Inside: Brian Van Bower on Perimeter Overflows

WaterShapes

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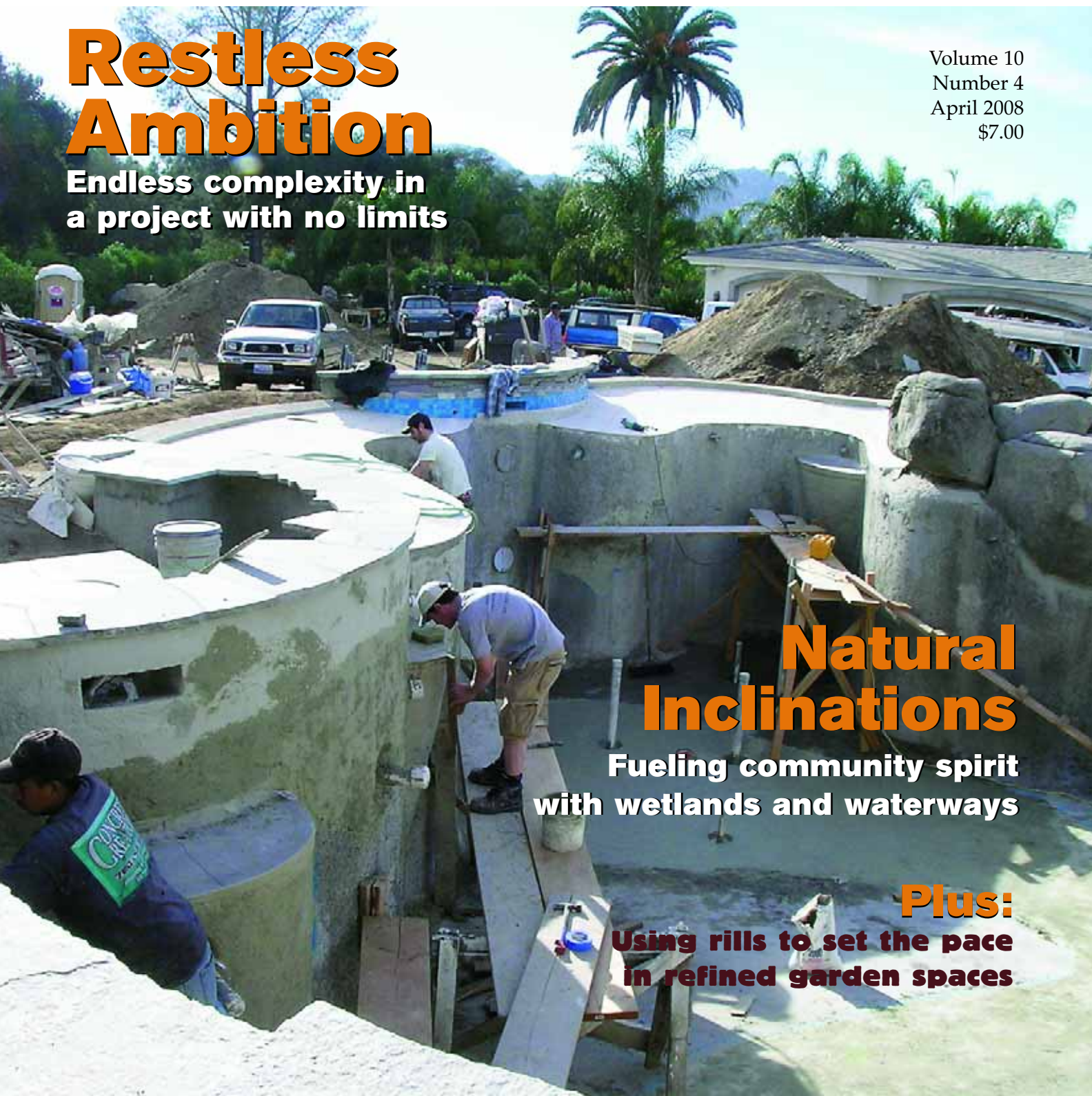

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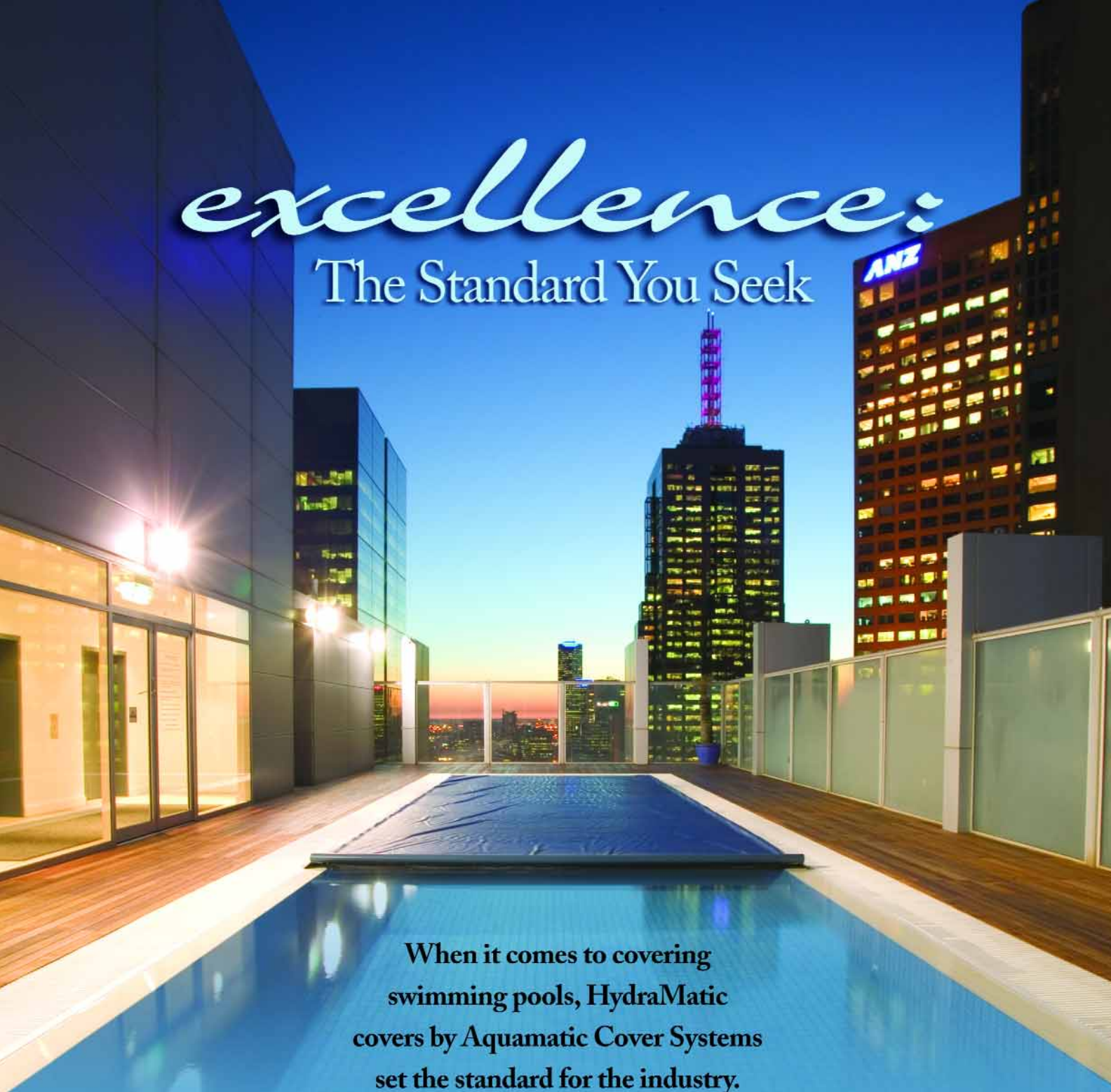

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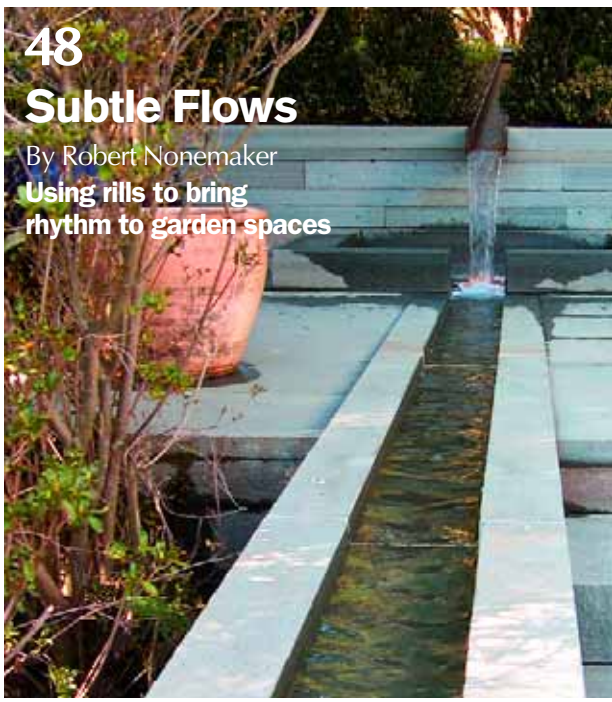

WATERSHAPES

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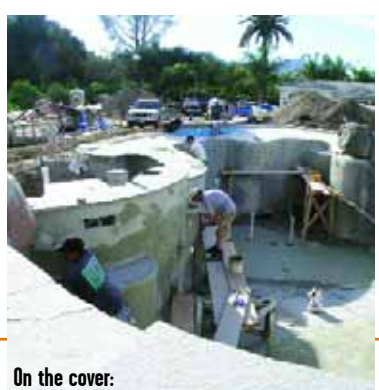

On the cover:
Photo by Kathy Marosz, Vision Design & Watershapes, San Diego, Calif.

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By Eric Herman

Ends and Beginnings

If you'll recall, I used this space last month to say farewell to David Tisherman's "Details" column. His departure left us with a significant role to fill – especially given how provocative his column had been through the years.

As often happens when a key person departs an organization, we weighed the available options and, not to flatter David overmuch, decided that replacing a voice so singular would best be accomplished by bringing multiple replacements on board to fill the void on a rotating basis.

The result is that, in this issue on page 26, you'll find the first installment of a new monthly column called "Currents." The debut is in the steady hands of longtime *WaterShapes* contributor Mark Holden, who uses the opportunity to pick up the discussion he began last year in his "Future Class" series of articles.

As previously established, Mark is in the process of assembling university-level course materials for landscape architects who want to learn something about watershaping. In this issue, he reports that, while his efforts and the forms they have taken have been constantly evolving through the past six academic years, he has managed to focus his work around a basic framework of topics he sees as needing coverage.

It's a fascinating process to watch – and one I've witnessed firsthand by joining Mark and his students on a couple of occasions to see how things are coming along.

In upcoming issues, Mark will be joined as a regular "Currents" contributor by engineer David Peterson, who will carry on the discussion he began in *WaterShapes* late last year about computer-assisted design and CAD standards. Another participant in the rotation will be lighting specialist Mike Gambino, who will use the space to examine both the technologies and techniques involved in developing quality lighting systems.

We'll start with this core group of three columnists, but don't be surprised to find other voices jumping into the mix either regularly or occasionally. I must say that I like the flexibility this approach affords us: The "big idea" is to increase the variety of topics flowing through our column pages – and help us keep things fresh, useful and interesting in our feature pages as well.

To that end, I'd like to invite you to offer us your comments and ideas with respect to subjects you'd like to see covered – either as column topics or feature articles. My phone number is listed next to my name in the staff box on the right side of this page, or you can send an e-mail to *eh@watershapes.com*. All feedback will be greatly appreciated, so please don't hesitate to speak up.

Our goal, as it has always been, is to propel our content to greater and greater heights so that when *WaterShapes* arrives in your mailbox, you'll continue to enjoy and value a magazine that reflects the dynamism of the industry we not only cover, but also seek to help and improve.

I trust you'll find "Currents" to your liking – and I'm fully confident you'll let us know what you think about it in the months and years to come!

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April's Writers

Kathy Marosz is founder and principle designer at Vision Design & Watershapes, a landscape and watershape design/construction firm based in San Diego, Calif. She established the firm in 2006 as a reorganized offshoot of her previous company, Enviroscapes, which she had established in 1997. Marosz has specialized in residential landscape design and construction since 1989, the year she earned her degree in landscape architecture from California State Polytechnic University at San Luis Obispo. She was the first woman who qualified for membership in Genesis 3's Society of Watershape Designers and currently teaches classes in site analysis and architectural drafting for Genesis 3's design schools. Before entering the landscape and watershaping industries, she was a professional musician and recording engineer.

Robert Nonemaker is co-owner of Outerspaces, Inc., a business he started with his brother David at the age of 12. After a college career during which he studied construction management, communications, engineering and business, he decided to resume his work in the landscaping business. Shortly thereafter, he added watershaping to their array of services, and it now dominates the brothers' business, which now employs 27 people and specializes in large, ultra-high-end, technically complex residential pool, fountain and landscape construction projects. He is also owner of Robert Nonemaker Exterior Design, a firm that offers design and construction consulting to architects and landscape architects throughout the coun

Interested in writing for WaterShapes *on design, engineering or construction topics? Contact Eric Herman at (949) 494-4533!*

Perry Wood is founder and president of Wood+Partners, Inc., a landscape architecture and land planning firm founded in 1988 that now has offices in Atlanta, Hilton Head Island, S.C., and Tallahassee, Fla. Wood is recognized as a leading authority in land planning, landscape architecture and urban design as well as zoning and land-use law. He has participated in a broad spectrum of project types for private and public sector clients, ranging from 15,000-acre community master plans to urban designs, streetscapes and community parks. Throughout his 28-year career, he has practiced and applied environment-based planning with an emphasis on "smart growth" and environmental preservation and stewardship. Wood earned his degree in landscape architecture from the University of Georgia and serves on the National Council of Landscape Architectural Registration Boards. **Mark Baker** is a partner at Wood+Partners. He began his career on Hilton Head Island in 1977 after receiving his landscape architecture degree from the University of Georgia. He later moved to Charleston, S.C., where he served as the director of land planning for a large architectural firm. In 1998, he returned to Hilton Head Island to form a partnership with Perry Wood. Recognized as a leading authority in community planning, parks and recreation planning, resorts, urban design and urban redevelopment projects, he has undertaken projects throughout the southeastern United States and the Caribbean. Baker is also active in his community and profession and currently chairs the Environment, Park and Recreation Subcommittee of the Greater Island Committee. **Travis Tuck** is a graduate of the University of Georgia's School of Environmental Design and specializes in community planning and amenity-center design for Wood+Partners.

