that show intentions having to do with re-circulation equipment, structures and finishes.

The performance specification will sometimes require the contractor to provide structural designs secured from a licensed engineer. However it goes, once the project is bid and moving forward, the specifier's main job is to make sure the design intent is executed by the con-

tractor and that a high level of quality is being maintained.

The design/build contractor can be a great source of knowledge for the specifier by virtue of having intimate knowledge of local codes that can help in coordinating efforts. Communication with the contractor – sooner rather than later – can also help determine best methods for construction and refine cost estimates early in the process.

### Good Choices

As a landscape-architecture firm that operates worldwide, we at EDAW generally will evaluate a client's need for our services when we're approached about a project.

As specifiers in these cases, there are instances when we might refer a project directly to a manufacturer or contractor if we feel the project does not warrant the full-scale services a consultant might offer. Our collective experience and long-established relationships with key manufacturers and contractors allows us to aim clients in the right directions.

By the same token, we know that even a project with a fairly simple design can warrant the use of a consultant to assist with installation complexities. This occurs most often when watershapes are located on a site and/or inside a building where pipe routing requires more extensive coordination with all the other building and construction services.

In those cases where retaining a con-

sultant makes sense, the drawings must be completely detailed and coordinated so that almost any competent mechanical, electrical or specialized fountain contractor can place an accurate bid. That's a big service and can get expensive – but there are trade-offs in taking other avenues that often make it worthwhile.

A set of drawings developed by a manufacturer, for example, may be free for the asking, but on-site coordination will generally be costlier for the specifier through the necessity of dealing with unresolved coordination items of the sort mentioned previously. And where use of a design/build contractor might relieve the specifier of much of the responsibility for the design, it might require a fair bit of diligence to make sure the intentions defined in the master plan and other documentation are carried through. The costs, balances and trade-offs may not work out evenly for any given project, but this is the continuum of possibilities a specifier must weigh against the depth of his or her intended role and the overall complexity of the project.

Given the fact that many commercial watershapes cost into the millions of dollars and that even residential projects are not-infrequently exceeding seven figures these days, these decisions should be made with as much knowledge and information as possible to ensure that the final product is of the highest possible quality.





**E**

Sometimes the sheer scale of a project means that many hands and minds will get involved, as with the 30-meter-long water wall at the Kerry Centre in Beijing (E) or the interactive watershape at Kierland Commons in Phoenix (F). Each of the available types of outside help brings different skills and expertise to the table: It's up to the project's managers to know the distinctions and bring in the right players.











# Images in Stone

Whether in the form of a statue, a bowl for a fountain or an architectural detail, carved stone lends a timeless beauty and an intriguing quality to any aquatic setting. But there's a difference between just using it and using it *well*, says watershaper Mark Holden, who defines what you should know about the raw materials and their sources and also explores the various challenges, costs and pitfalls that may come along as part of the deal.

By Mark Holden

Since the dawn of civilization, it has stood as the single most enduring of all artistic media: From representations of mythological characters and historic events to applications as purely architectural forms and fixtures, carved stone has been with us every step of the way.

As modern observers, we treasure this heritage in the pyramids of Egypt and Mesoamerica. We see it in the Parthenon in Athens, in the Roman Colosseum and in India's Taj Mahal – every one of them among humankind's finest uses of carved stone in the creation of monuments and public buildings. As watershapers in particular, we stand in awe before the Trevi Fountain in Rome, the glorious waterworks of the Villa d'Este and the fountains of Versailles, three of history's most prominent examples of carved stone's use in conjunction with water.

But you don't need to travel so far to recognize the stunning effect that carved stone can have within a space, aquatic or not. In fact, one need only consider how even the most modest use of sculpture or stone accents within an otherwise ordinary project can transform the "mid-





Stone has been quarried and carved through all of human history, and there are places around the world where stone carving continues to this day as trade and craft. Parts of the process







have been aided by modern technology, but mostly it's hard, gritty, painstaking toil that eventually turns rough stone into works of art.



range" into the "high end."

To be sure, most watershapers have worked with stone in one fashion or another, typically as a decking material or as a finish for walls. It's my view, however, that until you have used *sculpted* stone in one of its myriad forms, you have never truly used stone to its greatest aesthetic potential.

## Bodies of Work

Whether we're talking about limestone, sandstone, granite or marble, stone encompasses a certain, chaotic mixture of minerals that gives it an artistic coloration and texture that no painter could ever capture. And we accept and even celebrate its imperfections, which is, I believe, the truest testimonial to its remarkable aesthetic cachet.

If, for example, a stone sculpture is misshapen to some small degree as the result of an imperfection in the material or minor shipping damage, many people I've encountered will view the flaws as "character marks" that add to the appeal of a piece. By contrast, if a *concrete* structure is similarly uneven, it will likely be jackhammered out and re-poured or recast in an attempt to achieve visual perfection.

It is this unique, "organic" quality of carved stone that draws us to it – and inclines high-end clients to pay large amounts of money to obtain it. The fact that sculpture is art permanently rendered in three dimensions lends it an allure that flatwork or less durable media lack. We're captivated by the way light and shadow play on the features of a cherub or the petals of a rosette rendered in depth and detail. Whatever the form, sculpture creates wonderful focal points within a space and conjures a sense of elegance and class as well as connection to both the past and the future.

What many people do not know is that stone carving is far from a dead art: There are still "Old World" craftspeople who work with stone as a medium similar to clay and spend careers toiling in the dust and grime to perfect their ability to chip, drill, chisel and polish stone into fine art. These stone carvers are often poor and uneducated, yet they create works that appeal to clients who are anything but.

On a practical level, this time-honored process can come with a hefty price tag, not only with respect to direct costs but also in the lead times required to obtain the product and the level of difficulty involved in commissioning the work and then safely installing it. Much more so than sculptures made of metal or clay, stone sculptures are heavy, dense and inclined to fracturing – and therefore difficult and expensive to quarry, carve, transport and install. Depending upon place of origin, you can wait months for carved stone pieces to arrive on the job site.

For all these reasons as well as simple matters of taste, stone carvings are not for everyone or every project. But there's little doubt that, when working at the upper end of the market, knowing how to obtain and use carved stone is a crucial arrow to have in your quiver. And that know-how begins with an understanding of the material itself.

## Reality Check

In working with stone, you must always be aware that the sample you hold in your hand will look different from the stuff that shows up on pallets at the job site. The sample has been weathered, handled and had a chance to develop a patina – which will not be true of the freshly milled material hauled in by your stone supplier.

I discuss this point with my clients over and over again: It's a way to manage expectations, keep everyone on the same page and avoid disputes.

– M.H.



## Key Qualities

Selecting the right stone for a given situation can be summed up in a few pairs of words: color and texture; weight and stability; time and money. Making decisions about all of these are essential in bringing stone to a project while keeping the client happy and making a profit in the process.

► **Color and texture:** To a large extent, these aesthetic characteristics are of prime importance because they have everything to do with architectural style. Indeed, the colors and textures of certain stone materials are virtually synonymous with the settings in which they're typically applied.

The fact that certain stone types are historically associated with particular architectural styles leaves it up to the watershaper, landscape designer or architect to recognize those styles and, as needed, determine which stone types are most harmoniously used with which style.

► **Weight and stability:** There are certain logistical issues that must be taken into account before you order anything – and most certainly before you begin the installation process. Weight, for one thing, can affect your ability to get a piece into place. Will you need a crane? Can the piece be moved by hand? Can a loader or forklift be rigged to set a carved stone fountain bowl or sculpted centerpiece in your basin of choice?

Continued on page 62



Even flat surfaces can be carved – as seen here, where chisels have been used to work the surface and create artful texturing on otherwise unornamented planes of stone.







## Water Tight?

Stone does not typically hold water.

The idea that you can take a series of limestone wall sections and cement them together for a fountain basin, for instance, is generally a bad one. While it is true that *some* stones are quite dense, most are porous to some degree and allow moisture to pass very slowly through the stone matrix. Stone pieces are also hard to butt up against one another, and custom dowels must be used with structural epoxy to join them together with anything approaching water-tightness.

It's also true that manipulating stone to meet hydrologic and structural needs can be extremely expensive and can never be guaranteed to work for the long haul.