Join the Dialogue:

Write a letter or contribute an article to WaterShapes!

By Brian Van Bower

Over the Edge

If you're thinking about tackling a perimeter-overflow system for the first time, it's important either to bring in an expert consultant or take all the time or classes you need to gather information and nail down every detail as tightly as possible.

As we discussed last month, perimeter-overflow details are among the most distinctive and challenging of all features in today's custom pool market.

In March's column, we defined the different types of these edge designs, then described the complex, exacting process of building a knife-edge overflow system. This time, we'll get into the hydraulic finesse needed to make these systems work. This includes everything from calculating bather surges to sizing the plumbing and surge tanks needed to make these effects function reliably for the long haul.

Before we get into the numbers, however, let me restate the caution I offered last month: Designing and building these systems is *not* for beginners: If you're thinking about tackling a perimeter-overflow system for the first time, it's important either to bring in an expert consultant or take all the time or classes you need to gather information and nail down every detail as tightly as possible. Otherwise, you might run into big trouble once the system is supposedly complete.

gravity flow

Hydraulically speaking, the first thing to keep in mind is that these systems work by gravity flow on the suction side of the pump. Water is added to the pool to the point at which it flows over the edge, moves into the trough, proceeds down through plumbing drops installed (in our case) at five-foot intervals and then, finally, enters a trunk line that slopes down to feed a surge or collector tank.

In other words, it's all about gravity until the water reaches the surge tank, at which point a pump applies suction to draw the water through a filter before it is reintroduced to the pool. Keeping this gravity factor in mind is important because it influences the sizing of the trunk-line pipes.

That all seems clear now, but several years back, when my Genesis 3 partners and I started teaching about water-in-transit designs, we advocated using a chart that based plumbing selection on how much water a pipe of a particular size would handle based solely on the slope of the line. In other words, sizing was calculated relative to a slope of one-eighth-inch, one-quarter or one-half inch per foot – and that was that.

In the field, however, we observed that slope wasn't the only factor we had to consider, basically because the charted calculations were based on flow through a *full* pipe – a condition that prevails in pressurized systems but occurs only rarely in gravity-flow systems. It didn't take us long to recognize that basing plumbing size solely on flow down the slope wasn't enough and that we had to base our choices both on slope *and* the flow over the totality of the edge.

Continued on page 12

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To make a long story short, this led us to specify significantly larger trunk-line pipes than slope-alone calculations would indicate. The result is that, today, we teach our course participants that the calculation for plumbing size begins not with slopes, but instead with the amount of water flowing over the edge.

Let's illustrate all of this with a simple 40-by-20 foot rectangular pool with a knife-edge overflow system and, therefore, an edge 120 feet long.

Assuming you can achieve a tolerance along that entire edge of plus-or-minus 1/32 of an inch, we start by calculating the flow over the edge as one-half to one gallon per linear foot per minute. For purposes of illustration, let's assume a flow rate here of one gallon per linear foot per minute. (Yes, it's possible to achieve the edge effect with a lesser flow, but experience shows us that, to make up for bather surge and displacement fast enough to maintain the edge effect, you can't work reliably with a flow rate of less than one-half gallon per foot per minute. A variable-speed pump can be a help here.)

sliding over

Working with that one-gallon figure, we're looking for a total of 120 gallons to flow per minute over the 120-foot edge of the pool and into the gutter. If we base our plumbing capacity on this flow over the edge rather than just on the slope of the plumbing, it will soon be obvious that we need to upsize the plumbing beyond the basic guidelines of strict gravity flow/slope calculations.

We need to think in terms of larger pipes because we know that a four-inch pipe at a quarter-inch slope will handle only 53.4 gallons per minute when half full (according to a standard chart on approximate discharge rates in drains flowing at half full). Increase that to a half-inch slope, and the same four-inch pipe only handles 75.5 gallons per minute – still not enough.

Keeping in mind our desired flow rate is 120 gallons per minute, we know that the four-inch pipe just isn't going to work. If we go up to a six-inch pipe at a quarter inch slope, however, we know it will handle 157 gallons per minute half full, moving the water at a rate of about 3.75 feet per second – well within our desired maximum line velocity of six feet per second.

Now we have a plumbing size that more than handles the 120-gpm flow rate. And the fact that this flow rate is based on the line being half full – the common status of gravity-fed systems – means we're well within an acceptable performance range.

(As an aside, if you get in a situation where you're building a much larger system with a much longer edge, you can accommodate the larger flow rate without increasing the size of the plumbing – and blowing out the size of your bond beam, as we discussed last month – by splitting the trunk-line system in two so that wa-

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ter flows away from a central high point in opposite directions. That way, the plumbing handles only half of the total flow at any given point, meaning it can be smaller than if it's set up as a single loop handling the entirety of the flow over the edge. In another option, we just completed design work on a very large pool that calls for four separate eight-inch trunk lines spaced around the pool to handle the tremendous flow.)

The water flowing through the trunk line eventually flows to the surge tank – another area in which sizing calculations are critical. In fact, I probably get more questions about setting up these tanks than I do about any other system detail because tank sizing is a genuinely complicated issue.

The big questions about surge capacity have to do with the impossibility of knowing just how many bodies might jump into the pool at the same time, the size of those bodies and the overall level of displacement. There's also weather-related displacement. In fact, I've seen a high wind blow two inches of water out of a pool in rapid order.

There are a variety of ways to look at this issue, but the Genesis 3 perspective – based on years of collective practical experience and consultation with numerous experts – leads me to calculate surge capacity based on two inches of displacement for the entire surface of the pool. Yes, more than that might be displaced were an entire band of sumo wrestlers to descend upon a given pool all at once; under most circumstances, however, we've found that the two-inch figure for surge capacity keeps everything well within an acceptable working range.

This is, however, strictly a guideline, and you need to draw your own conclusions based upon what you know about the project, the clients and the setting. Size is also a factor, and you may see the need to adjust your thinking if you're working with a small pool or spa – or when you're facing a very large pool.

in the tank

Getting back to our 40-by-20-foot pool, we have 800 square feet of surface area to consider. A square foot of water contains approximately 7.5 gallons. Multiply the square footage by 7.5 and then divide it by six, and you get to the desired total volume of two inches of water for the entire pool. In this scenario, that calls for approximately 1,000 gallons of surge capacity – and now we can begin sizing the surge tank.

That word "begin" is important, because there's a lot more to consider here beyond bather surge. That number, for example, does *not* include the minimum operating level within the tank – that is, the water volume needed to keep the pump from cavitating and to maintain proper flow through the system. In a typical project, that minimum operating level will require the presence of one foot of water in the surge tank at all times.

Let's assume that we're building a surge tank out of concrete in an area that allows

for interior dimensions of five by eight feet. This means that this surge tank has a flat surface area of 40 square feet.

To accommodate the minimum operating level, you multiply 40 square feet by the 7.5 gallons in a cubic foot of water, which gives us 300 gallons for every foot of depth. So now we know that, in addition to the 1,000 gallons of surge capacity we need to handle flow through the trunk line, we also need to add in the 300 gallons to accommodate the minimum operating level – in other words, we're after at least 1,300 gallons of surge-tank capacity.

Doubling back, we know that we have 300 gallons per foot of depth, so, dividing 1,300 by 300, we find the tank needs to have a depth of four feet, four inches.

But collector tanks should always have freeboard above the calculated capacity to allow for installation and proper functioning of an auto-leveling system as well as overflow to waste. So if we think about an additional eight inches of depth (adequate for functioning of the auto-leveler), we're looking at a tank that will need

keeping things clean

With perimeter-overflow systems, there are always questions about maintenance of the gutters and the surge tank.

When we first started building these systems, we placed removable pieces of deck material at the corners of rectilinear pools so that they could be removed and someone could use a hose to blow out the gutters. This was aimed specifically at situations in which excessive amounts of debris would be forced into the system – as by a hurricane, for example.

Through experience, however, we've found that this detail isn't really necessary. With a one-inch opening in the gutter slot, you can easily take a garden hose with a pressure nozzle and rinse the gutter to displace debris of any sort (such as beach sand) that might not readily flow to the surge tank. It's really that simple.

Surge tanks are a bit more involved when it comes to upkeep. The debris that collects in these tanks can affect water quality if left in place for more than a limited time, which is why it's important to stress maintenance with homeowners and set things up in such a way that someone can gain access to the tank to net it out or vacuum it.

To ease this process, we've been experimenting with in-line nets or baskets placed just below the main trunk line's entry point to the tank. This has some potential, and we're continuing to play with an array of available options.

Finally, in all of our designs, the perimeter-overflow system is on a completely separate loop from the primary filtration system, and water flowing out of the surge tank is always filtered separately. That doesn't take care of large debris on the bottom, but it does help maintain overall water quality.

– B.V.B.

to be five feet deep.

But now there's an X factor: In sizing a surge tank, if you're going to be off in any way, you always want to err in favor of making the tank too big. While one that's too small will create a range of problems, all that having one that's too big means is that it can accept an excessive surge should it occur. In other words, in this scenario, if you made the tank five and a half or even six feet deep, that only means the system is able to handle more water – and that's a good thing.

relativity theory

There's another key issue with surge tanks that bears consideration – that is, the level at which they should be placed relative to the pool.

In many commercial applications, these tanks are set at the same level as the pool, meaning the maximum level in the tank (in this case four feet, four inches) and the point at which we'd install the overflow line. This all makes sense, because it eliminates concerns about equalizing the levels of the two bodies of water.

The drawback in this arrangement, however, is that when the system is shut off, water seeks its level and there won't be any water at the level needed to wet the top of the edge. This compromises the pool's appearance, and we know that clients opt for this detail mainly because they like the way it looks. To address this situation, you either need to run the system all the time or accept the fact that it just won't look as good when it's shut off.

Moreover, when there's no movement of water through the gutter, you lose what's known as "gutter scrub," which is the flow that carries debris to the drop pipes (which are never grated because you want debris to flow through the system) and ultimately into the surge tank. When the maximum level of the tank and the pool are the same, water won't move through the system when it's off and debris will stay in the gutter.

Given these factors, my preference is to install the surge tank so that its maximum operating level is lower than the bottom of the gutters. That means that when the system is turned off, gravity will continue to move water through the system until the gutters are evacuated and debris has flowed into the surge tank. (For more on debris and system maintenance, see the sidebar on page 15.)

Finally, it's a hard and fast rule that in all water-in-transit systems, without exception, the vessel that collects the water must have an automatic leveling system. The reason is simple: If the water in the tank drops below its minimum operating level, the system will run dry and the pump will cavitate.

In my practice, we use an auto-leveling systems manufactured by Levolor, a longtime supplier of these systems that was recently acquired by Jandy Pool Products of Petaluma, Calif. The model we use has two sensors, one at the minimum operating level and the other at the maximum level (that is, at the overflow). When wa-

ter drops below the lower sensor, it activates a solenoid that opens a valve connected to the water supply and adds water until the sensor is wetted once again.

The upper sensor is used to activate the circulation system (if it's off) when the water reaches the overflow level. This is useful in case of excessive bather surge or weather-related challenges and ensures that the system doesn't simply lose water but rather circulates and filters it when surge is excessive.

The only downside: If it rains for 40 days and 40 nights, the system might stay on for the duration – a possibility we discuss with clients. All in all, however, that minimal possibility is far outweighed by the upside of having these dual-function auto-levelers in place.

caution and care

As with most complicated design challenges, when you break down all of the components and considerations into individual bits, no single element of installing a perimeter-overflow, knife-edge pool is all that daunting. Still, the issue with these systems is that they are extraordinarily unforgiving: Every single detail discussed last month and this month must be done right the first time, because if anything goes wrong, it's never an easy or inexpensive fix.

And while we're talking details, let me make a last few hydraulically relevant points: First, the water drawn from the collector tank must always be filtered before it returns to the pool. Second, the return piping must have a loop that reaches above the maximum water level and must be rigged with in-line check and vacuum-relief valves to prevent equalization. Third, the water should then be returned to the pool at a low level or through a floor return to minimize turbulence – a topic we'll address more fully in another column.

If you have questions or doubts, it always makes sense to bring in an expert who knows these systems front to back. Just reading through these two columns in no way qualifies anyone to build one of these without further (and extensive) support: There are simply too many variables, and as anyone deeply involved in custom watershaping already knows, every situation is going to be different and present its own, specific set of challenges.

For all that, the upside is that these water-in-transit designs are indisputably a wonderful way to deliver something very special to your clients. When you master these features, you can be very proud of the fact that you've just moved to the head of the class. WS

Brian Van Bower runs Aquatic Consultants, a design firm based in Miami, Fla., and is a co- founder of the Genesis 3 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.

By Bruce Zaretsky

On Decks

If I'm going to work with wood, I want the result to be something special. What I'm after is a deck that will speak to my client in ways that are exciting, interesting and fun.

I'm sort of a curmudgeon when it comes to wood decks.

They've been on the scene for a good 50 years now, and many of them are just fine – but I've spent an awful lot of time in my career loathing what I see and helping my clients remedy the short-sightedness of those who set them up in the first place. At times, I just wish everyone had stuck to stone.

What really gets my goat are the uninspired linear expanses that poke aimlessly off the backs of houses. Residential developers often resort to this excessively simple approach to provide a basic "amenity" for newly constructed homes – a place to barbecue dinner or relax or send the children to play where they can still be easily watched.

This grossly utilitarian mindset has resulted through the years in way too many rectangular slabs of pressure-treated wood hung off the backs of houses. If there's any slope at all, they're propped up on spindly, stilt-like legs with uninspired sets of steps on stringers with baluster railings made from off-the-shelf pressure-treated two-by-twos that end up looking like boomerangs once the treatment evaporates and the wood inevitably begins to warp.

For all that, however, I'm not totally anti-deck. Although I prefer to build with stone and am confident about its longevity and easy maintenance, there are always instances where building with wood is not only the most cost-effective way to go, but also the best design option.

in its place

Helpfully, there are several options when it comes to available decking materials. In addition to traditional choices such as Redwood and Red Cedar, there's also Ipé, a tropical hardwood that's becoming increasing popular, as well as a range of wood substitutes such as Trex.

Each one has its advantages and disadvantages depending upon a project's specifics, but usually it boils down to what a client wants. Of course, we need to do what we can to inform their decisions with our ideas and experience, but if my clients want a wood deck, I'll do my very best to make it a work of art.

And yes, in many situations, decks have advantages over stone terraces. If there's a big grade change, for example, or your client wants a second-story deck, then wood will obviously be the most cost-effective and workable option. It's not impossible to build stone terraces on slopes – or even up to the second story of a home – but it would look silly and would also cost a small fortune.

Indeed, simply building a stone terrace up to the level of a new home's sliding doors – usually about two feet above the surrounding grade – brings the cost of this construction up significantly because of the required grading, compaction and retaining structure. While raising a wood deck does add to the cost of such a project, it is nonetheless a pretty straightforward operation.

My basic point here is this: If I'm going to work with wood, I want the result to be something special. A simple survey of American backyards shows us that just about anyone can build a simple square or rectangle off the back of a house; what I'm after is a deck that will

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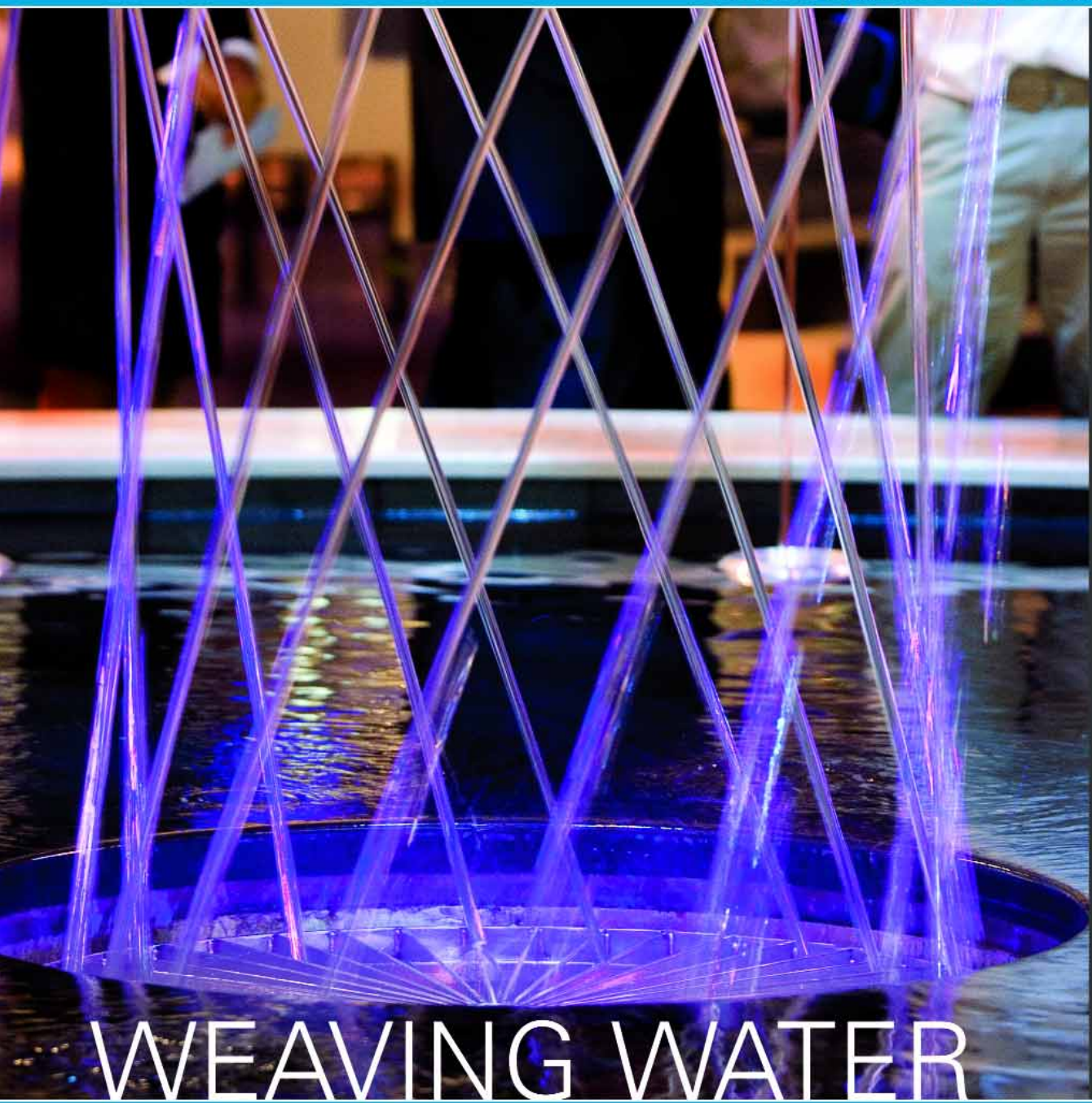

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speak to my client in ways that are exciting, interesting and fun.

Take the project shown here as an example: When the clients first contacted us, it was to design the backyard landscape of a new mid-size home for a pair of empty-nesters. We used our standard questionnaire to elicit their thoughts and desires, and it was clear that they wanted us to include a deck off of the rear of the house.

The drop from the door to the common grade was about five feet, so a wooden deck was the obvious choice whether we went with a small terrace as a transition to the yard below or designed a complete entertainment area on or close to the level of the home's interior.

As it turns out, these folks wanted a bit of everything, with a deck as well as a patio area to create two distinct gathering and entertainment spaces as well as landscape lighting and a variety of plants. We'd been referred to them by a past client who praised our creativity, they said, and thought we'd be up to the challenge of bringing all the detail they wanted into a relatively small space.

mixing it up

In surveying the site, I immediately began thinking of using mixed materials.

This is something I've been doing for a long time – setting up, for example, outdoor "carpets" of one paving material inlaid into another. I've used Bluestone in spots within brick terraces to add visual interest while also defining areas for specific uses – the same way an area rug can define a conversation area or a space for a dining table and chairs.

Recently, I've been thinking through ways to use *wood* in conjunction with stone (new for me, but something I've seen done very well by others in the pages of *WaterShapes*) and decided to float the idea to my clients in the form of a stone inlay within the deck.

They had numerous questions about viability, specifically given our winter temperature swings and snow loads. But I reassured them that we could design a frame that could handle the challenge (basically by making it about twice as strong as would be required by local codes). I figured the worst that could happen would be for the stone to separate from the framing (which wouldn't be the end of the world), so I made a commitment to do whatever it took to ensure their satisfaction.

They decided to forge ahead, and we started by installing the footings. The design called for a stone slab that would serve as the step down from the door. This is a good idea in our area, because we always have to worry about snow and water migrating under a door's threshold and heaving its framing when the moisture freezes. Simply put, a step down from the house to a deck or terrace minimizes the chances of this being a problem.

To support the slab, we placed three Sonotubes (the thick cardboard cylin-

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In some respects, wood decks that incorporate stone sections are structured in much the same way as all-wood decks. Of course, we had to allow for the thickness of the stone, steel mesh and mortar bed in establishing levels in the two areas where stone was to appear. And for caution's sake, we also upgraded the framework to be about twice as strong as code would require for a typical, all-wood deck.

ders used to form concrete footings) in a triangular pattern. Once the concrete set, we used a Bobcat to set the slab in place. Once this was done, the rest of the footings were augered to our usual local specifications: 42 inches deep to accommodate the frost line and spaced according to the requirements of the framing lumber.

Under the two areas that were to receive stonework inlays, we added additional footings to avoid any flexing of the deck in the area. Even with good-size framing lumber, there's always some flex in a deck, but given mortared stone's incompatibility with such movement, we wanted these portions of the deck to be as rigid as we could make them. In doing so, we solidified the entire framing scheme.

In this specific case, the decking surface was to be Ipé, which is just an inch thick compared to the flagstone's thickness of one-and-a-half to two inches. This would mean notching the joists by about three inches to accommodate the stone as well as its plywood base, steel mesh and mortar, so we used two-by-eight joists instead of the usual two-by-sixes – then double-framed below the joists that were to support the stone.

assembling the pieces

We installed the decking using boards of three different widths to make the deck mimic a hardwood floor. The areas that were to receive the stone were left with boards overhanging; eventually, we would cut these with a jigsaw to create the exact contours we needed. Once this process was complete, we covered the entire wood expanse with layers of cardboard and plastic so we could install the stone without doing any damage.

As we were laying the deck, the clients asked if we could build in a bench. Picking up on the mixed-media concept, I suggested using a stone slab for the purpose and soon found a suitable one. To accommodate it, we ran a pair of six-by-six posts up through the decking. We then core-drilled a pair of two-inch holes a third of the way through the six-inch-thick slab, drilled another, smaller hole in the center of the cores and bolted the slab down to the tops of the posts. Finally, we plugged the holes with two-inch circles of Ipé to add a bit of contrast and visual interest to the top of the bench.

Now it was time to focus on the stone inlays. Because of the structure we'd established, it was pretty much like installing any other flagstone deck we'd ever done – something akin to a very heavy jigsaw puzzle where you have the advantage of being able to cut the pieces to make them fit.

In this case, we'd position two stones overlapping each other, cut down through both of them, then separate them by about a half inch to establish consistent joints throughout the paving.

Continued on page 24

Once all of the pieces were cut and placed, we set them in a mortar bed. Both of the paved areas reached to an edge of the deck, so looking edge-on, you see lines of wood edge transitioning into thicker lines of stone.

Typically, wood decks are perfectly level, with water passing through gaps in the boards instead of accumulating. By contrast, stone decks are typically pitched a degree or two to let them shed water. In this mixed-media deck, we kept everything perfectly level. Once the stone was installed, we flooded those areas to see where water accumulated; next, we drilled holes through the stone and the underlayment to give the water a place to go.

From the deck level, we set up steps that flow down to a flagstone terrace. To make this transition interesting, I made a bottom step in which stone slabs flank a sentinel boulder. This boulder also bisects a couple of the wood steps above: This called for some detailed trimming of the

Our aim here in 'mixing media' by introducing stone elements to the deck surface and in the form of the stone sentinel looming over the stairway had to do with wanting to produce something special for our clients. For their part, they were so pleased and engaged by the way things were going that they asked us to add the stone bench as well as the stone skirting at the deck's base.

Ipé, which is extremely hard and gummy and *very* hard on tools.

It now looks as though the boulder had always been there and was so thoroughly in the way that we had no choice but to work around it. I've always been intrigued by this concept of working within parameters that "nature" sets for us: The thought that comes to mind in seeing this arrangement is that we built to suit the grade and existing site features rather than the other way around.

rising to the task

We had no sooner finished the upper deck and begun the work of preparing the rest of the yard for placement of the flagstone patio and plants when the client mentioned at our daily meeting that they didn't want to use wood skirting to wrap the bottom of the deck. They knew we had to do something to keep animals out and hide the unsightly substructure – could we use stone instead?

So we drew up plans to build a stone wall around the entire deck, setting it up underneath the wood and stone edges to make it appear as though the deck had been built on top of the wall.

None of this was easy to do at this point. We built this non-structural wall "dry" with no mortar, so there was no need for deep footings because dry-stacked walls move with the frost. But we still needed to cut a foot-deep base: If this had been considered easily, we could have cut the channel in a few minutes with an excavator. At this late date, however, everything had to be done by hand, mostly on our knees so we could reach under the deck.

The deck portion of the project has been through two winters now, with no sign of any issues related to the stone inlays. I'd tried a number of times before this project to get clients to roll with this wood-and-stone concept, but to no avail. In this case, however, the confidence our clients had in us because of the strength of the referral paid off for everyone.

The result: Our clients' new deck looks fantastic, and we have something we've shown other clients to get them to come along for a more adventurous ride. In fact, we're now in the process of installing a large, covered wood deck with Travertine "carpeting" and border inlays for another client who was emboldened by the success of this project.

Using details such as this has continued to set us apart form the norm and confirmed to me that taking a chance and going beyond the norm is really the only way I want to work. WS

Bruce Zaretsky is president of Zaretsky and Associates, a landscape design/construction/consultation company in Rochester, N.Y. Nationally recognized for creative and inspiring residential landscapes, he also works with healthcare facilities, nursing homes and local municipalities in conceiving and installing healing and meditation gardens. You can reach him at bruce@zaretskyassociates.com.

By Mark Holden

Indentifying the Issue

I know full well that landscape architecture programs fill valuable space that would be better occupied by watershaping and devote it instead to a half-dozen topics that convey little of real value to students.

It's an unfortunate fact that landscape architects receive little or no formal education in watershaping while they're in school. As a result, where the typical landscape architect's irrigation plan will show every pipe, fitting, wire and component for a given project, that same project's pool plan will carry almost no detail at all.

This phenomenon begs the question: Why don't our colleges and universities do more to educate landscape architects about watershaping?

The answer to this question causes me double pain, because I know full well that landscape architecture programs fill valuable space that would be better occupied by watershaping and devote it instead to a half-dozen civil-engineering topics that convey little of real value to landscape students. Why spend two or three intensive weeks on surveying, road design and regional watershed calculations – none of which fall under the ultimate purview of landscape architects – while something as practical and fundamental as watershaping gets no coverage at all?

As a university instructor myself, my observation is that most faculty and staff ignore this gap in what they teach because they aren't inclined to concede that they know nothing about the subject and may even feel threatened by the need of having to turn to contractors to learn something. The upshot, as I have mentioned before in *WaterShapes*, is that everything I currently know about working with ornamental and recreational water is the product of self-education and exposure to people and organizations within the pool industry.

providing solutions

In the past decade, I've spent countless hours teaching design students about water, and I've found that most of them crave far more watershaping knowledge than they've ever been offered. (Last year in this magazine, I chronicled some of what I've experienced so far in a brief series titled "Future Class.")

As this effort moved forward, I've found that the scope and design of such a specialized curriculum has kept on evolving, so now, as I assume a role in this rotating "Currents" column, I'm going to track that evolution and will start here with a brief update on what I see as the anatomy of this type of course.