My preferred strategy when using stone inside a watershape is to build a masonry or concrete basin that can be plumbed, water-proofed and even veneered with tile before the stone ever arrives on site. This way, you can water-test the vessel and make modifications as needed. Now the stone is just an aesthetic element to be applied in a sealed, water-tight environment, and you will avoid problems down the line.

— M.H.

Carved stone can be used in myriad ways in and around water-shapes, from decorative accents, housings for fountain spouts or figurative statuary to fountain bowls and surrounds, architectural details or stairway treads. Whatever the application, the play of light and shadow across carved surfaces – not to mention the special affinities between carvings, plants and flowing water – make powerful design statements in just about any setting.



Potential stone shapes are basically unlimited: Whatever you can imagine can usually be carved, but if it hasn't been done before or you want something even slightly out of the ordinary, you need to be able to tell the carver, in very precise terms, exactly what you want.

You also need to focus on the stability of the material and its ability to withstand the stresses of shipment and installation without fracturing. There are trade-offs here: Granite, for example, is very stable but extremely heavy. Cantera is a much lighter, igneous stone, but it's also known for its brittleness. These distinctions can be key factors in determining whether all goes well or you end up re-ordering a piece you have dropped, damaged, or fractured before getting it set.

► **Time and money:** It can take a long time to obtain carved stonework – and, depending on the size and complexity of the piece, it can be quite expensive not just to acquire but also to ship and install. In many cases, the costs for the crane and labor needed to set the piece in place will be considerable on their own.

Many watershapers and other builders have been burned in the process by underestimating and underbidding the full cost of assembling stone creations and therefore have chosen not to work with them again. That's unfortunate, because all it takes is a realistic assessment of these

basic costs and clear communication with clients about how much money will be involved above and beyond the raw cost of creating the artwork and about how long the process can take.

I've found that under the best circumstances of timing, material availability and geography, carved pieces I order from Mexico for use in southern California take a minimum of four weeks to mine, carve and deliver. If I'm ordering limestone pieces from Italy, which is another place where stone carving still flourishes, I'll be lucky to see the finished piece within three or four months, depending on the situation.

### Stone Species

As mentioned above, selecting the appropriate raw material for a stone carving in a particular setting is critical when it comes to consistency with a particular style.

In addition, knowing something about the raw material is just as important to managing the practicalities of acquiring the pieces you seek. Certainly, almost any stone can be manipulated and shaped as you wish, but certain stones – including

slate and quartzite – have limitations that generally restrict them from use in carved-stone applications.

Indeed, knowing the nature of these raw materials and making the right choices among them is far more than half the battle. As I've worked with carved stone and studied its use throughout history, I've come to appreciate the characteristics of these stone types. There are many more than those listed below, but this basic list will carry you a long way:

► **Cantera and Adoquin:** Found in central Mexico, these common volcanic stone types are actually quite similar. Cantera, the softer of the two stones, is the more common and can be obtained in colors from almost white and through a range of earth tones to almost black. Adoquin is a denser stone and therefore can be manipulated with finer detail and stability. Both are widely used in California and the Southwest.

► **Limestone (Italian and Mexican):** Limestone has been our basic building block for thousands of years, and the fact that so many ancient limestone structures still stand today, with so many fine details intact, tells quite a story about its longevity. Known for its pure, creamy color, this is a dense, heavy stone well suited for carvings of extremely high detail and quality.

Mexican limestone, mostly from the Yucatan Peninsula, is less consistent in color and less dense than its Italian cousin and often contains fossilized sea life, a feature valued by some but seen as a blemish by others. These factors, as well as geographic proximity, makes Mexican limestone less expensive and easier to acquire than Italian limestone.

► **Sandstone:** Many types of stone fall under this large umbrella. For the most part, these stones have soft, earth-toned coloration and smooth outer surfaces. They also have what the experts term "modular consistency," which means that sandstone is, when carved, less likely to fracture than some other stones. (Where

## Horror Story

Most large projects involve their share of problems.

With one of my largest, the *Cima del Mundo* project that has been covered extensively in *WaterShapes*, I had ordered a custom-designed, custom-cut nine-foot-tall Cantera stone fountain for the central courtyard. I designed it, ordered it, paid a 50% deposit and waited eight weeks only to open a monstrosity on the job site.

A basketball-sized chunk had broken away from the bottom bowl and had been patched with colored cement. Other fist-sized holes hadn't been patched at all and, topping everything off, the camel-colored stone I had ordered came through as pure white. I refused to show my client the fountain and made profuse apologies while taking blame for the whole disaster.

I also went looking for another supplier. After some digging, I found Sean Nelms at DeSantana Stone in San Diego, Calif. He handled the task with military precision, quickly developed shop drawings from my conceptual sketches, delivered a replacement in a matter of weeks and literally saved the day for us: If the central courtyard fountain had not been pulled off to perfection, we would have had an extremely displeased client.

This experience reinforced my sense that you need to deal with true professionals if you seek to provide your clients with top-flight results.

– M.H.



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# The Power of Flowers

By George Forni





Long a fixture in San Francisco's Golden Gate Park, the Conservatory of Flowers is one of the most photographed structures in a city famous for picturesque beauty.

At 125 years old, the facility is the oldest surviving public conservatory in the western hemisphere. Originally built in 1878 and then rebuilt after a devastating fire in 1883, it's also an architectural and engineering treasure – an extremely rare example of a prefabricated Victorian-era structure that had withstood the test of time. In 1995, however, a severe storm caused extensive damage and led city building officials to deem it unsafe for public use.

Despite that decision, a dedicated group of paid staff and volunteers doggedly maintained and managed the site and its plants in a gallant effort to stave off further degradation, all with the hope that someday the Conservatory would be restored. They bit off no small challenge, as many of the facility's "botanical residents" are difficult and expensive to maintain – including a 100-year-old Philodendron with five-foot tall leaves that fills much of the space beneath the Conservatory's towering central glass dome.

The ongoing campaign to save the facility picked up steam in 1998, when the World Monuments Fund placed the Conservatory of Flowers on its list of the "100 Most Endangered World Monuments." With that exposure, funding



**The renovation of San Francisco's historic Conservatory of Flowers became that elusive, once-in-a-career opportunity for George Forni and the specialists in the design, construction and maintenance of living watershapes at Aquatic Environments: Not only was their work important to the preservation and sustenance of incredible aquatic plants, but it was also a project that saw a young firm get involved in salvaging a part of California's cultural history.**

snapped into place and, by 2000, renovation had begun in earnest – including planning for what was to be our work in creating a new aquatic-plants exhibit for the building's east wing.

### Natural Selection

Designed by Portico Group of Seattle, the aquatic-plant exhibit was intended to recreate the feel and experience of a tropical rainforest, complete with colorful (and even some carnivorous) plants and flowers. The watershape was to play a central role in conjuring that exotic experience for generations to come.

In February of 2002, we at Aquatic Environments met with Conservatory staff to establish our capabilities with respect to installing the exhibit and meeting its ongoing maintenance requirements. This was far and away the most prestigious project we'd ever pursued in our company's brief history (we had been around just three-and-a-half years at that time), but collectively we had decades of experience in the restoration and management of natural and man-made lakes, ponds, streams and other waterways and had a strong case to make.