To recap, in the past six academic years, I've had the opportunity to work with students and capture the attention of both instructors and administrators in the landscape architecture department at California State Polytechnic University in Pomona. Based on the reception for my water-based courses, this year's standard classes have once again been restructured to feature special, week-long work-

This is the first 'Currents' column to appear in WaterShapes. For an explanation of what to expect in this space in issues to come, see Eric Herman's 'Reflections' on page 6.

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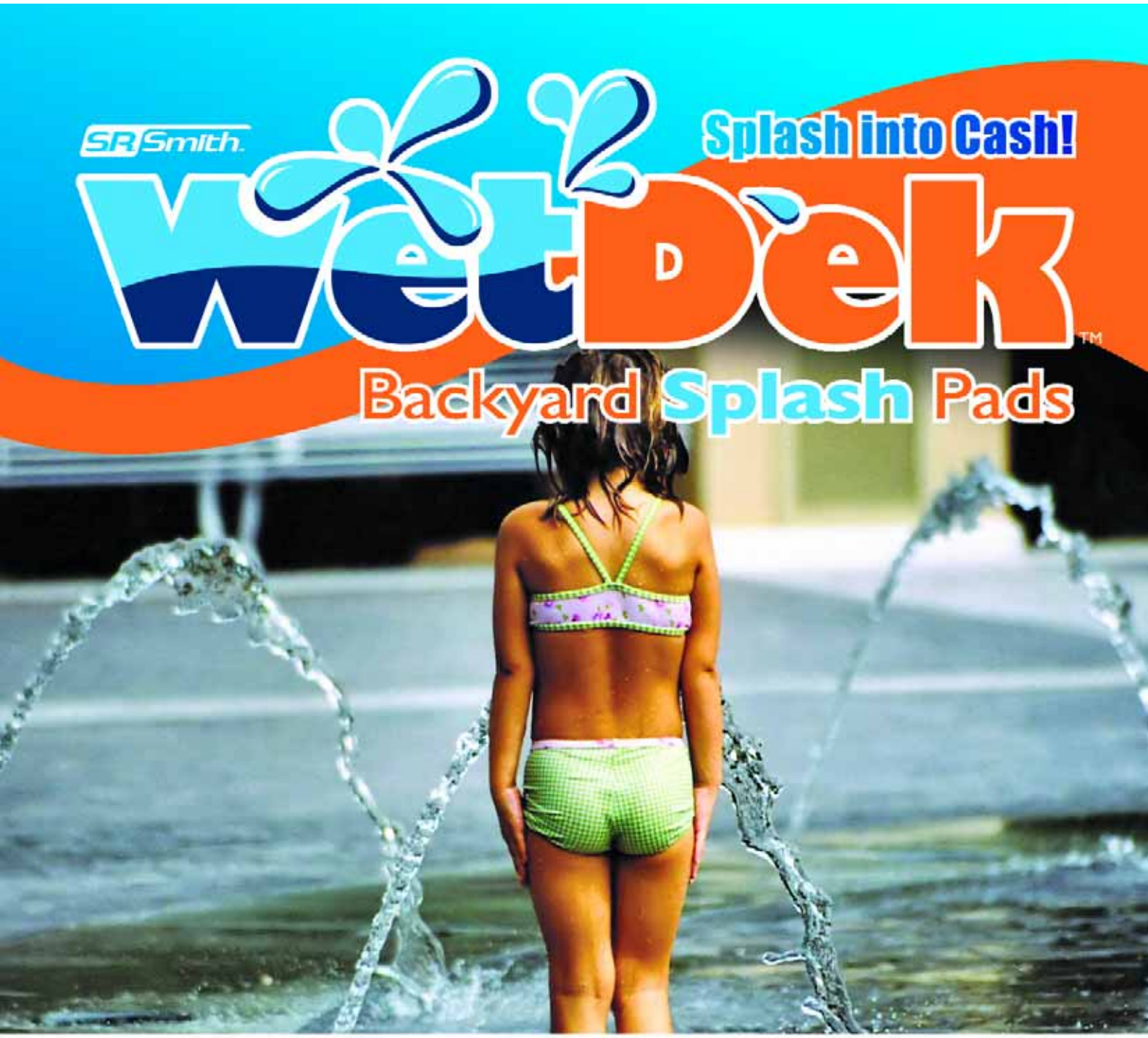

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shops – and a water program is one of the modules.

This "Water Module" focuses on what these students must know in order to consider watershaping as one of their capabilities. It's only an introduction, of course, but even in a week's time we've been able to define key parameters and give class participants a basic, working knowledge of how to use decorative and recreational water in their landscapes.

In establishing the workshop, I identified all of the tools that these professionals-to-be lacked and integrated them into a lecture/laboratory approach that is familiar to them. As I see it, even this compact set of lessons is a foot in the door – a necessary first step in developing a program that, someday, might actually produce graduates of what might be called a "School of Water Architecture."

In developing material for this concentrated treatment, I've honed the subject matter into clear units so students can grasp enough of the importance of each concept that they'll be inclined to seek additional information. To be sure, each of these topics merits a full course of its own, but we must start *somewhere*.

In the past decade, I've spent countless hours teaching design students about water, and I've found that most of them crave far more watershaping knowledge than they've ever been offered.

distinct elements

In just a week's time, this leaves us to plow our way through a broad range of key topics, including:

- **History:** This unit counters the popular assumption that swimming pools are a modern innovation that took root in the early decades of the 20th Century. The reality is that watershaping has been pursued for millennia in various forms, with some of the oldest "pools" having been built in what is now Pakistan some 4,000 years ago.

  Introducing students to any field's past is part of all comprehensive educational programs, whether the subject is engineering, literature or mathematics. As I see it, learning about the lineage and developmental history of pools and fountains is crucial to progress – and absolutely essential if any of these students is ever to get involved in reproducing period pieces. In grander terms, the aim here is to prepare students to do more than mimic what they see around them and instead set them up to draw on the past as a platform for future innovation.

- **Industry Operations:** The watershaping industry has been around for quite some time, but it has recently been undergoing significant transformations in response to increasingly sophisticated consumer demand as well as increasingly stringent licensing, codes and construction protocols.

  In that context, the processes of taking a watershape from concept to fruition has become remarkably convoluted and almost invariably involves unique twists and turns – a cluster of pathways not at all familiar to the vast majority of landscape architects. (This is one of the key reasons landscape architects are generally so reluctant to wrestle with water in their projects.)

  Shining a light on the murkier parts of watershaping business is therefore a key component in any comprehensive educational program for landscape architects. As it stands now, most landscape architects are ignorant of the simplest aspects of watershaping. As I see it, basic knowledge of industry players and dynamics will better enable these future professionals to make certain their designs are built as intended.

Hydraulic Technology: One new feature of watershaping that no historical survey will reveal is the extent to which changing (and advancing) technologies are affecting modern watershaping. Hydraulics as a science has been around for thousands of years, but high-efficiency heaters, ozone generators and motorized valve actuators (among *many* other devices) have been with us for only a short time, relatively speaking.

There are very few places for landscape architects to go and learn about these products – another big reason why they rely so easily and heavily on contractors for this sort of information and support. And this is despite the fact that discussions of technology and how different technologies relate to one another are commonly part of the design curriculum in colleges and universities. Indeed, such discussions have always been part of the landscape-construction units I teach in standard university courses.

As mentioned above, landscape architects may leave school knowing the minutiae of irrigation plans, but up to now they have never focused on technologies related specifically to watershapes. This unit is a first step in addressing that information gap and in explaining how pumps and filters and more fit into the picture.

Engineering: Geotechnical and structural considerations are among the keystones of watershaping, yet they're seldom part of the education of landscape architects. As a result, when one of their future clients asks for a pool on the crest of a hillside in highly expansive soils, few landscape architects will be aware of the need to factor some very costly (and high liability) thinking into their design work.

All experienced watershapers know (or *should* know, at any rate) that soil conditions dictate the nature of the structure required to make a given design work for the long haul. In many cases, however, these structures are so extensive that they cannot be built within available budgets and are subsequently either constructed inadequately or undergo major alterations once the construction process begins.

Knowing about bedding planes and how concrete and steel work together in support structures for watershapes eliminates many of these issues, while understanding how much these interventions cost also helps preclude preparation of designs that lack essential information needed for quality project execution. What they learn, in other words, is that what might seem at first glance to be a $100,000 pool might turn out to be a $750,000 pool with a completely different set of physical design parameters.

Concept and Presentation: The majority of the plans for watershapes reviewed by my firm, Holdenwater of Fullerton, Calif., are ghost-like outlines with little or no indication of any essential components. My business associates and I speak both "landscape architect"

good terms

As I've worked to develop courses on watershaping for landscape architecture students, I've learned just how critical vocabulary can be in creating acceptance for information and driving home the importance of shared literacy when it comes to communicating key ideas. That's why I've always loved the inclusiveness of key terms associated with this magazine, such as "watershape," "watershaping," and "watershaper." Each one is punchy, clear and extremely useful.

In my opinion, however, in the academic world we need a different term better suited to a scholarly pursuit, and my suggestion here is "water architecture," which I would define as the art and science of designing watershapes.

Water architecture is a design process that deploys the fundamentals of architecture in the creation of watershapes such as pools, fountains, ponds, lakes, interactive features and more. If the term has legs, it will also come to describe the academic discipline that focuses on developing students' understanding of all aspects of watershaping.

– M. H.

and "contractor," so we perform as interpreters and make certain people are having apples-to-apples conversations.

If landscape architects were to become more knowledgeable about watershapes, the apples-to-oranges bidding process would cease to be the huge issue it is today. That's the rationale for this unit, in which we discuss the need for watershape designs and graphic representations that are both more refined and more elaborate at the same time.

To that end, I teach students to draw not only the waterline, but also the coping, steps, benches and depths, all of which have tended to be been absent from landscape architects' pool designs. I'm also striving to teach them to represent the character of water in presentations, meaning they need to understand and differentiate water that moves, splashes, sprays, cascades, dances and sheets – or lies still.

Ultimately, better informed conceptual design and graphics presentation will help eliminate water-related disconnections from the general design vocabulary – a step that will help rid watershaping of a problem that has plagued it for years.

I've been on a quest to inject watershaping into the landscape architecture curriculum for years now, and I see signs that this 'new' discipline may well be the next big thing to catch hold in the halls of our colleges and universities.

◗ **Materials:** The selection of materials used in watershapes has a tremendous influence on the character of a design as well as the durability of the watershape itself, yet even professional watershapers often lack much by way of knowledge about materials beyond a very narrow set of options. Watershape education therefore should familiarize students with both the broad realm of possibilities – and with the limitations of certain selections as well.

We know, for example, that harsh chemicals and various mechanical challenges are present in watershape environments. This is why we don't run plaster up a raised bond beam where it would be exposed to wet/dry conditions and instead interrupt the flow of that material with the familiar six-inch band of waterline tile. Care must also be taken, for example, with wood decks used around watershapes.

Through materials education, aspiring watershapers will learn how to work within such constraints while also identifying a far wider range of possible solutions.

◗ **Construction Methods, Materials and Costs:** Contractors employ common sets of methods in building watershapes. As an example, they may use shotcrete or gunite most of the time but will readily shift to poured-in-place concrete to shape shells where pneumatically placed concrete isn't the right choice. To guide these projects, landscape architects should be aware of the distinctions in these applications as well as the relative costs, uses and limits of these products and processes.

In short, students of landscape architecture need to be aware of the entirety of what their landscapes are made of, including their watershapes, just as well as they might know plants, irrigation systems, lighting and masonry. Without a "watershape vocabulary," their designs will only be rough ideas of what can be achieved in terms of construction. By understanding methods of watershape construction, however, these future professionals will enjoy greater freedom to design and reach for elevated aesthetics.

◗ **Resources:** A typical watershaper's office shelves are full of catalogs and binders about products and services available to their industry – as are the shelves of landscape architects, although usually with a different set of printed material. To synchronize these valuable collections of information, this unit aims to define all of the tools students have at their disposal.

Even if they never actually specify a skimmer, for example, they need to know what one looks like to accommodate it within a physical design and where to go and how to navigate the supply chain to get the products their projects might need.

To function well in this realm, students need to have their eyes opened to the components of basic watershaping. Again, this is only an introduction, but they need to know the names of key suppliers and have some sense of delivery timelines and local product availability to function capably in the watershaping realm.

adaptations

It is my strong, personal belief that watershape education will eventually be a permanent component of every landscape architecture program. I see the situation as being not unlike irrigation, which was once found only in the disciplines of agricultural engineering but is now a fixture in every landscape architecture program.

It only makes sense to clear a slot in the educational registry for watershaping, given how concerned we all are these days about overall environmental design. If profit isn't sufficient motivation on its own, then consider the general need to accommodate clients who are looking for *truly* complete design programming and execution.

As mentioned above, I've been on a quest to inject watershaping into the landscape architecture curriculum for years now, and I see signs that this "new" discipline may well be the next big thing to catch hold in the halls of our colleges and universities.

To watch this trend emerge, all one needs to do is note how many landscape architects are visiting pool-industry trade shows these days – or note the increasing number of pool vendors now advertising in landscape-oriented trade magazines. The key in all this, the factor that ultimately will force a change, is the enthusiasm of students who are lucky enough to have gained exposure to some or any form of watershape education.

These students already know that the creative use of water in the landscape is one of the most potent design elements at their disposal, and they want to know how to wield it. Their time has come! WS

Mark Holden is a landscape architect and contractor who has specialized in watershapes and their environments for nearly 20 years. His firm, Holdenwater of Fullerton, Calif., also assists other professionals with their projects, and he is also an instructor for the Genesis 3 schools. He can be contacted at *mark@waterarchitecture.com*.

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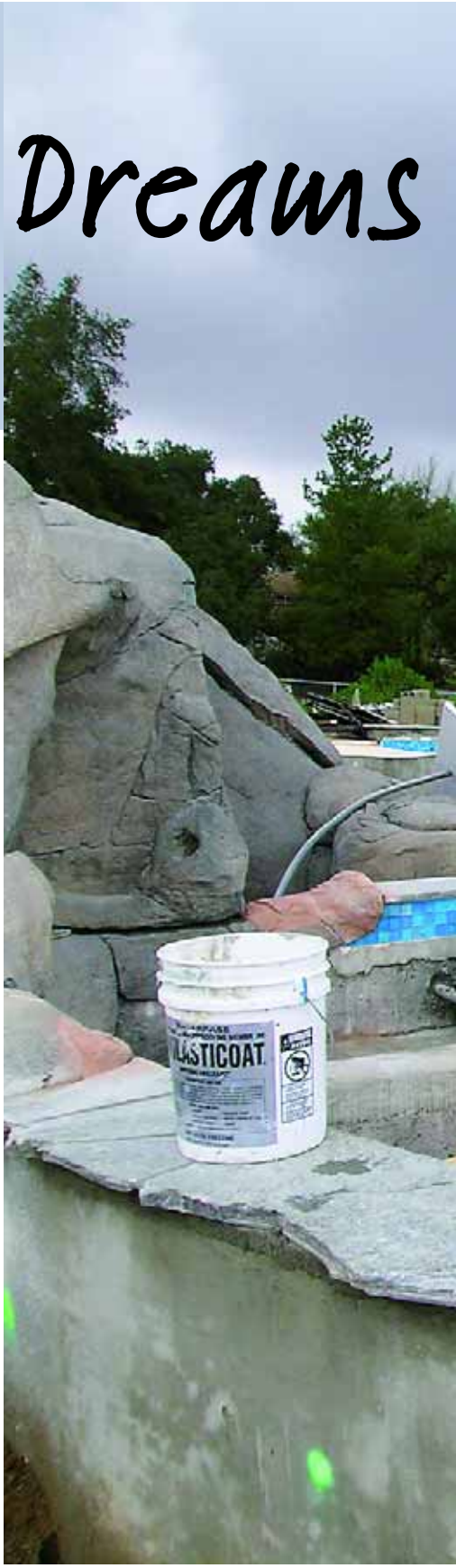
When Dreams

The project depicted here has been the professional challenge of a lifetime, says watershaper and landscape architect Kathy Marosz. It all started two years ago, when she began working with a highly imaginative client who refused to put any limits on what might be done. Subsequently, as she reports in the first of three articles on the results, her involvement grew from execution of a plan into a near-boundless exercise in creative collaboration.



By Kathy Marosz

Some clients don't know any limits when it comes to their ambitions – and that's certainly been true in this case.

His mountain-sized home is set on a relatively flat four-acre parcel in otherwise hilly Ramona, Calif. The client himself describes the building as looking like a casino, and indeed it does have a decidedly "eclectic" architectural look. What he wanted was a backyard to match – a free-wheeling composition that might best be described as a Tommy Bahama-inspired tropical resort.

He let me know that the family includes three young children, so there was a clear need for fun, safe play spaces. He also informed me that he and his wife entertain a lot and wanted the backyard to be a venue in which they might throw parties for as many as 250 guests.

This basic information was offered in initial conversations that took place more than two years ago, and at that time I had no clue how deeply involved I would become or how brutally difficult getting everything done would turn out to be. In fact, this project has been the most elaborate and challenging I've ever tackled, mainly because the complex design kept evolving and growing, almost from the start.

It's a project so broad in scope that I'm inclined to see it as a clinic in dealing with the host of issues related to grand-scale design and construction.

A Foot in the Door

I became involved here through Skip Phillips of Questar Pools (Escondido, Calif.) – another instance in which my involvement in Genesis 3's community of designers and builders has served me well.

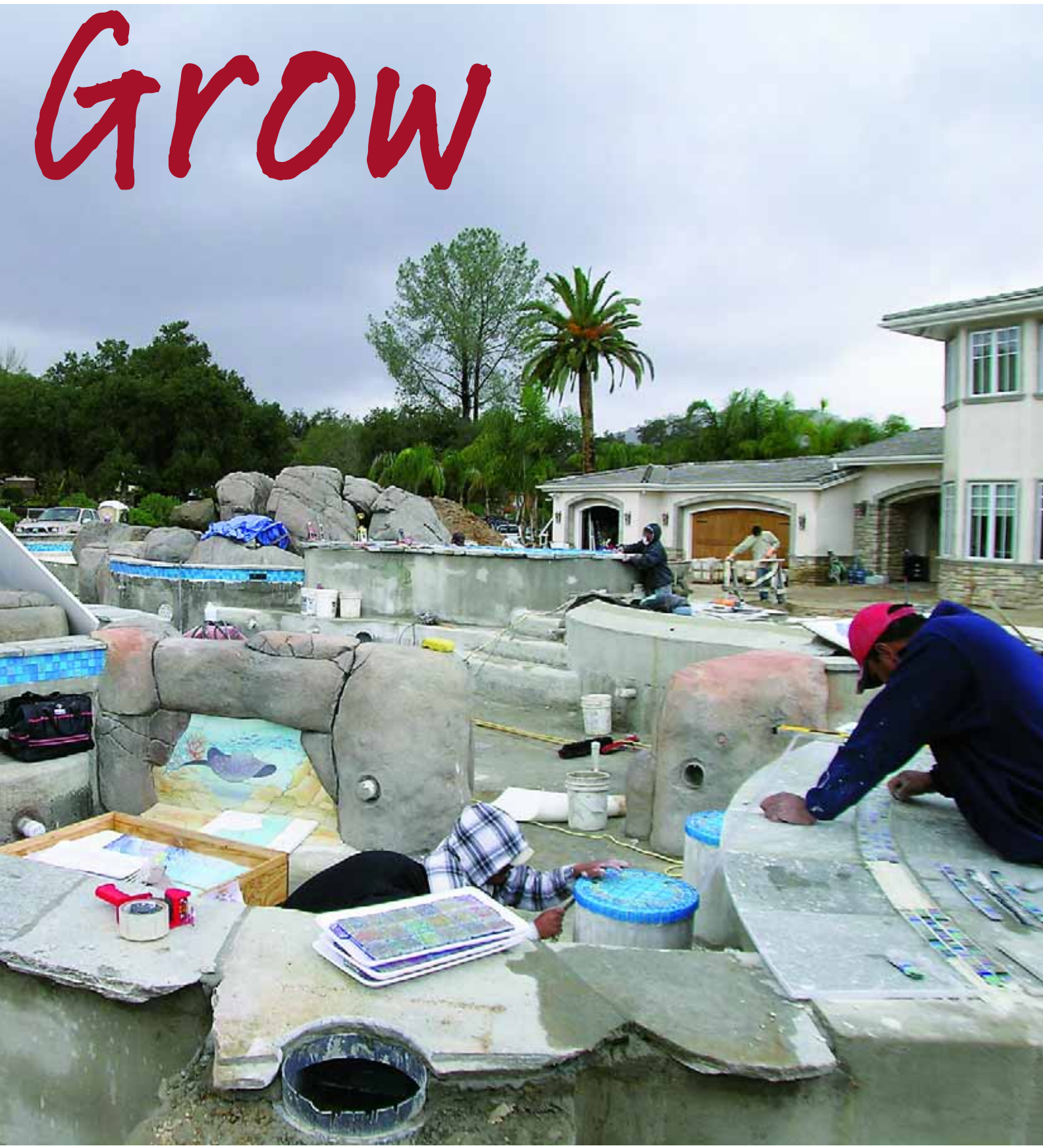
In recent years, Skip has shifted the emphasis of his own business to designing and consulting after long service in the design/build realm, and I had contacted him to explore the idea of being able to offer construction bids on some of his designs. As a San Diego-based landscape architect and contractor with a great deal of practical watershape-construction experience, I've always been interested in combining creative design with quality construction, and I thought working with him seemed like a perfect fit.

Skip had met with these clients and had developed a design that seemed to hit all the right notes with its freeform pool, beach entrance, spa, swim-up bar, diving area and various other touches that bounced off the concept of tropical fun and whimsy. To give you a sense of the scope and scale, the original plan called for a pool that was to be about 50 feet long.

When I met with the client to discuss the design, I asked him if there were other things that he'd like to see included. I had no idea I was effectively opening the floodgates.

Before too long, I learned that he was

Grow



The yard we were called into was surrounded by hilly areas, but what we had was essentially a flat plane that rose a bit in one far corner. Up from this blank slate emerged a rock outcropping that broke the surface in two places – and provided the dual anchor for the entire design.

somebody who wanted as many suggestions and ideas as I could offer – and that he was open to just about *anything*. There were lots of conventional features (and several unconventional ones) in the existing plan, but he let me know in clear terms that what he really wanted was something no one else had and that he wasn't concerned about conceptual or budgetary limitations. At the most basic level, he said, what he wanted was Big Fun for his family and friends.

He certainly had the room for that sort of playground: The area in which we're working encompasses approximately one acre stretching from the back of the house to the base of a slight slope at the rear corner of the property. In almost the exact center of that space is a large rock formation that, from the start, the client wanted to incorporate as part of the design for the pool and its associated structures.

It wasn't long before I recognized that he was more than interested in blowing the boundaries off the original plan and that we would be installing a much larger, much more elaborate lagoon-style pool with a far broader range of aesthetic, recreational and fun touches – not to mention a generous supply of bells and whistles.

Almost immediately, in other words, I set my thoughts of a serene, naturalistic setting aside and instead began thinking in terms of raw, unbridled fun – hoping at the same time that I would be able to maintain a sense of casual elegance.

Project Evolution

As mentioned above, the original plan called for a 50-foot-long pool with a swim-up bar, spa and beach entrance. Although much was eventually added by way of features, the core layout of that plan remained intact. From its outlines, we started exploring how the client wanted to use the space and ways we might enhance and manipulate the original layout – generally by bumping things up or out in various directions to accommodate his expanding registry of wishes.

In overview, the early stages were the very picture of chaos. In fact, the only way we could keep up with everything was to view the site as a set of zones we could evaluate and organize as individual subunits.

At one end of the pool, for example, we saw the swim-up bar as being a space for entertaining and adult-type fun. This zone transitions to a nearby shallow area designed for comfortable child's play. On the side of the pool nearest the home is the spa, which would evolve to become a large, raised, all-glass-tile affair set adjacent to the beach entrance. Opposite the swim-up bar is a deep end designed for diving and deep-water swimming or play.

The objective in everything we were discussing was to find approaches that made things fun for the kids and classy for adults at the same time.

By the time we were ready to begin construction, however, the original footprint of the pool had grown to its current length of just beyond 90 feet and an

augmented width of up to 53 feet. And there were some added features that bear mentioning: To the original plan, we had now added a gargantuan grotto complex, various fire features, a unique set of deep-end beach entrances, diving rocks, elaborate tile murals, leaping deck jets, arcing laminar jets, fiberoptic lighting, sheeting and cascading waterfalls, extensive artificial rockwork, associated deck areas and, for good measure, a 25-foot vanishing edge.

One of the first significant expansions had to do with the vanishing edge. The existing elevations of the site and its limited outward views didn't particularly lend themselves to a traditional vanishing-edge approach, but it was something the client really wanted to go along with his beach entry. The property sloped up away from the back of the house, so there was an excellent opportunity to view the proposed edge from the home's sunken great room; this led me to suggest raising the main pool so it would spill into a beach entry/play pool. The visual concept was to suggest the main pool was a lake spilling over its dam and toward the house.

With the beach entry terminating at the vanishings edge's dam wall instead of flowing into the rest of the pool, this area is a particularly secure and visible play space for small children. In addition, this approach provided the opportunity of using a battered ledger-stone dam wall to create a whitewater-cascade effect the client also wanted. And when he asked me to suggest anything else I thought would be fun for the kids, I came up with the notion of including deck-level leaping jets adjacent to the beach entry. Everyone loved the idea.

The important point to note is that this episode set the pattern: If one new idea was good enough, why not come up with a couple more to make things truly different and special?

A Graceful Weave

Another early addition to the program was the outsized grotto.

We were working with the natural rock outcropping as the core of the design, so it made sense to pick up that look and expand it into an elaborate, artifi-

Excavating for the pool was a distinct challenge because of all the subsurface rock, but attention was focused as well by the fact that the design called for a wild set of contours that needed to be painstakingly shaped.

cial-rock structure that would blend visually with the natural outcropping.

Blending real, native stone with artificial rockwork is, of course, a big challenge when it comes to balancing natural elements with those that are clearly built by human hands. We knew we couldn't rival Mother Nature here, so we decided to acknowledge that most of what can now be seen is a built structure that we have artfully interwoven with a natural one.

Once we headed in this direction, the client jumped in with both feet and the grotto itself began to grow. At this point, the structure's exterior covers about 15 by 20 feet and rises to a level from five to eight feet above the water level. There's a swim-in entrance masked by a waterfall; inside, it has a natural-cave appearance with a fiberoptic twinkling-starlight ceiling and a subtle underwater system of fiberoptic lights and custom color wheels designed to lend an otherworldly atmosphere to the interior space.

We spent a tremendous amount of time with all of the rockwork for this project, but we paid special attention to the grotto knowing that we had to do all we could to make it a seamless visual extension of the real outcropping. This explains the careful detailing, for example, of the waterfall over the entrance: Rather than the usual straight weir you see with lots of these features, we carefully sculpted the edge so it is as irregular and broken as it would be in nature.

We also studded the grotto's exterior with a variety of fractures and irregular outcroppings interwoven with planting pockets, our aim being to drape the structure in greenery. When the project is finished, the back of the structure will nestle into the slope and hillside at the back corner of the property, and we'll dress the area with plants to ease the transition.

Even with this ambitious project element, however, the changes kept coming. Indeed, after a substantial amount of structural steel was in place, the client decided he wanted a dry entrance on the far side of the grotto. His updated wish list included a doorway-height ceiling above the back entry's vestibule, with obscured lines of sight in and out of the main grotto space. I returned to the

Once our excavation work in the reliable portion of the soil was complete, we set up a system of big grade beams in the less-desirable filled area (which we'd used as a ramp down to the deep end of the pool) and began intricate preparations for concrete application.

Before this job, I'd been involved in projects that required a lot of steel, but this one is unrivalled in the tonnage of material we used and the sheer complexity of what this substructure was being asked to accomplish.

drawing board, knowing these new ideas presented a number of challenges – not the least of which was the potential negative visual effect of adding too much height to the already-imposing faux-rock structure.