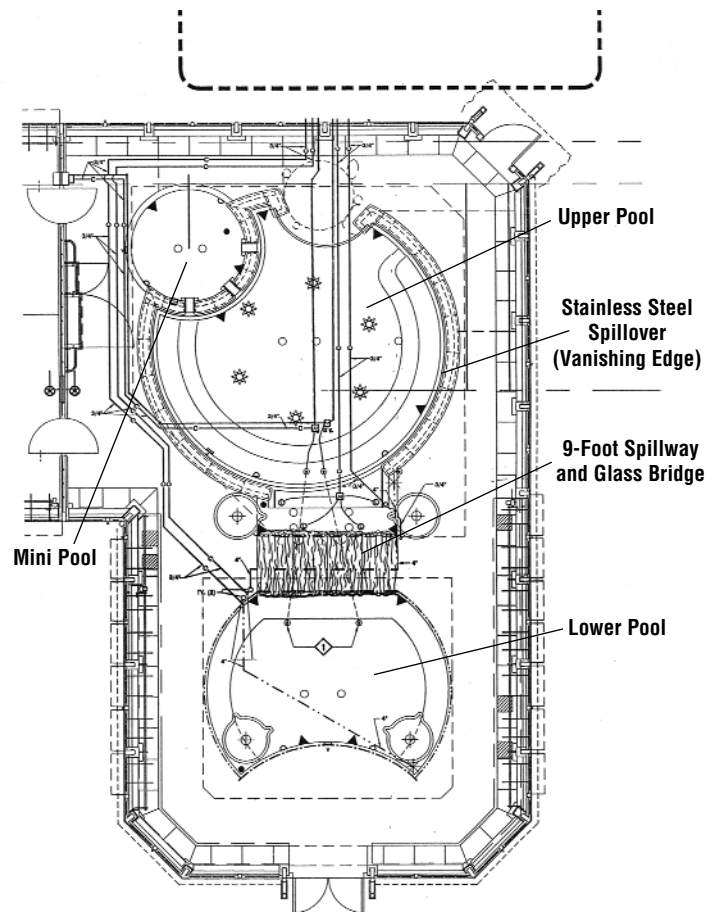
After several more meetings, we were finally successful in securing the design/build contract and immediately jumped into the planning stage. Up to that point, the watershape was simply a set of plans with architectural render-



The Conservatory of Flowers in Golden Gate Park has long been one of San Francisco's most-photographed structures. A lengthy, complicated renovation project has revived the facility with the aim of delighting future generations of park visitors.



The Conservatory's plants include many specimens of great size and age, including the Philodendron that fills the main entry hall of the facility with its five-foot-tall leaves. Our work was performed in the east wing – and started without any clear idea of where the equipment pad would be!





ings, detail views and a rough mechanical schematic. This left us to seek input from the project's major players and develop a design that would meet the needs of the facility and plants while staying within budget.

The result of this process was a set of working drawings for a watershape consisting of three visually integrated vessels: an upper pool, a second-tier mini-pool and a lower pool, each designed to house different sets of plants. With a long service life in mind, the whole complex was to be made of reinforced gunite as a monolithic unit.

As planned, the circular upper pool was to be 30 feet across and spill over a long vanishing edge into either the mini-pool – a horseshoe-shaped catch basin ten feet across, or spill over a sheer, nine-

foot edge into the catch pool. The lower pool, 22 feet across, is separated from the catch pool by a large acrylic barrier. Four “spilling pots” would accent the flow into the lower catch pools, with two pots on the deck and the other two appearing as though they were flowing on the lower pool's surface.

The vessels were to range between 18 and 42 inches in depth and house hundreds of spectacular tropical plants growing in pots set directly on the midnight blue, two-part epoxy finish chosen for the vessels' interiors. Elegant materials were selected to set off the watershape's clean, simple lines: A beautiful, powder-coated stainless steel band, for instance, was chosen to serve as the weir for the 75 total feet of vanishing edge, and we specified fiberoptic lighting and laminar

jets as well. (The project also features an artificial tree and a glass bridge described, respectively, in sidebars on page 72.)

### Staying Focused

As a small player in a huge project with a \$25 million overall budget and an extremely high profile, we were realistically worried about getting lost in the shuffle. But that proved not to be the case, and we soon came to see that our part of the east wing was to house some of the Conservatory's most exotic and prized specimens and was intended to be among the facility's biggest draws.

Plants now on display include floating lilies and other familiar water plants, along with vibrantly hued bromeliads, fascinating carnivorous plants and other tropical species that require warm



Views across the water surfaces from a variety of angles showcase a wide variety of exotic aquatic plants, including the giant lilies that seem an irresistible draw to the Conservatory's visitors.





There isn't much by way of elevation change, but we made the most of the space by varying the ways water flowed through the system, using perimeter overflows, vanishing edges, sheet waterfalls, spillways and flows from the decorative pots to bring the sounds of moving water to different areas within the relatively small available space.

temperatures, high humidity and bright light. The star attractions are several Victorian Lilies, giants that grow floating pads upwards of six feet in diameter and protect themselves with thousands of needle-sharp thorns.

The construction of the watershape seen on these pages strongly resembles that of a common swimming pool, but the complex is anything but ordinary when it comes to operation, circulation and maintenance. Two separate circulation systems operate the trio of vessels, each of which is specifically designed to support a distinct array of plants – and each of which, absent any chemical control, functions at temperatures that invite extreme algae growth and raise a range of other water-quality concerns.

But thoughts of the Conservatory's history, the project's mission and the specifics of maintenance were far off in the distance as construction began. In fact, our work on site began with a disheartening thud as we surveyed a sand pile enclosed by a rough concrete footing – a mess that made it tough to envision the layout and finished project, let alone pin down exact positions for the structures and a plumbing system that had to be routed under the old foundations to an as-yet-undetermined location.

Left with few fixed items from which to pull reference points, we found that simply laying things out was a daunting exercise. We knew, for example, that the watershape had to be centered perfectly inside a room that had been completely

dismantled and set up under a fixed beam that did not yet exist. And naturally, we had to have the pools and decks in place before any of that structure could reappear. Just as naturally, stub ups for items such as the four-foot diameter spilling pots had to be set within fractions of inches – this at a point where flow characteristics were still being modeled and equipment had yet to be selected.

We muttered a bit about chickens and eggs as we worked, but we had to keep moving forward just the same.

### Making Decisions

Suffice it to say that we spent days rather than hours laying out this project, and even then we were aware that we were making little more than educated



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## A Glass Span

The aquatic-plant exhibit described in the accompanying article includes an unusual glass bridge that enables visitors to get closer-than-usual looks at some of the exhibit's exotic plants. It also performs an aesthetic service by masking the division of the lower pool into two parts by a large, cast-acrylic panel.

Although building the bridge was beyond the scope of our contract, its inclusion had a lot to do with the way we built the three interconnected pools the bridge was to span. We had to factor it into our load-bearing calculations and our design drawings while making arrangements for conduits to power an unspecified lighting system.

All in all, it added considerably to our work – but the outcome made it worthwhile.

– G.F.

guesses about where everything should go when it came to the three vessels, their plumbing and their equipment.

We eventually took a deep collective breath, completed the layout phase and began setting up the structural footings, plumbing and electrical conduits. Even with a painstakingly developed layout, however, this phase was made difficult by the sand in which we worked. It was like building a sand castle, with gravity working against us at every turn and making our excavations unstable and prone to collapse even though we were digging to depths that weren't even deep enough to raise OSHA concerns. By the time we were through, we'd had to invent a specialized trench-shoring system to make subsequent construction possible.

The rough grade was at minus-12 inches, which wasn't much of a challenge, but the bottom of the building's structural footings checked in at minus-54 inches and we had to reach two feet below that level to allow adequate access for the plumbing runs and con-

duits – all of which ran to an equipment room whose rough location behind the east wing had been set with no design or details as yet.

The tricky excavation was followed by steel and plumbing phases complicated by the fact that roughly two dozen different trades were now on site performing a wide array of duties right on top of each other. Interaction and timing of the work became important factors in the critical path toward completion, and there was no hope of separating the work of our watershapers from the activities of the woodworkers, masons and glaziers who were operating on the same tight timetables. Throughout, I'd say there were no fewer than three distinct trades operating at any given time – all in a space of just 35 by 65 feet.

Through all of the difficulties of the early stages, we managed to toil our way through and establish locations for the structures and piping runs in such a way that the pools could be constructed as a solid unit that we could shoot in one very long day. We did so in the belief that, given the soil conditions, one integrated watershape would have better long-term structural integrity than would three individual pools set up with cold joints.

## Designs and Changes

As mentioned above, we became involved in the project at a time when the watershape was only slightly more than a "rough" with respect to functional design. This lack of hydraulic and mechanical design definition brought on an ongoing need for request-for-clarification (RFC) submittals; time spent waiting for responses; and eventually responding to the "as bid" or "change order" determinations handed down by the project's managers.

Included in this time-consuming process were our professional views of how an item or function should be considered or constructed, based on our ex-

perience. The result was an ongoing, laborious, complicated process of revising and changing throughout the duration of the project, all covered by weekly or monthly visits from the architect.

In all of the give and take, deliberations about flow and water-exchange rates were the most critical. As a decorative display, the hydraulics would not have been particularly difficult to arrange. But the fact that this was to be a living biological system as well as a display multiplied our challenges exponentially.

Ultimately, we devised a system that uses multiple pumps and achieves a turnover rate of just two hours – a swiftness that was needed to ensure water quality and clarity in the absence of any chemical treatment. We also set it up so there would be minimal draw-down at system initiation, the concern being that a consistent water level is necessary for the health of the plants.