Working with the engineer, we arrived at a solution that involved expanding the bond beam of the pool to encompass the footprint of the new entry. This allowed us to establish the accessway to the grotto as a set of steps up from the pool, which in turn enabled us to lower the ceiling in the entry area. Then, to make this added space seem less like a stairway and more like a cave, we added a weeping wall of contrasting material as a focal point.

In the photographs seen here, the grotto currently appears as a mass of rocks that doesn't blend particularly well into the space. We're confident, however, that once we're finished, everything will look as though it truly belongs together.

Tile Lines

In sharp visual contrast to all that rockwork, the design also includes more than 1,000 square feet of extremely elaborate tile in ceramic and glass. As with all other aspects of the project, the client wanted something that was as customized and lavish as we could imagine – thereby setting the stage for expansion of this part of the project into its own long journey.

Fittingly, the tile treatments blend the output of a pair of the industry's most creative suppliers: Craig Bragdy Design (Dinbigh, Wales) and Lightstreams Glass Tile (Mountain View, Calif.). The great thing here was the extent to which both had aspired to work together on some sort of project that had not yet presented itself.

I'd already been working with David Knox of Lightstreams on this project for quite some time, and in one of our many conversations I indicated that a coral-themed mural in Craig Bragdy Design's tile would be a perfect complement to his glass tile. Knox wasted no time in helping me make it all happen.

Craig Bragdy Design has long been known for wildly expressive murals made up of textured ceramic-tile panels. Its

Of all the zones we developed for this project, none matched the intensity of what had to be done to make the spa into everything the client wanted it to be. It isn't *that* large, but the spa features 42 jets, a stand-up well and an amazing conglomeration of steel and piping – not to mention concrete that had to be applied with the utmost care and precision.

artists can create almost any image, and in this case we asked them to work with underwater motifs featuring a whole menagerie of sea creatures as well as sandy beaches. Spread throughout the pool, the installation puts dolphins on the walls of the deep end along with flying fish, rays, crabs, seashells and assorted colorful fish swimming through coral reefs. There are also murals of tropical plants that reach up out of the water on the raised walls.

As is typical of this supplier, the tile work is colorful, textured and in all ways beautiful. Some expanses are quite large and dominating, but others are small and retiring – as if they're hiding and waiting for someone to discover them.

The work by Lightstreams, a company that produces vivid glass tiles with almost mind-blowing optical characteristics, was equally spectacular. To get this particular ball rolling, the client offered me the use of his private plane and pilot to fly up to Lightstreams' facility so I could meet at length with Knox to set plans for the custom colors and tile shapes we'd use throughout the pool.

The colors in this case harmonize with the aquatic themes and hues used in the ceramic murals, which means all sorts of blues, greens and purples salted with warm accent colors. The spa is finished entirely with this tile, as are the 30-foot-long swim up bar and its nine barstools. Lightstreams' tile also appears at the waterline, on steps and benches and on the outside of raised sections of the pool wall in a variety of configurations.

Perhaps the most amazing tilework of all is in the shallow beach entrance, where Knox and Craig Bragdy Design's Nick Powell used both materials in a composition that's meant to shimmer and become animated once it's covered by water. In other places, the Lightstreams tile is used as tiny shards set in the surface to provide beautiful, visually enriching highlights. As with the small ceramic-tile details, these are accents that might be missed by those who just aren't paying enough attention.

To maintain visual continuity and avoid disrupting the beauty of the tile murals (not to mention the pebble finish that we'll be installing to round out the surface finishes), we're using more than 30 drain covers and fitting sets from AquaStar Pool Products (San Diego, Calif.). These components are designed so that any form of tile, plaster or exposed aggregate finish can be applied to their surfaces, making them disappear into the background. That detailing is critical in a project such as this in which the finishes will inevitably draw lots of attention.

Here as with just about every detail of this project, no capsule description of the process conveys the seemingly endless discussions, design revisions, e-mail communications and phone calls required to make everything come together. Happily, the tilework is so spectacular that anyone who bothers to look carefully will be impressed enough to gather that this isn't off-the-shelf work. Indeed, it's about as custom as custom gets.

Hidden from View

Beyond the surface details and complexity, of course, much of the difficulty of this project will be forever hidden from view and would be a candidate for feature-length treatment on its own. For now, however, let's limit this discussion to a few key details, starting with the excavation and basic structural work.

As one might expect from the presence of the large outcropping, simply digging the hole for the pool was epic both because of complex shape and the fact that much of the area was dotted with submerged granite boulders, some of immense size. In fact, to call this "digging" would be a misrepresentation of what we had to do.

Calling in a demolition specialist was an option we considered, but to sidestep both a probable delay and all sorts of other headaches, our excavation subcontractor turned to chemistry: With the larger boulders, the crews drilled two-foot-deep holes at six inches on center, burning through numerous diamond drill bits in the process. These holes were then filled with a special expanding compound that, overnight, fractured the boulders, allowing them to be broken into pieces for removal the following day. The job was backbreaking and labor-intensive, but it worked.

Instead of taking a few hours or days, however, clearing things away to accommodate the pool complex took a difficult 30 days.

Now we faced issues related to the soil conditions and the structural design. As it turned out, the pool spanned two areas – one filled with boulders and surrounding material adequate to support a concrete structure, the other with undocumented and inadequate fill. This resulted in a complex structural design from civil engineer Jay Shniderman of Mark L. Smith Architecture & Engineering (Tarzana, Calif.). The structure includes a system of massive grade beams (some of which were to sink as deep as six feet into the ground below the floor of the pool) as well as an equally massive double curtain of steel including lots of #7 grade 60 rebar that required off-site fabrication.

Also, because the steel structure contained #7 rebar, our municipality required us to provide proof that we could achieve full encasement of the bars with pneumatically applied concrete. We met that requirement by building a mock-up panel that replicated an area of the pool with the most congested steel structure. After we shot the test panel, we took six cores and

Working beyond the deep end of the pool on the side opposite the outcropping, we began building the grotto – and undertook the constant, difficult task of doing all we could to match our artificial-rock structures with the natural ones. Fortunately, we were able to make patterns using a number of local formations, and by the time the structure is planted out and the water starts to flow over various waterfalls, we're confident it will all seem as though it belongs there.

had them analyzed to confirm that we had successfully achieved proper rebar coverage.

Concrete application was a complicated, multi-phase process as well. After the grade beams were in place, we applied concrete and shotcrete in six stages over eight separate days. In one phase, for example, we vibrated concrete into place in the floor of the deep end where the double curtain of steel was at its most congested before working our way up the walls with shotcrete.

Properly preparing the construction joints between phases (as defined in our engineering details) resulted in the overall process taking four months. To be certain that everything we did complied with codes and met the engineering specifications, we hired a deputy inspector to verify correct installation of steel and to collect concrete samples at intervals as the shell was installed for compression testing.

Beyond the Water

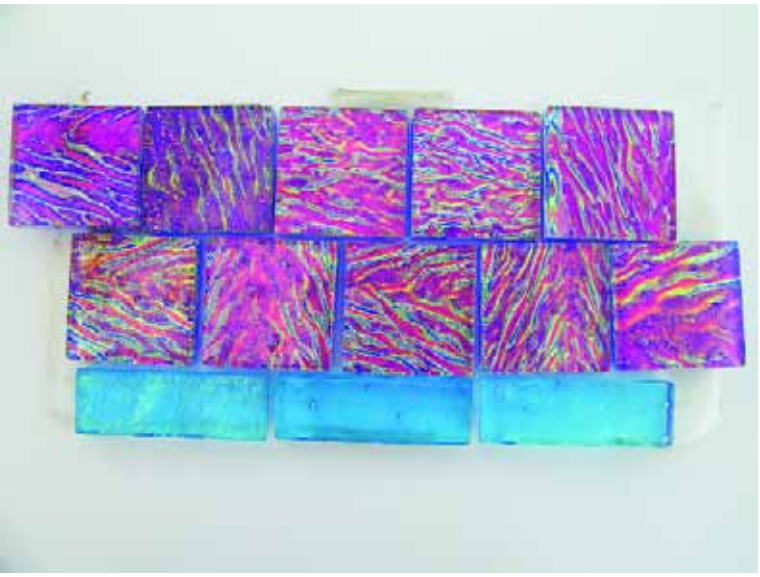
The watershapes on display here are still under construction at this writing. After two long years, I must say that I'm getting anxious to move along to subsequent project phases in which we'll be installing a whole range of dry-land amenities to go along with the pool, spa and all the rest.

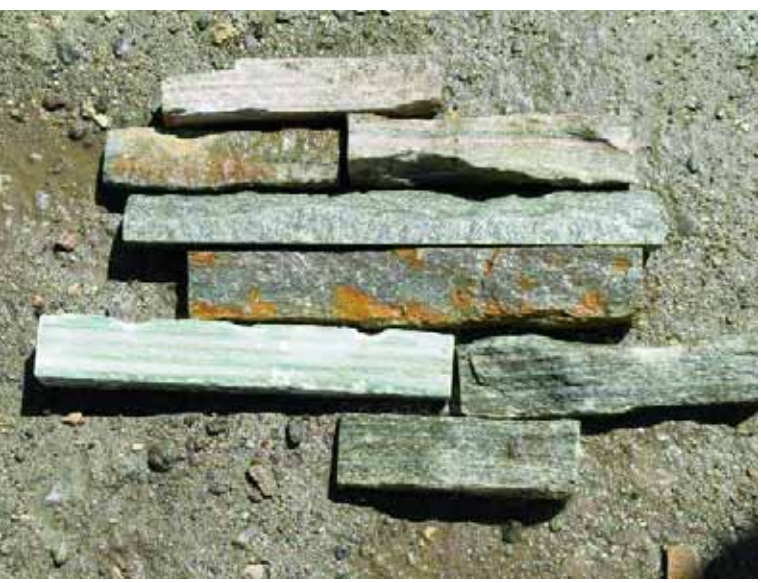
Given the clients' desire to throw huge parties and catered affairs, this means we still need to get around to installing a variety of broad deck areas, facilities for catering services, outdoor cooking facilities, shade structures, changing rooms, bathroom facilities, extensive pathways and garden areas.

Much of this will eventually rise in the space facing the swim-up bar, but our work will spread throughout the yard – including the area around the deep end, where we'll be installing what we're calling a "fire deck" that will feature fire and water elements as well as dry-deck extensions of the deep-end beaches for entertainment and family relaxation.

The final forms these amenities will take are still under discussion. If the experience we've had in creating the poolscape is any indication, however, it's safe to say that the ideas will evolve and expand in ways we can't anticipate as we approach the construction stage.

– K.M.





Throughout the early construction phases, we spent an amazing amount of time making decisions about finish materials and how they'd be arrayed over the grotto's and watershapes' interior and exterior surfaces. Working through the myriad possible combinations took persistence – and the participation of a number of wonderfully patient and supportive suppliers.

Way Beyond Normal

Before any of that could happen, of course, the entire pool had to be formed and plumbed. As was true of everything else we did on site, those two operations were extraordinarily complex – so much so that the second article in this three-part series will focus on the hydraulic systems alone.

The forming was another big challenge, given the intricacies of the structure, multiple radiuses, elevation changes, the bar-area planter and vanishing-edge walls that essentially required the forms to float above the floor with minimal support – while still remaining sturdy through a lengthy construction process. This part of the project was so complex, difficult and *important* that I handled all of it myself, working with the invaluable support of my brother, Tom Marosz.

As we shaped the space, plumbing and steel crews were active all around us. The hydraulic-system design was tackled by All Water Tek of San Diego, Calif., a firm run by Steve Sebo, an extremely talented (and patient) hydraulics expert. He and his field supervisor, Paul Reed, did an amazing job in laying out and installing the multiple and complex plumbing systems and establishing the enormous equipment area.

The spa offers a particular testimonial to All Water Tek's craftsmanship: This vessel measures just 12 by 18 feet but has 42 jets, a two-person deep well for full-body hydrotherapy and seating for 14 people. I had spent countless hours in specifying jet groupings, pipe sizes and dimensions for jet placements in amazing detail, but fitting so much pipe into so confined a space was

A Warming Touch

One of the most deluxe and unique features of this project involves the area around the huge swim-up bar.

This whole section of the swimming pool is separated from the rest of the vessel by a faux-rock wall that breaks at a level just above the water's surface. There's a gap in the wall that allows bathers to move easily from the pool to the bar area, which in itself is quite large.

The wall is designed so the gap can be closed using an acrylic panel, thus isolating this area from the rest of the pool. The circulation system (with separate filtration and ozone generation) is designed to heat this area of the pool to spa temperatures – all to increase creature comforts for those relaxing at the bar.

– K.M.

The natural consequence of such a complex set of features and structures was a need for plumbing and conduits – *in quantity*. Keeping track of every line was an absolute necessity, because everything had to surface in specific spots in what simply had to be an extremely well-organized equipment pad.

an effort that required consummate skill.

The area with the deck-level leaping jets was similarly complicated, as were the waterfalls for the grotto, the circulation system for the swim-up bar area (discussed briefly in the sidebar on this page), the vanishing-edge detail and its deck-level collector system – not to mention the pool itself.

All of this plumbing leads over to an equipment area unlike any I've ever seen outside of a waterpark. The set includes 16 Intelliflow variable-speed pumps, four WhisperFlo pumps, five propane heaters and a half-dozen diatomaceous-earth filters from Pentair

Once the shell had cured and appropriate waterproofing agents had been applied, the structures were literally crawling with craftspeople applying glass and ceramic tile and several varieties of stone. If all goes as planned, this work will be wrapped up by the time this article appears in print and we'll have moved on to tackle the array of amenities that are to be built around this phenomenal structure.

Water Pool & Spa (Sanford, N.C.). There are also five heat pumps by AquaCal (Port Charlotte, Fla.), three corona-discharge ozone generators from Clearwater Tech (San Luis Obispo, Calif.), special flow meters from Signet Brand (El Monte, Calif.), chemical automation by Chemtrol (Santa Barbara, Calif.) and extensive control systems arrayed with a staggering number of valves and valve controllers.

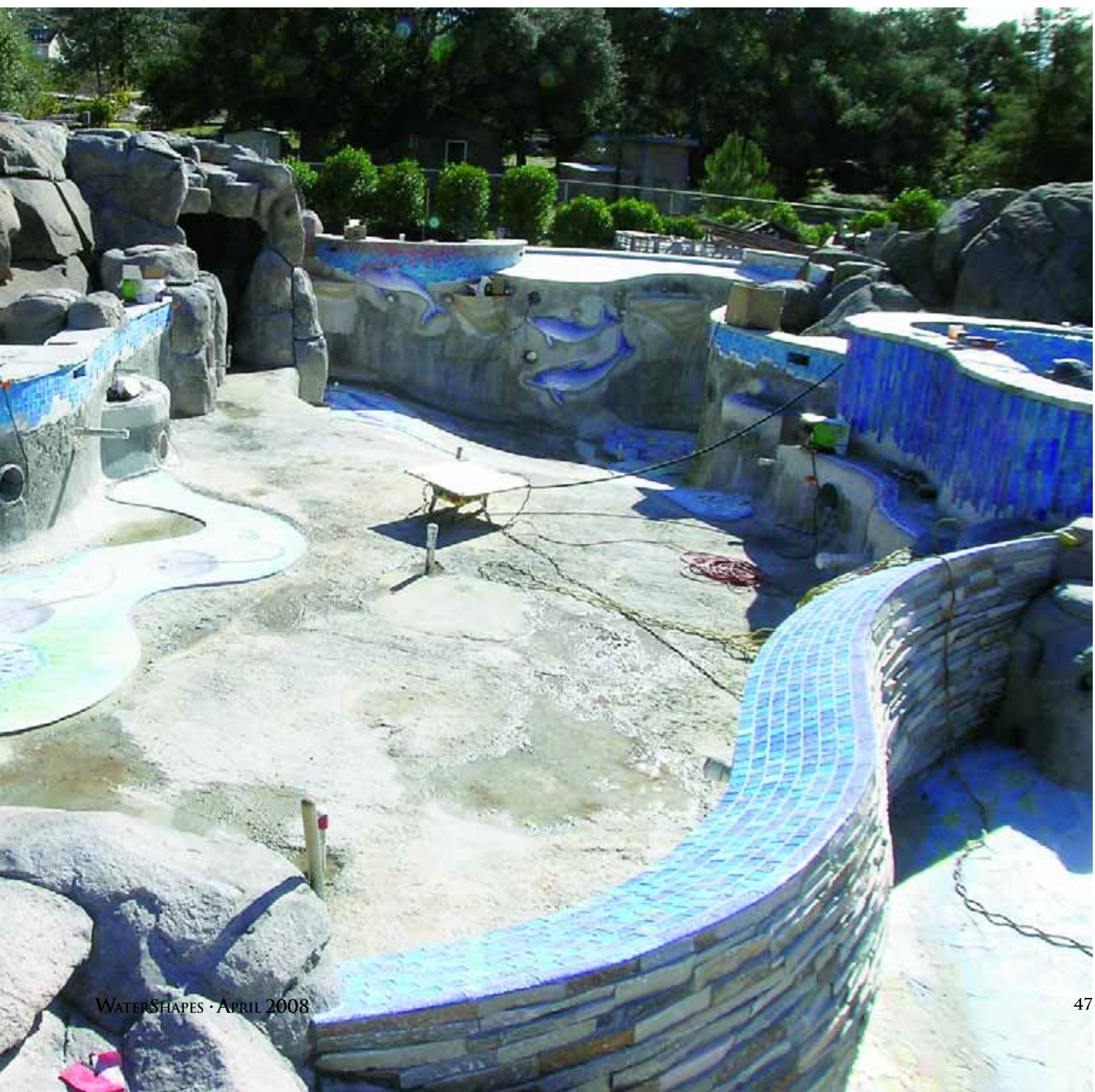
A range of other suppliers became involved as well, including Crystal Fountains of Toronto (various jets and waterfeatures); Custom Cascade of Temecula, Calif. (waterfall units); Nexxus Lighting of Orlando, Fla. (specialty fiberoptics); and underwater-speaker supplier Lubell Labs of Columbus, Ohio.

Sticking Together

At every stage so far, this project has been all about collaboration, from my initial conversations with Skip Phillips and the homeowner through to countless discussions with consultants and subcontractors too numerous to mention. We still have a long way to go before the project is complete, and there's little doubt that others will get involved to help me clear the hurdles that still remain between us and completion.

Without question, this has been the most difficult and, at times, the most frustrating and exhausting job I've ever tackled, but I'm finding a great deal of satisfaction as each of the zones we've established take their shapes and the grand vision comes to fruition. If all goes well, we'll wrap up our work this summer, and I can't convey how much I look forward to sharing not only the promised article on hydraulic systems but also the finished product with you in *WaterShapes* sometime this fall.

For now, I'm still enjoying the process of exploring all the possibilities we have at our disposal as watershapers and, on the flip side, figuring out just how much work creating Big Fun can sometimes be.



Subtle Flows

In his work as a landscape artist and custom watershaper, Robert Nonemaker often uses rills – small channels that simply and gracefully move water from one place to another – to bring interesting rhythms and harmonies to his garden spaces. Although these features tend to be less than assertive, he notes, the way water moves through their narrow slots can do wonders when it comes to adding depth and detail to watershape designs.

By Robert Nonemaker

My dictionary defines a *rill* as a small stream cut by erosion. In the practice of watershaping, however, that colorful little word has been stretched to cover manufactured channels in which we artfully move water from one place to another.

These often-subtle effects have a history dating at least to the 5th Century BC, when Persian kings demonstrated their power over nature by using rills to bring water – a symbol of fertility as well as a practical means of cooling architectural spaces – from rivers and aqueducts to their palaces.

These early rills were observed and adopted by Muslim designers and engineers who rose to eminence in the Middle East more than a millennium later and were carried along as Islamic influence spread through India, North Africa and, eventually, Spain, where signature elements of Moorish architecture are still seen today in the famous Alhambra. From there, rills finally made their way into Europe, where they mutated and appeared in Renaissance palaces in Italy in the form of ornate water chains and staircases.

In the years since, rills have become part of the global vocabulary of watershaping. But where modern watershapers have been quick to pull other historic looks as rectangular reflecting pools and quatrefoil fountain basins into their designs, relatively few have turned to rills as another way to embrace the traditions of water design in their poolscapes and landscapes. And this is despite the fact that rills are not limited to use in traditional designs and can indeed be used in a wide range of styles and settings.

Time and Movement

As a designer, I see rills as a device we can use to build a measure of sensory rhythm into a landscape, basically because these features are so good at controlling the way someone's eyes and body move through a space. In fact, rills are invaluable in that respect, simply because of the way flowing water attracts attention by creating sounds and animating a space.

We've also found them to be useful in drawing attention to architectural elements such as walls or staircases; in visually connecting points along an axial view; or in cutting paths through planted areas between bodies of water, thus conjuring an impression of connectedness even across relatively long distances between watershapes.

They also can be used to create a sense of mystery, captivating observers' attention and leading them through a space to an unknown destination where they might find anything from a small pond to a grand swimming pool that might not be visible from upstream points in the rill's course. I've seen them used as well to lead people through a landscape, stopping them at a point where the water gathers at a destination of some kind, whether for recreation or to enjoy a nice view.

Photo courtesy Dreamstime

Photo by Amy Morie, Los Angeles

From historical roots in Islamic architecture through to ultramodern statements and classic garden architecture, rills have always lent the spaces they occupy a special sense of cooling, inviting motion and subtle visual interest.

In other words, rills create movement and pique the interest of those who follow their courses to find out where they're going. As such, these features play to basic human nature: It's quite normal to want to follow moving water to see where it goes, in much the same way as we like to follow natural streams to see where they'll take us.

I'm no psychologist, but as a watershaper I know that rills tap into something fundamental and give me a way to manage and direct the way people experience a landscape. My observations show further that rills can influence the *speed* with which people move through a space: If a rill's water moves swiftly, people tend to keep pace and stroll along at a good clip; if the flow is slow, they tend to move at more languid paces. In their own minimalist way, these rills are a surprisingly powerful means of connecting one point to another within a given space.

This sublime capacity they have to weave elements together within a space is, I think, the chief contribution rills make to watershaping. If you have a fountain in one area and a pond in another, for example, those things may seem completely separate. Simply by setting up a rill between them, you completely alter observers' perception of the space, downplaying the physical separation of the bodies of water and giving people a sense of a grander system encompassing the entire landscape.

Variations and Themes

As was mentioned at the outset, rills come in many shapes and sizes and are adaptable to a broad range of styles. In some cases, the basic definitions get stretched and some might see one moving through a large vertical transition as a cascade or even a waterfall – or one moving across a level space as less of a rill and more of a stream.

In my work, I tend to think of rills as any water-in-transit system that is notably long and very narrow. And although they certainly might see applications in otherwise naturalistic designs, I also tend to think of them as having a distinctively architectural quality in the way they are designed and the way they look.

I am comfortable as well in thinking of rills as covering vertical transitions of some kind, either in conjunction with steps, for example, or sloping lawns. In lots of cases, however, rills function admirably in flat spaces and do not need any sort of slope to work well. All it takes is adding water at one end and removing it at the other: The flow moves as the water seeks its level, either brisky on a slope or slowly on level terrain.

Rills also function either recessed into grades to move through a deck or across

Photo by Isaac Pinnock, London, England

a lawn – or can be raised above grade either by just a few inches or several feet when set atop walls. They can be perfectly straight or wind in serpentine forms; can vary in width and depth; and may differ widely in materials of construction. Some have smooth bottoms that create silky-smooth flows, while others provide steps, shingles, cobbles or other obstructions to create surface turbulence.

They can transit spaces without any ornamentation other than the textures lent by the flowing water, but in other cases they can be formed to make artistic, sculptural or architectural statements. In the rills of Italian Renaissance palaces, for example, moving water and fixed forms work in concert, drawing attention to one another to create dramatic compositions of motion and stillness, light and shadow, permanence and transition.

Within all of these variations, the practical key to a rill's appeal has to do with the speed at which the water moves and its volume. This is why, from the outset of a project in which a rill is part of the picture, I always work first to understand what we're trying to achieve and never leave the characteristics or details of the water's flow to chance. Moreover, I know that the homeowners' sense of what they want is subject to change, so I always think of these systems as having a flow that can be adjusted within a working range to suit immediate or future needs.

In this way, rills become a tool in establishing a space's moods. At times, for instance, clients might want a more aggressive flow through a rill to animate a waterfall on one end; contrariwise, there will be times when they'll favor a more retiring presence and a gentler, slower-moving flow. All it takes to accommodate this range of desires is setting the system up with valves or variable-speed pumps.

The Practicalities

Another consideration in rill design has to do with how water is introduced to and exits from the channel.

Again, there's an almost limitless range of possibilities here. As with streams, however, I find it useful in most cases to conceal the source by setting up a welling pond of some kind as the headwaters. In contrast to naturalistic streams, however, it's also possible with rills to make artistic statements by adding water in a clearly visible fashion, whether over a weir or from a spout. Likewise, rills can terminate in any number of ways, spilling into a pool, fountain or pond or cascading over a waterfall.

With any water-in-transit system, of course, comes a set of practical considerations. Water flowing through the system, for example, must have a place to go when the system shuts down. Depending on the length, width and depth of the rill, that volume can be considerable and, in a situation where the

Photo by David Glaves, Exeter, England

While rills work well with formal architecture, they also shine when approached with a more whimsical attitude and serve beautifully in leading people where you want them to go – and at the pace you want to lead them as well.

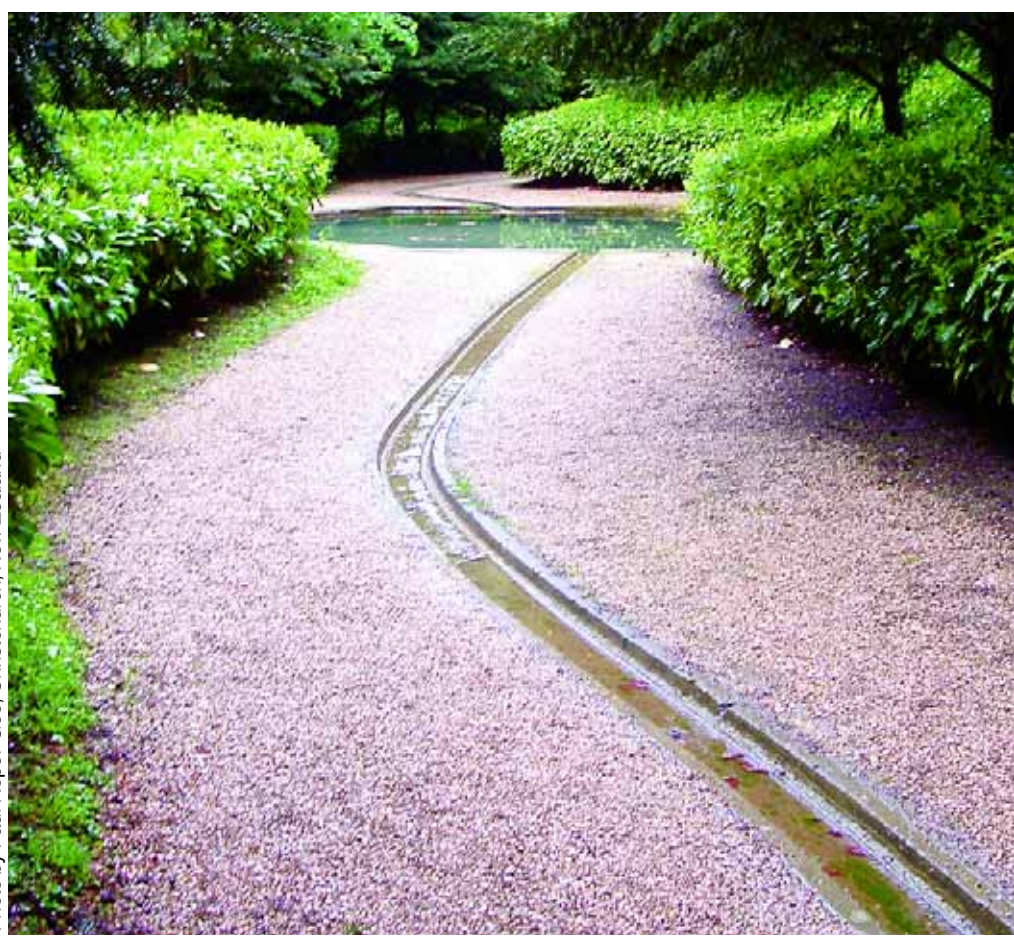


Photo by Paul Roper-Gee, Christchurch, New Zealand

rill's terminus is small relative to the rill's dimensions, you may well need a surge tank to accept all the water. By contrast, if a narrow, shallow rill flows into a large pool or pond, there may be no concern about surge capacity at all.