## Tree Housed

The artificial tree that looms so prominently above our watershape was another design element that stood beyond the scope of our contract – and was another case where we had to work creatively and interactively with another contractor to make certain everything would come together.

The tree could not be installed until the pools were nearly finished, with all capstones in place – but had to be brought in before the vessels were filled because there was a significant amount of work that needed to be done from inside the pools as installation moved forward and we continued our finishing work around the tree. Coordination was a huge challenge, but we managed it despite all the starting and stopping.

At "tree time," the upper and lower pools were nearly complete. With finishes in place, anchoring points were drilled and scaffolding erected both inside and outside the vessels. As each operation was completed, we water-proofed the intrusions and did our touch-up work – a discontinuous workflow that gave us all headaches but that resulted in successful installation and detailing of the exhibit's signature feature.

– G.F.

We spent days rather than hours laying out this project, and even then we were aware that we were making little more than educated guesses about where everything should go.



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**8:15-9:30 am:** The Projects and Philosophies of Genesis 3, with David Tisherman, Skip Phillips and Brian Van Bower.

**9:45-11:15 am:** Job Costing for Profit vs. Existence, with Brian Van Bower.

## Wednesday, January 7

**8:15-9:30 am:** You Are What You Think, with Brian Van Bower.

**9:45-11 am:** The Art of Conquering Difficult and Unusual Projects, with David Tisherman.

**11:15 am-12:30 pm:** Genesis Edge Program, with Skip Phillips and Brian Van Bower.

## Thursday, January 8

**8:15-9:30 am:** Structural Engineering, with Ron Lacher.

**9:45-11 am:** Basic Understanding of Soil Conditions, with Ron Lacher.

**11:15-12:30 pm:** Hydraulics for Pools, Spas and Waterfeatures, with Skip Phillips and Steve Gutai.



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So many details of the project fell into the “to be determined” category that we had to make educated guesses about penetrations and their size to accommodate such things as the yet-to-be-designed lighting system for the bridge. Simply placing the equipment was a big issue as well: The Conservatory had no space to spare, yet we were setting up a system that included five pumps, two biofilters, two pre-filters, two heaters, two UV sterilizers, three control panels and a cartridge filter (for the laminar-jet system). This was exclusive of all of the piping, valves and fittings that would make the three pools operate as intended.

The equipment space initially offered was about the size of a small half-bathroom. Simply put, there wasn’t nearly enough room for our equipment (see the sidebar below for details) as well as the 50-gallon

## The Equipment Set

Interestingly, the equipment used for the watershape in San Francisco’s Conservatory of Flowers is something of a cross-section of products available in the swimming pool and pond industries, with each component selected for very specific performance characteristics.


The pumps, for example, were selected from three different suppliers based on variable sets of criteria that taught us that one size definitely does *not* fit all. By contrast, the two biofilters were packaged units sold by a single distributor.

The other equipment – the filters, pre-filters and UV system – were sized and selected once the gallonage of the entire system was determined. Wherever possible, we selected units that would not only meet but would reliably exceed their specified warranties with the goal in mind of minimizing replacement and forcing anyone to deal with the marginal access we were able to provide to the equipment.

Ultimately, we settled on Pentair’s MiniMax heater as well as some of its pumps and backwash valves on an equipment pad that also featured Jandy’s valves and pumps. OASE Pumps donated a laminar-jet system, and we used a Hayward Maxi-Flo pump to drive it. Fiberstars provided the illumination for the nine-foot sheet waterfall from Custom Cascades, which also provided the three mini-pool spillways.

Because of the unique nature of the project, we did as much as we could to select just the right equipment but ended up in some cases making educated guesses about how certain components would operate under the conditions we envisioned. Fortunately, everything came together at start-up, at which point a few adjustments were all that was needed to fine-tune the systems.

– G.E.



The tree may be artificial and working with it through the installation process was no small task, but it makes an enormous contribution to the tropical atmosphere of the space and interacts beautifully with the watershapes on many levels.





water heater needed for the staff's shower. After careful negotiation, however, space was found for a two-tiered equipment room that meets code and allows for reasonable service access.

### Personal Pride

As watershapers, we leave our personal touch on each project we design or build. As specialists who engage in custom, one-of-a-kind projects such as this one, we know further that what we do is most often undertaken without the sorts of benchmarks or routines that might make it easier to foresee costs, timetables and action plans.

Yes, it would be easier to work on similar sorts of projects and develop the efficiencies that come with repetition, but what appeals to us most about what we do is the uniqueness that sets each project apart and keeps us fully engaged in the work we do.

Beyond that, as a fourth-generation

Californian, I see something special in the Conservatory of Flowers project – a sense of history that came with the structure, a special sense of place that came in working in the shadow of the Golden Gate Bridge and the sense of camaraderie that came from working shoulder to shoulder with so many talented and professional craftspeople on the job site.

Certainly, we take pride in having participated in such a high-profile project. But in retrospect, we don't see prestige as having been our prime motivator. Instead, we stood back when we were finished, in awe of the building and its history and happy with thoughts of the smiles of joy and wonder that will be brought to future generations of our fellow Californians and visitors from around the world.

It's a feeling of pride and satisfaction that can't quite be accurately described.

### The Acrylic Panel

One of the more prominent (and difficult) elements to design and install for the Conservatory project was the curved acrylic panel situated in the upper pool.

Intended to provide for underwater viewing, the four-by-eight-foot panel gives the upper portion of the exhibit an aquarium-like feel, was great from an aesthetic standpoint and serves its purpose – but was a design element to which nobody paid much attention until fairly late in the process.

Nobody, for example, had thought through the engineering far enough to determine the force with which the water would press against the panel, which was to be supported only on three sides with no support up top. Nor had anyone considered the fact that aesthetics called for freeboard between the waterline and the top of the panel to be less than an inch – all of which meant the panel's size and thickness as well as the dimensions of a mounting notch in the shell had to be calculated within fractions of millimeters.

But everything eventually came together. The panel was custom-manufactured by Nippura, a Japanese firm that specializes in large cast-acrylic panels such as this one. Nippura's U.S. representative pitched in, and along with our project manager, David Jones, worked out the sizing and engineering.

During construction of the shell, we built a Masonite mold to create a notch that would accept a flexible seal, specialized sealants and the panel itself. Some of us lost a bit of sleep in the days before we installed the panel, aware that the load could result in deflection of the panel that might force it out of the notch and also conscious of the fact that a whole lot of guesswork had gone into the execution of this part of the project.

To be sure, we breathed a collective sigh of relief when the watershape was filled and the panel worked perfectly. However stressful this episode with the acrylic panel may have been, it stands as a wonderful example of how different materials can be integrated into watershapes to create a certain ambiance or just the right aesthetics.

– G.E.



# MISSING ANY?

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☒ **April 1999** (Vol. 1, No. 2)

**Hopkins** on designing with large rocks; **Hare** on basic hydraulics; **Straub** on shell curing.

☐ **June 1999** (Vol. 1, No. 3)

**Phillips** on water and decks; **Parmelee & Schick** on soils and geology; **Anderson** on water sounds.

☐ **August 1999** (Vol. 1, No. 4)

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The **Beards** on collaboration; **Yavis** on custom vinyl-liner pools; **Mitovich** on Microsoft's campus.

☐ **March 2003** (Vol. 5, No. 3)

**Fowler** on habitats for marine mammals; **Benedetti** on outdoor kitchens; **Dews** on planting pockets.

☐ **April 2003** (Vol. 5, No. 4)

**Shoplick** on watershapes as teaching tools; **Gutai** on water flow; **Schwartz** on Maya rockwork.

☐ **May 2003** (Vol. 5, No. 5)

**Zaretsky** on sensory gardens; **Freeman** on hydraulic retrofitting; **Hanson** on water/stone sculpture.

☐ **June 2003** (Vol. 5, No. 6)

**Gunn** on fountain whimsy; **Tisherman** on water-shaping for an art collector; **Holden** on tile.

☐ **July 2003** (Vol. 5, No. 7)

**Fintel** on attracting birds; **Lacher** on structural engineering; **Alperstein** on golf course design.

☐ **August 2003** (Vol. 5, No. 8)

**Miller** on site-specific fountains; **Gutai** on plumbing joints; **Holden** on period-sensitive restoration.

☐ **September 2003** (Vol. 5, No. 9)

**Hebdon** on borrowing naturalism; **Ruddy** on indoor designs; **So** on modernist sculpture.

☐ **October 2003** (Vol. 5, No. 10)

**Mitovich** on dry-deck fountains; **Roth** on liner issues; **Marckx & Fleming** on glass tile.

**Please note:** These are just partial listings of each issue's contents!

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## ROOT BARRIER

Circle 135 on Reader Service Card



**BBA NONWOVENS** offers Biobarrier, a system that redirects growth patterns of tree roots to protect watershapes, walkways, decks and other structures from root damage. The system works through the long-term, slow release of a pre-emergence herbicide incorporated into a

Tygar drainage fabric. The herbicide creates an inhibition zone that stops root elongation. **BBA Nonwovens**, Old Hickory, TN.

## CUSTOM SITE FURNISHINGS

Circle 136 on Reader Service Card

**IRONSMITH** offers an array of custom cast or fabricated site furnishings, including fountain grates, gates, trash receptacles and tree grates. The ornamental metal work can be produced in cast iron, aluminum or bronze or fabricated in steel, aluminum or copper alloys, and the company's design department can assist with concepts and provide visualization tools through 3-D modeling and rendering. **Ironsmith**, Palm Desert, CA.



## SHADED IN-POOL SEATING

Circle 137 on Reader Service Card



**S.R. SMITH** offers The Pool Bar, a unique poolside assembly that includes two submerged seats and an umbrella table with four recessed drink holders. The assembly mounts

on the deck with six stainless steel lag bolts, can easily be removed for seasonal storage and folds up and out of the water to ease either automatic or manual pool cleaning. The 72-inch umbrella folds and tilts for optimal use. **S.R. Smith**, Canby, OR.

## COMMERCIAL POOL CATALOG

Circle 138 on Reader Service Card

**RECREONICS** has published a catalog covering its full line of systems, equipment and accessories for commercial swimming pools and aquatic recreation centers. The 180-page, full-color book covers the range from basic equipment, fountains and cleaning/maintenance products through to aquatic exercise and therapy equipment, competitive swimming systems and disability-access equipment. **Recreonics**, Louisville, KY.



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## RECEIVER-TRACK CATALOG

Circle 139 on Reader Service Card



MODERN POOL SYSTEMS has published a 16-page, full-color catalog covering its complete line of aluminum fiberoptic receiver tracks for use on virtually every type of pool construction. The tracks receive flat or round fiberoptic systems, and the brochure includes installation instructions and a range of helpful hints for setting up lighting systems for either concrete or vinyl-liner pools. **Modern**

**Pool Systems**, Columbus, MS.

## POOL/SPA HEATERS

Circle 141 on Reader Service Card



JANDY offers the new Laars Low NOx LX and LT pool/spa heaters. The LX offers advanced digital control and a user-friendly graphical interface, while both heaters meet stringent clean-air standards. Available in 250,000 and 400,000 Btu models, both heaters have specially designed burners

for long life, use fan-assisted combustion for more efficiency, and are ready for complete automation. **Jandy**, Petaluma, CA

## PVC CHECK VALVES

Circle 140 on Reader Service Card



PRAHER offers single-union-type PVC check valves in 1-1/2 and 2-inch diameters. The valves can be used at pressures up to 145 psi and are designed to provide maintenance-free back-flow prevention with minimum head loss at multiple spring loads (between 1/4 and 5 pounds). They also feature stainless steel springs, EPDM O-rings and seals, a raised-radius valve seat and full serviceability. **Praher**, Barrie, Ontario, Canada.

## POWER SCREED

Circle 142 on Reader Service Card



NORTHROCK INDUSTRIES has introduced a new line of concrete power screeds. Designed for use with new pours or for repair work, the devices provide rapid consolidation of concrete decking while improving both the quality and flatness of the finished surface. Blades come in 4- to 14-foot lengths for one-person and 16- to 22-foot lengths for two-person operation. **Northrock Industries**, Medford, NY.

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## PRE-CAST ARCHITECTURAL STONE

### Circle 143 on Reader Service Card



**CORONADO STONE** has added Euro Villa Stone to its Villa Stone Series. Designed to reproduce the look of classic European stonework, the lightweight, pre-cast material can be used in a variety of interior and exterior applications for both residential and commercial installations. Durable enough to withstand the tests of time and Mother Nature, the stone installs quickly and easily. **Coronado Stone**, Fontana, CA.

## CONTROLS FOR TWO-SPEED PUMPS

### Circle 144 on Reader Service Card

**INTERMATIC** offers a control system designed to exploit the full capabilities of two-speed pumps. The device's all-weather, galvanized-steel enclosure contains two heavy-duty time switches that allow for separate timing of motor operations for system efficiency, energy savings, extended equipment life and low maintenance. The flexible enclosure also allows for system expansion. **Intermatic**, Spring Grove, IL.



## DECKING SYSTEM

### Circle 145 on Reader Service Card



**SEAMCO LABORATORIES** manufactures Stone Bond, an epoxy system designed for use in creating patios, driveways, walkways, pool decks, steps and planters. Combined with seashells or natural pebbles, the epoxy offers surfaces suited to both residential and commercial applications that are tough, durable and stain- and crack-resistant – and that can be customized to suit a client's desires. **Seamco Laboratories**, Tampa, FL.

## GARDEN ORNAMENTS

### Circle 146 on Reader Service Card

**HADDONSTONE** has published a catalog covering The Collection, a complete line of garden ornaments as well as interior details and architectural stonework. The 142-page, full-color book offers a comprehensive, illustrated product guide along with technical specifications, information on materials of construction, technical support, the company's custom-fabrication services and much more. **Haddonstone**, Bellmawr, NJ.



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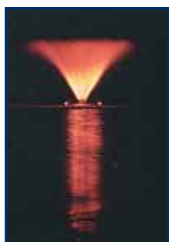
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## DECORATIVE AERATOR

Circle 147 on Reader Service Card



**KASCO MARINE** offers the F2400/VF, a half-horsepower decorative aerator designed to control algae, organic sludge and the growth of aquatic weeds by increasing the circulation and oxygenation of thermally stratified water in ponds while stimulating the degradation of organic waste. Lightweight and easy to install and operate, the unit is available with an optional lighting system. **Kasco Marine**, Prescott, WI.

## POOL EDGES

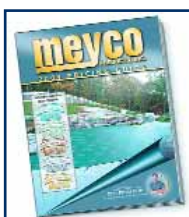
Circle 148 on Reader Service Card

**PACIFIC CLAY PRODUCTS** offers the Poolside Collection, a line of pavers, tiles and bullnose brick designed to bring flexibility and creativity to the design process. The pavers come in 11 earth-tone colors, the tiles in more than two dozen colors and textures and the bullnose in 11 earth tones and in two "used" finishes. The coping is available with several profile options. **Pacific Clay Products**, Lake Elsinore, CA.



## SAFETY POOL COVERS

Circle 149 on Reader Service Card



**MEYCO PRODUCTS** has expanded its line of safety pool covers to meet the needs of specific sorts of pool designs. The line features five series – Traditional, Classic Quick Ship, Classic, Estate, and Grand Estate – to meet the needs of projects of all types, from the most straightforward to the most intricate, multi-level custom designs. All are

fastened to the pool decking using specialized hardware. **Meyco Products**, Melville, NY.

## PIPE EXTENDERS


Circle 150 on Reader Service Card

**VALTERRA PRODUCTS** offers pipe extenders for use in repairing any glued plumbing joint. Effective and easy to use, the fittings provide permanent, invisible repairs without replacement of long sections of pipe. All you do is cut the defective valve or fitting from the system, remove it and install the extender, which is available in sizes ranging from 1/2 to 2-1/2 inches IPS. **Valterra Products**, Mission Hills, CA.





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## ANCHOR-WORM CONTROL

Circle 151 on Reader Service Card



AQUARIUM PHARMACEUTICALS introduces Pond Care Dimilin. Designed to rid ornamental ponds of infestations of parasitic anchor worms that cause unsightly wounds and may lead to secondary infection and even death among fish, the EPA-registered material interrupts the worms' life cycles and reproductive processes and is effective at any water temperature. **Aquarium Pharmaceuticals**, Chalfont, PA.

## TWO- AND THREE-PORT VALVES

Circle 152 on Reader Service Card



A&A MANUFACTURING has introduced the Tsunami two- and three-port water-actuated valves. Available in standard top and low-profile side-feed configurations, the valves allow installers to create dual-valve systems without the need for additional electrical devices or connections – ideal for use with fountains, spas, pools, waterfeatures, automatic surface returns and overflows. **A&A Manufacturing**, Scottsdale, AZ.

## BACKWASH VALVE

Circle 153 on Reader Service Card



PENTAIR POOL PRODUCTS offers HiFlow, a backwash valve for side-mounted sand and DE filters. Designed to provide precise control of filter functions at flow rates up to 125 gpm, the six-position, positive-lock valve is pre-plumbed for easy installation and features a PVC housing, a one-piece handle, two-inch inlets and outlets for unrestricted flow and permanently marked ports. **Pentair Pool Products**, Sanford, NC.

## ULTRAVIOLET STERILIZERS

Circle 154 on Reader Service Card



AQUA ULTRAVIOLET offers a full line of UV-disinfection systems. Featuring long-life, easy-change lamps and quartz sleeves that allow for a 99.9% transmission rate, the modular devices are designed for use on swimming pools and ponds from very small to very large. Safe for fish, the units control or eradicate algae, bacteria and protozoa present in the water without leaving harmful residuals. **Aqua Ultraviolet**, Temecula, CA.

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## CONCRETE STAMPING

Circle 155 on Reader Service Card



STAMPCRETE INTERNATIONAL has a 28-page, full color brochure on its full range of available concrete-stamp designs and patterns. From stone textures to brickwork in 40 standard patterns, the system starts with a fiber-reinforced, 3,500 psi concrete (with the color integrated), with texturing and application of additional etching stains (as needed) before sealers are applied. **Stampcrete International**, Liverpool, NY.

## POOL ENCLOSURES

Circle 156 on Reader Service Card

OMEGA POOL STRUCTURES distributes and installs the OpenAire line of retractable-roof pool enclosures and skylights. Built with maintenance-free aluminum framing, the systems work at the touch of a button to open 50% of the roof area to let in sunshine and fresh air. They also feature thermal breaks that keep condensation from forming on interior metal surfaces. **Omega Pool Structures**, Toms River, NJ.



## HAND-GLAZED TILE

Circle 157 on Reader Service Card



AGAPE TILE manufactures hand-glazed tiles, both original and reproduction, for use in pool-bottom murals and logos and for waterline decorations. Offered with lifetime guarantees, these tiles are also designed for use on spill walls, standing walls and flooring. Custom all-tile pool design and installation are also available, along with complete services for all-stone and all-glass-tile pools. **Agape Tile**, Fort Myers, FL.

## FOUNTAINS AND PLANTERS

Circle 158 on Reader Service Card

TREVI has published a full-color, spiral-bound booklet of single-sided sheets featuring complete dimensions and specifications on its line of freestanding and wall-mounted fountains, vase fountains, large and small planters and statues ranging from Buddhas to spheres. Made with composite materials, the products are designed to last longer and weigh half as much as comparable cast-concrete products. **Trevi**, Las Vegas, NV.



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## LIMESTONE PAVERS

### Circle 159 on Reader Service Card



**FRANCIS McCORMACK STONE DESIGN** offers natural stone pavers of gray and Irish blue limestone. Featuring remarkable fossil traceries when wet, the tumbled stone is available in 4 by 4, 6 by 6 and 8 by 8 inch configurations.

Flamed slabs are also available in sizes ranging from 12 by 12 to 29 by 35 inches. All materials are 1-1/2 inches thick. **Francis McCormack Stone Design**, Charlestown, MA.

## TILE SAWS

### Circle 160 on Reader Service Card

**MULTIQUIP** offers the Tile Pro line of ceramic-tile and stone saws in three portable models. Designed for cutting of ceramics, stone and masonry materials, all models have rugged frame assemblies and come with removable water trays; padded aluminum conveyor carts; maintenance-free submersible pumps; water-cooled blade shaft bearing assemblies; and hinged aluminum blade guards. **Multiquip**, Carson, CA.



## POND-EQUIPMENT CATALOG

### Circle 161 on Reader Service Card



**OASE PUMPS** has published a catalog on its pond, aeration and fountain equipment. The 48-page, full-color booklet covers the Strata-vator series of aerating fountains, the Strata-flo series of high-flow surface spray aerators, the Strata-fuser floating sub-surface aerators and a range of accessories. Also provided is a design section complete with sizing requirements and guidelines. **OASE Pumps**, Irvine, CA.

## STRAIGHT CENTRIFUGAL PUMPS

### Circle 162 on Reader Service Card

**NEPTUNE-BENSON** distributes the F Series line of end-suction, straight centrifugal pumps made by Griswold Pumps. The NSF-listed, close-coupled units are capable of delivering flow rates ranging from 50 to 3,000 gpm and can be equipped with motors from 2 to 75 hp. Features include upsized suction and discharge connections, tri-voltage motors and epoxy coating. **Neptune-Benson**, West Warwick, RI.



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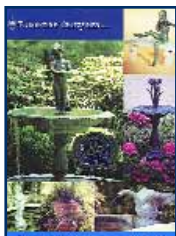
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## GARDEN-DECORATION CATALOG

Circle 163 on Reader Service Card



FLORENTINE CRAFTSMEN has published an 85th-anniversary catalog covering its line of hand-crafted garden ornaments, furniture, fountains, statuary, planters and urns. The 48-page booklet highlights new products along with familiar ones and emphasizes the fact that, because all products are hand-assembled and hand-finished, custom combinations and adaptations are always possible. **Florentine Craftsmen**, Long Island City, NY.

## MINI HYDRAULIC EXCAVATOR

Circle 164 on Reader Service Card

CATERPILLAR introduces its Model 304 CR, a compact-radius, mini hydraulic excavator designed for use in space-restricted applications. Weighing in at less than 5 tons, the unit can be used with a variety of buckets and work tools and delivers 36 net hp while accommodating two stick sizes. With the optional long stick, the excavator has a maximum digging depth of 12 feet, 4 inches. **Caterpillar**, Peoria, IL.



## GLASS TILE

Circle 165 on Reader Service Card

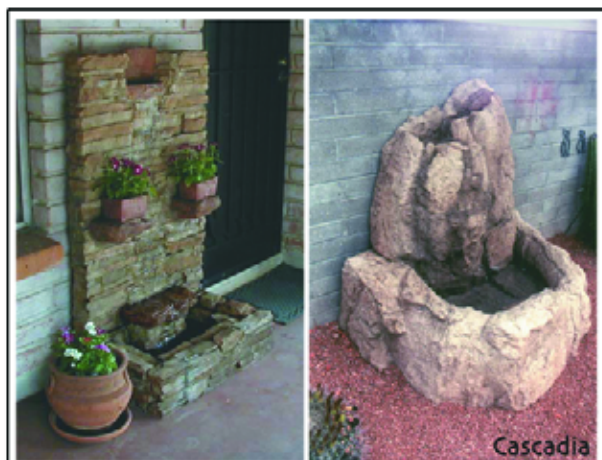


OCEANSIDE GLASSTILE has published a poster on its line of glass tile. One side shows a number of residential and commercial product applications. The other shows four families of products in flat, embossed and textured forms – Tessera, with classic iridescence; Casa California, embossed with aquatic themes; Haiku, with Asian-style designs and colors; and Minerali, a special textured line. **Oceanside Glasstile**, Carlsbad, CA.

## ORNAMENTAL PLANTERS

Circle 166 on Reader Service Card

QUICK CRETE PRODUCTS offers a catalog covering its complete line of planters. The 16-page, full-color brochure offers full details on round, square and rectangular shapes in a broad range of profiles and sizes as well as a range of specialty planters and planting rings. Six standard Colorburst glazes are available, as are three cast-limestone finishes and a special granite finish. **Quick Crete Products**, Norco, CA.



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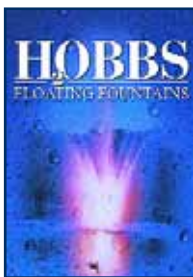
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## FLOATING FOUNTAINS

Circle 167 on Reader Service Card



**HOBBS FLOATING FOUNTAINS** has published a brochure on its line of floating fountains. The eight-page, full-color pamphlet offers background information on the company, its history and technology as well as details on a range of jets and multi-tiered fountains. Specifications are included, along with information on options such as lighting, wind compensation and freeze protection. **Hobbs Floating Fountains**, Atlanta, GA.

## READY-TO-INSTALL WATERFALL

Circle 168 on Reader Service Card

**ROCK & WATER CREATIONS** introduces The San Miguel, first in a series of all-in-one waterfeatures. Designed for quick, easy installation, the waterfall system is made of the same glass-fiber-reinforced concrete as the company's custom boulders and panels and offers realistic features and naturalistic sounds in a 600-to-750-lb structure measuring 5 feet wide by 4 feet long by 3 feet high. **Rock & Water Creations**, Fillmore, CA.



## POROUS-MATERIAL SEALER

Circle 169 on Reader Service Card



**SYSTEM DYNAMICS** offers StoneCare, a family of products designed to help reduce the maintenance associated with stains caused by minerals on porous materials such as plaster, natural stone, slate, flagstone, exposed aggregate and more. The core product is a water-based sealer that can be applied (even as the surface is curing) without changing the surface's appearance. **System Dynamics**, Scottsdale, AZ.

## MEDIEVAL-THEME CASTLE

Circle 170 on Reader Service Card

**VORTEX AQUATIC STRUCTURES** offers The Castle as the centerpiece to its play-oriented Medieval Fantasy Splashpad system. The fully automated, interactive play structure includes a roof-top dumping bucket, two rising flags with flush-mounted pod sprays, six nozzle sprays, two waterfall spray bars and a pair of drawbridge spray wheels that rotate 360 degrees. **Vortex Aquatic Structures**, Montreal, Quebec, Canada.





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## UV STERILIZERS

Circle 171 on Reader Service Card



**EMPEROR AQUATICS** offers the SMART line of multiple-lamp UV sterilizers for applications requiring flow rates exceeding 100 gpm or waterfeatures with capacities greater than 15,000 gallons. Features include single-vessel/multiple-lamp arrays; UL-listed, long-life, GPH/T5-style 65-watt UV lamps; sealed, watertight power supplies; and durable, UV-resistant, heavy-wall plastic construction. **Emperor Aquatics**, Pottstown, PA.

## POOL TILE CATALOG

Circle 172 on Reader Service Card

**NATIONAL POOL TILE** has published a catalog on its complete lines of pool and spa tiles. The 40-page, full-color brochure covers dozens of patterns and possibilities, from solids and florals to specially textured and embossed tiles. Tips on mixing and matching are offered, as is information on gaining access to a web-based system that lets the designer play freely with styles and colors. **National Pool Tile**, Anaheim, CA.



## PENNSYLVANIA BLUESTONE

Circle 173 on Reader Service Card



**DELAWARE QUARRIES** offers fine dimensional and irregularly shaped Pennsylvania bluestone. With standard thicknesses from 1/2 to 2 inches and sizes ranging from 12 by 12 to 36 by 36 inches, the stone is available in three basic colors – quarry run gray, blue and lilac – and includes treads, sills, coping and tumbled products as well as special-order items such as bull-nose cuts. **Delaware Quarries**, New Hope, PA.

## CHLORINE GENERATOR

Circle 174 on Reader Service Card

**GOLDLINE CONTROLS** manufactures the Aqua Rite chlorine-generating system. NSF tested at 1.5 lbs of chlorine per day and approved for commercial pools, the system installs easily in any type of pool, produces 100% of the pool's chlorine requirement and creates no flow restrictions. Training for installers and technicians is offered, as are manuals, salt testers and cell cleaners. **Goldline Controls**, La Mesa, CA.



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## STAIN-PREVENTING SYSTEM

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**JACK'S MAGIC PRODUCTS** has introduced Jack in a Box, a system designed to prevent staining and discoloration in swimming pools. The product is used once a week, with no mixing or diluting, and works with chlorine, bromine or biguanide systems. If the pool develops a stain or discoloration related to metals, scum-line or algae, the company will treat the problem, free of charge. **Jack's Magic Products**, Clearwater, FL.

## LIGHTING FIXTURE LINE

Circle 176 on Reader Service Card



**BRONZELITE** has introduced the DB-5000 line of in-ground lighting fixtures. Rugged, durable and water-resistant, the units were designed with the needs of architects and engineers as well as installers and maintenance staff in mind. Lighting components offer easy access and maintenance, and the broad line of fixtures is complemented by a wide range of accessories. **Bronzelite**, Littlestown, PA.

## DEBRIS REMOVAL SYSTEM

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**PARAMOUNT POOL & SPA SYSTEMS** offers the MDX Debris Removal System. Tested by an independent laboratory and reviewed and accepted by IAPMO, the system offers an alternative to conventional pool/spa drains while providing multiple layers of anti-entrapment protection. The system compresses and directs debris to the outlet port for quick removal with less likelihood of blockage. **Paramount Pool & Spa Systems**, Tempe, AZ.

## BIRD-ATTRACTING WATERFEATURE

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**AVIAN AQUATICS** has published a catalog of misters, drippers, waterfalls, creeks and ponds designed to attract birds. The systems are installed at ground level or slight elevations, mimicking natural settings and featuring the fresh, moving water that attracts more species than common feeders or elevated bird-baths. The catalog also covers a range of accessories, including de-icers, filters and more. **Avian Aquatics**, Milton, DE.

Continued on page 90



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## HIGH-EFFICIENCY POOL HEATER

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LOCHINVAR offers the Copper-Fin II, a next-generation pool-heating system designed for high efficiency and superior heater reliability. The system features a gasketless heat exchanger, dual independent ignition systems, seven venting options, pre-assembled multi-stack frames and referenced gas valves –

all set up in a service-friendly design for faster installation and easier maintenance. **Lochinvar**, Lebanon, TN.

## CONCRETE COLORANT

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L.M. SCOFIELD offers Chromix admixtures for coloring cast-in-place and pre-cast concrete. Available in a range of earth tones from rich grays and warm reds to sand-colored buffs, the material is also available in custom colors. Permanent and non-fading, the admixture increases workability and concrete strength at all ages, reduces efflorescence and features complete batch-to-

batch uniformity. **L.M. Scofield**, Los Angeles, CA.

## EARTH-MOVING EQUIPMENT CATALOG

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BOBCAT has published a buyer's guide/catalog highlighting its complete line of skid-steer loaders, all-wheel steer loaders, compact and mini-track loaders, excavators, loader backhoes, compactors and utility products as well as accessories, portable power systems and more than five dozen attachments. The 48-page, full-color booklet also covers parts and service as well as financing options. **Bobcat**, West Fargo, ND.



## DUAL-DIFFUSER AERATOR

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AQUAMASTER FOUNTAINS & AERATORS introduces AquaAir, a system designed to provide lakes, ponds and marinas with superior aeration, circulation and de-stratification. The system's bottom-mounted dual diffusers, which entrain bottom water and lift it to the surface, are connected via hoses to a shore-mounted air compressor, so there are no moving parts in the water. **Aquamaster Fountains & Aerators**, Kiel, WI.



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## DECORATIVE POTTERY

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GARDEN ART INTERNATIONAL imports garden pottery from around the world, including an extensive line of Italian terra cotta urns, bowls, vases, boxes and more. The terra cotta line is available unfinished and with an array of custom treatments, from weathered washes and rustic finishes to a variety of coloring rubs. The company also offers concrete wall fountains and more. **Garden Art International**, Irvine, CA.

## CONTROLLER FOR SOUND/LIGHT DISPLAYS

### Circle 184 on Reader Service Card



GILDERFLUKE & CO. makes the Mp3-50 control system for sound/light displays. When used with an animation option, the device provides sound and control for fountains and other special effects with timing governed with precision by a link to the U.S. Naval Observatory's atomic clock. The device controls small lights, relays and solenoid valves directly; higher-voltage loads are run through relays. **Gilderfluke & Co.**, Burbank, CA.

## UNDERWATER LIGHTING

### Circle 185 on Reader Service Card



HYDREL has published a 64-page, full-color catalog of its underwater lighting systems, including niche- and base-mounted lights for fountains and pools, special fixtures for wet/dry applications and standard swimming pool lights. Available with a variety of lamp choices and full lines of accessories and electrical equipment, the systems are all designed for easy installation and meet all applicable standards. **Hydrel**, Sylmar, CA.

## HIGH-RATE SAND FILTERS

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ASTRAL offers commercial high-rate sand filters ranging in tank diameter from 42 to 93 inches. Made of non-corrosive fiberglass and polyester resin, the lightweight tanks are designed to allow for efficient use of fewer filters in most applications. The operation of single or multiple filter tanks can be managed with four- or five-valve manifolds that allow for versatile filter-cycle control. **Astral**, Jacksonville, FL.

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## NATURAL PEBBLE FINISHES

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Pebble Technology, Scottsdale, AZ.

PEBBLE TECHNOLOGY offers Pebbletec, a pool finish that uses naturally tumbled pebbles and specially formulated cement products and additives. These materials are mixed and applied pneumatically before hand-troweling reveals the top layer of pebbles. Available in various colors, the material works for new pools and renovations in both residential and commercial settings.

## POOL SAFETY SYSTEM

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RJE TECHNOLOGIES introduces the SonarGuard swimming pool safety system. Using patented sonar technology, the custom-installed system functions constantly, 24 hours a day, providing an invisible, ever-present underwater net that ignores such things as wind, rain or even a basketball hitting the surface but is broken when a child falls in the pool, instantly triggering the alarm. **RJE Technologies**, Irvine, CA.

## OVERFLOW FITTINGS

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easy connection to standard drainage systems. **Overflo**, Tarzana, CA.

OVERFLO makes a flat intake opening that provides overflow protection for pools and fountain basins with an aperture that offers up to five times the drainage capacity of common one-inch-diameter pipe drains and a lesser tendency to clog with debris. The drain fits flat in the bond beam and transforms into a round drainpipe beyond the beam for

## HEAVY-DUTY HEATER

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STA-RITE offers its Max-E-Therm heaters with a new copper/nickel exchanger designed to withstand greater fluctuations in pH while providing all the benefits of the heater's original design. The burner technology requires no outdoor draft hood and exceeds the NOx-emission standards for Texas and southern California. The 200,000, 333,000 and 400,000 Btu/hour heaters are available in natural gas- or propane-burning models. **Sta-Rite**, Delavan, WI.

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# WATER SHAPES



## ASSISTED-ACCESS LIFT

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**SPECTRUM AQUATICS** has introduced the Elkhorn, its latest Swim-Lift model. Designed to ease the movement of disabled bathers getting into and out of the water, the strong, economical unit is fabricated of heavy-wall stainless steel and can support a 400-pound load – a capacity claim fully certified by engineers with their endorsement for installations within seismic zone 4 areas. **Spectrum Aquatics**, Missoula, MT.

## DIVERTER VALVES

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**HAYWARD POOL PRODUCTS** is offering four new diverter valves as part of its Totally Hayward pool-management system. The two- and three-way valves make flow management as simple as the flip of a lever or click of a button and are available with either 1-1/2- or 2-inch ports. The index handle allows the installer to customize the port configuration without removing the cover. **Hayward Pool Products**, Elizabeth, NJ.

## WATERPROOF CONNECTORS

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**KING INNOVATION** offers DryConn Waterproof Connectors. Filled with non-hardening silicone to provide a dry, safe environment for wire splices exposed to water, condensation, vapors or dust in exterior and interior applications, the connectors are engineered to eliminate the need for pre-

twisting, heat shrink, resin packs or multi-piece corrosion kits and are color-coded to ease installation. **King Innovation**, St. Charles, MO.

## LANDSCAPE LIGHTING BROCHURE

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**HADCO** has published literature on NightLife, a line of low-voltage landscape lights designed for a wide variety of applications – from path and accent lighting to lighting for steps and details as well as under-water and inground applications. The eight-page, full-color brochure highlights available fixture styles and colors and includes details on finishes, wattages, lamp types and materials of construction. **Hadco**, Littlestown, PA.

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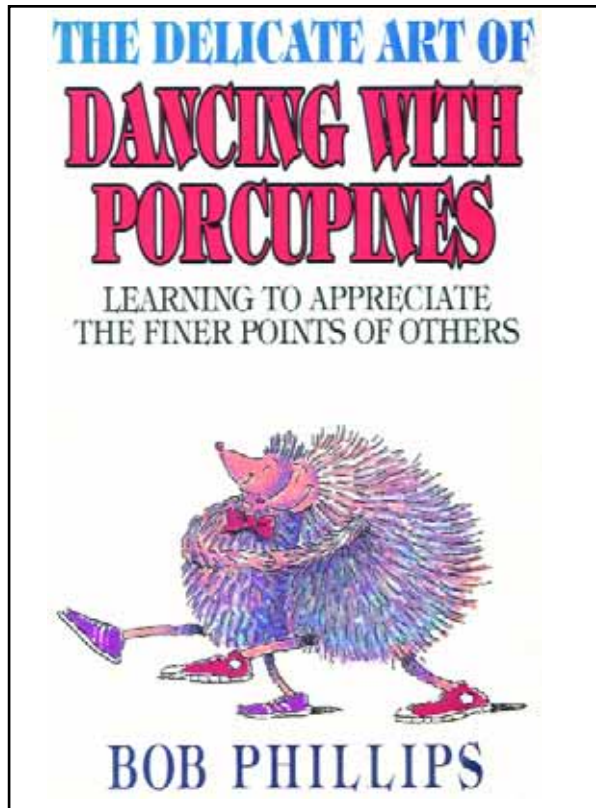
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## Of Porcupines and Personalities

**T**he *Delicate Art of Dancing with Porcupines* by Bob Phillips (Regal Books, 1989) may have one of the most unusual titles I've ever seen, but fortunately the quirky name didn't stop me from picking it up several years ago. At this point, I've read it multiple times and have taken to presenting it as a gift to friends and associates.

I like it so well myself because the text applies in practical and profound ways to my work as a watershape designer. I share it with others because it has had something to say about every aspect of my life and can do the same for them, too.

A widely published marriage and family counselor, Phillips is best known for this small book (just 160 pages) in which he examines in wonderfully clear and concise detail what he calls "social style." The idea is that people generally fall into categories having to do with how they communicate with and relate to other people – and that they will exhibit more or less predictable responses based upon the extent to which they fit into one category or another.

I hesitated to buy into anything he was saying at first, because I have a basic inclination to avoid viewing other people through stereotypes. And I've always chafed at the notion that I myself could be pigeonholed

as one "type" of person or another.

I overcame those reservations as I began considering his approach in light of my own experiences in dealing with other people, whether at home or in the workplace. I also saw that it wasn't about stereotypes and that, in fact, he allows for all of the diverse personalities we encounter while helping us find effective ways of communicating with others by understanding their styles and personal preferences.

Basically, Phillips defines two sliding scales of personality types, classifying us as either relationship- or task-oriented and as tellers or askers. On a graph, his approach sets us on four basic quadrants, and each of us can be plugged into the graph somewhere depending upon how we combine the four characteristics.

To clarify how it all works, he describes a variety of personal characteristics that are typical of people in each category and how the extent to which a person fits those criteria (and to what degree) determines his or her social style. He explores how various personality types will tend to interact with others in a variety of situations – in the workplace, in romantic or spousal relationships, in raising children or in making major decisions.

I now consider Phillips' categories as I interact with my watershape clients (who are certainly in the process of making major purchasing decisions), and I've found the insights to be useful in the detective work I do in determining what my clients really want and how best to connect with them. It all makes perfect sense to me: The more I understand my clients, the better able I will be to do my job and make them happy.

I've read a number of other books that fall into this basic category of examining personality types, but by and large I've found them to be difficult to grasp and apply. For his part, Phillips does a wonderful job of explaining his ideas in simple, straightforward ways.

Because watershaping is a business that requires close interaction with and a good understanding of clients (not to mention colleagues and other members of a project team), I've used what I've learned from Phillips' book over and over again in a huge range of situations. I have the hunch that if you read this book with an open mind and consider how it stacks up against what you know about yourself and others, you may find yourself just as compelled as I've been share it with family and friends. **WS**

**Mike Farley** is a landscape architect with more than 20 years of experience and is currently a designer/project manager for Gohlke Pools in Denton, Texas. A graduate of Genesis 3's Level I Design School, he holds a degree in landscape architecture from Texas Tech University and has worked as a watershaper in both California and Texas.



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