There are also practical concerns related to debris, which rills can collect in abundance. With fast-flowing rills, there will be a tendency for debris to flow through the system, which is good; at the same time, as leaves flow swiftly through a rill, they become waterlogged and will sink very rapidly when they make their way into a pond, pool or fountain, which isn't so good.

By contrast, if the rill is slow moving, it's safe to assume that debris will collect and build up and that you need to make provisions for periodic cleaning. In using such a rill in a heavily wooded area, there's also a concern that debris can build up quickly – and to such an extent that the channel will clog to the point where water will spill over the rill's sides and might cause serious damage.

Finally, you need to consider the possibility that a grade-level rill can become a pedestrian trip hazard. This issue obviously limits the use of rills in commercial applications, but in many settings the difficulty can be overcome by either raising the rill above grade or using an edge treatment that helps identify the hazard and prevent problems. And in any event, these are possibilities that must be discussed with the client early in the design process.

Formal Connections

In this case, a rill appears in an entirely contemporary design. The landscape, in which gardens and watershapes are distributed over a gently sloping lot, was designed by the talented landscape architect Steve Stimpson.

The channel originates in a welling pool by a pathway leading from the garage to the house – an obvious invitation to change directions and follow along the rill's course to a different location. Made from stainless steel, it runs along the top of a wall, with the water eventually falling into a narrow pool of water.

The system effectively welcomes visitors to the entire property. Personally, I enjoy standing on the top path and looking across the top of the rill, reveling in the reflective quality of the water and the way it draws the sky into the beautiful vista – and in the way it links the starkly modern architecture of the home into its relaxed, bucolic surroundings.

Once these features enter your design vocabulary, they can be used in an endless number of ways – linking indoor and outdoor spaces, drawing attention to sculptures and architectural details or leading to hidden retreats, for example. They may be used as well to introduce the comforting sounds of moving water or mask traffic noise. The only real limit to these applications is the imagination of the watershaper.

Rills will probably never be a dominant presence in any space they occupy, but as the the projects illustrated on the following pages show, they weave through designs in wonderful ways, lending a continuity that adds considerably to the enjoyment homeowners and their guests will find in experiencing these landscapes.

Axial Arrow

In this case, I used a rill to connect a combination spa/fireplace structure with a swimming pool located across a large deck – a design approach I borrowed from Sutton Place, an English estate renowned for its gardens and its artful use of rills.

We used a rill in this setting to create a linked axial view between the fireplace and the obelisk on the opposite side of the yard. When you stand at the obelisk and look toward the pool, the line of the rill draws the eye to the fireplace in the distance; likewise, when you're sitting by the fireplace or in the spa, the rill carries your eye in a direct line across the pool and toward the obelisk.

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All About the Water

Specialists in land planning for large-scale developments, the Hilton Head Island, S.C.-based landscape architecture firm of Wood+ Partners, Inc., believes in building communities that harmonize with nature. In late 2003, say the authors, the company was asked to generate a master plan for Hampton Lake, a planned community that follows the company philosophy to the letter, linking luxury living to responsible environmental stewardship.

By Perry Wood, Mark Baker & Travis Tuck

People who live in and around Hilton Head Island, S.C., cherish the memory of Charles Fraser, the visionary developer who set the standard for the way communities look along vast stretches of the Carolina coast. Most prominently, he pioneered progressive land-planning standards 50 years ago in developing Sea Pines, one of the first communities to incorporate environmental preservation as part of the development, take its design cues from nature and support the concept with land covenants and restrictions.

Fraser's vision for Sea Pines has since become the foundation for many planned communities worldwide and embodies a philosophy that has, in the intervening years, spread throughout the country. Indeed, our firm – Wood+Partners of Hilton Head – has always endeavored to adhere to this approach in planning communities that are situated in and around natural environments.

Most of the time, that means we work (as Fraser did) with water as a central amenity, whether the setting borders a lake, the ocean, a river or a natural wetland area. As we see it, our mission is to preserve and, where we can, even *enhance* the presence of the environment in ways that influence the culture and character of communities that share these spaces with their surroundings.

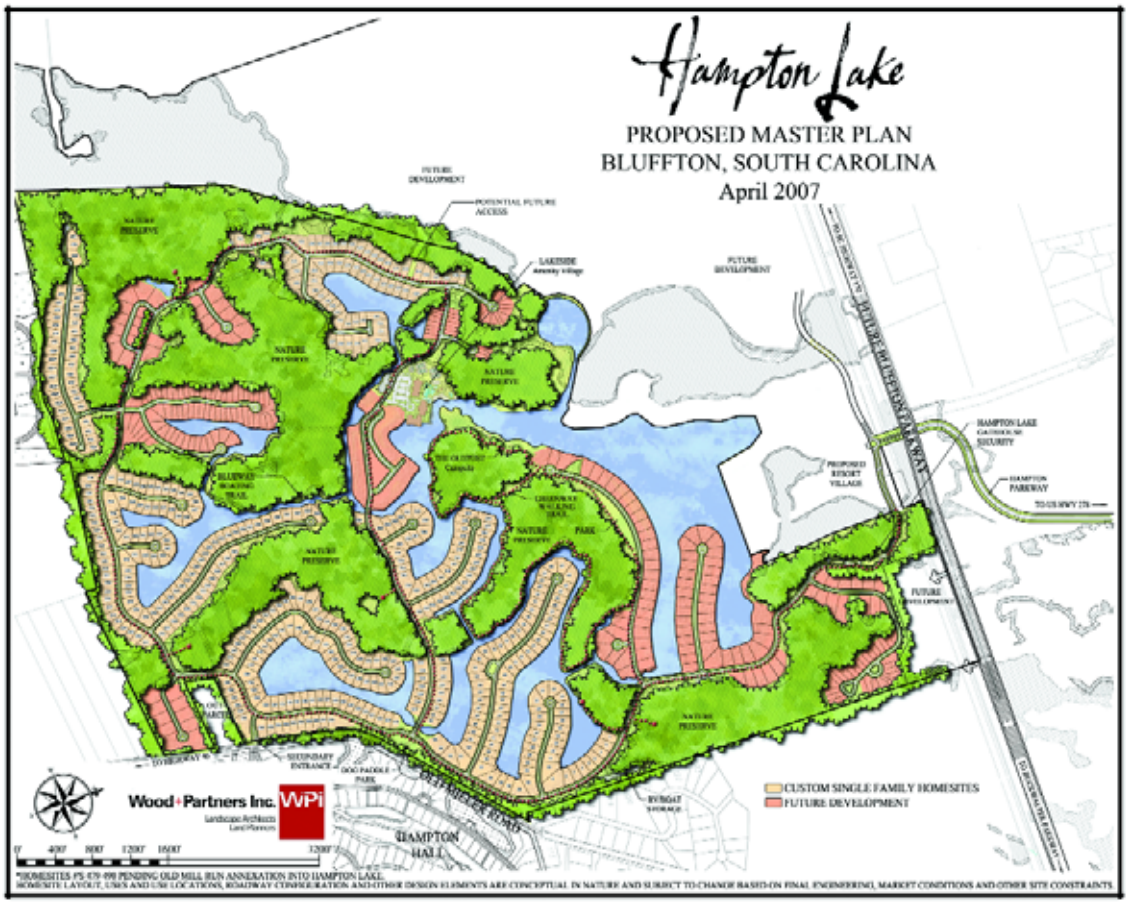
Everything we do is steeped in the thought that nature and people can coexist when the needs of both are allowed to harmonize. In fact, we like to say that we listen to the story the land tells us, and then base our designs on the opportunities and constraints it defines for us. Whether it's a wetland, a forest, a mountainous area or someplace on the ocean, we find ways to value and preserve those settings and reconcile them with the communities we establish.

Although every situation is a bit different, our objective is always the same: We seek sensible ways to blend the two together.

Paper Place

The Hampton Lake project we'll be discussing here is a textbook example of this approach to land planning and development – one that's probably unique within the greater Hilton Head Island community.

Where most of the communities on the



island are organized around ocean or river frontage and are defined by proximity to large bodies of water, Hampton Lake is different in that it is located ten miles inland in the town of Bluffton, S.C. Before this project, none of the inland developments in this area featured any kind of interface with an aquatic environment – but this project changed all that.

The 900-acre site is part of the 4,500 acre Buckwalter Tract. The tract includes forest and wetland areas once owned by International Paper Co., which managed the land to generate pulp for its paper mills. The company sold the land to our client, John Reed, the owner and founder of Reed Development Co., who hired us in the mid-1990s to begin the process of preparing the area for development.

This parcel was a key component in Bluffton's annexation of 50,000 acres of former commercial forest into the town proper – this at a time when its population included a mere 500 people. With the annexation, Bluffton overnight became the fifth largest city in South Carolina in terms of land area and has seen explosive growth since then, with 100,000 homes on board or in the planning stages and almost all of them in the area once controlled by International Paper.

As part of the process, community leaders established a number of guidelines related to land use and the preservation of natural areas. From the start, they've kept this focus on maintaining and responsibly using the area's natural resources – principally meaning that all wetlands were to be preserved because of their critical role in processing stormwater runoff and maintaining water quality in local wetlands, rivers and waterways.

The work we do and our guiding philosophy made us a natural fit for the job. And it didn't hurt that we were a local firm and that all of us are locals who have a personal interest in seeing the beauty of Hilton Head and the low-country area of the state preserved, celebrated and even augmented.

In analyzing the site, we found ex-

The intricacies of the space reflect our desire to maximize resident's access both to the wetlands that grace the property as well as to the man-made waterways their homes overlook. While we aimed to encourage direct contact with and use of the lakes and channels, we needed to set distinct physical boundaries to separate people from the wetlands – and did so by setting up miles of paths and bridges that carry homeowners and their guests right up to the preserved areas without permitting any sort of intrusive access.

tensive wetland areas, but no river or ocean frontage. This led us to organize the community with an eye to a defined, 345-acre wetland reserve, but it also led Reed and the planning team to include a 165-acre lake with more than 15 miles of shoreline that the majority of the development's 900-plus homes would overlook and which would host many of the development's major and minor amenities.

This dual exercise in watershaping would enable us to preserve the wetlands while at the same time creating a desirably high standard of living for residents – a mixing of interests that we've always seen as being within reach when water is used in harmonious, creative ways. In fact, early planning led Reed to coin what would become the slogan for the entire project: "It's all about the water."

Wetlands Preservation

Application of that mantra began with the 345-acre wetlands.

In general, these areas tend to be low-lying and play key roles in accommodating the runoff from storms both major and minor. As such, they have non-sandy soils that are heavy with nutrients and play host to large varieties of plants supported by the near-constant presence of water. This means they sustain all sorts of wetland grasses and hardwood species – oak, cypress and maple – that flourish in wet environments.

The wetlands of coastal South Carolina also have their idiosyncrasies, including unusually complex physical configurations that extend from the fact that the land is very flat and the water table is extremely high – just a few feet

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below the surface. Typically, the total vertical difference from the highest point to the lowest in these areas is no more than four to five feet.

Given the flat terrain, these wetlands are configured in complex patterns in which fingers of shallow water area extend in web-like forms into the pine forest and tend to organize themselves around central drainage flows. It's not exactly like the watershed for a stream or river, but with careful observation it's nonetheless possible to perceive a general flow of water from one end of an area to the other.

In this particular setting, we found ourselves in a place where dense pine forests on dry land were shot through with patches of old-growth hardwood and wetlands ecosystems. It's a wonderful natural amenity that we knew could be preserved and even enhanced at the same time we could take full advantage of its presence in the development.

The trick, of course, is to achieve both aims without damaging the wetlands or compromising the quality of life in the human environment.

In this case, preservation was of particularly critical importance: In surveying the site, we discovered that these particular wetlands absorb runoff from a much wider area than the 900 acres with which we were concerned and were absolutely critical in providing natural filtration for stormwater and irrigation runoff flowing through the area and moving into the nearby May River.

Wetlands are invaluable in areas such as these because of their remarkable ability to absorb and process chemicals that are inevitably present in developed areas. As a result, our planning from the very earliest stages involved a tremendous amount of care and consideration of the

In setting up the edges of the lakes and channels, we used a number of approaches that define natural intersections between the wetlands and the open water – or, by contrast, establish spaces in which residents are encouraged to approach the water directly. In many areas, we set up broad littoral shelves that are crucial in maintaining natural filtration and keeping the lake's water crystal clear.

Digging In

Building a 165-acre lake of the complexity of the one described in the accompanying article is no small task.

First, all vestiges of the pine forest had to be cleared from the lake's footprint – a task handled in conjunction with local lumber companies that bought, graded and removed the timber. Next, we removed and stockpiled the top 12 to 18 inches of topsoil. Laden with roots, mulch and a variety of other organic material, this soil was extremely rich in nutrients and was to be put to use as a soil amendment throughout the site.

With that done, we brought in heavy excavating equipment to dig out the main body of the lake, stockpiling the spoils for use around the site or passing it along as fill to other developments in the area. In other words, nothing we unearthed in creating the lake – timber, topsoil or fill – went to waste.

With the hole dug, we now had to deal directly with the fact that the water table at Hampton Lake was just a couple feet below the surface level. Our intention to create a lake that would be several feet deeper than the water table's level engaged us in a massive dewatering operation – and also encouraged digging at breakneck speeds.

Once we had the lake at the desired eight- to ten-foot depth, we contoured the banks, set up the littoral shelves and started planting grasses and other materials to stabilize the slopes. Next, we established the drainage structures: These allow water to flow out of the lake, into the nearby wetlands and, ultimately, into the river system beyond.

The lake is fed using groundwater, which, because it is naturally filtered, means it has terrific water quality. But the lake is basically a self-contained system, so we help keep the water clear, clean and oxygenated with a series of subsurface aeration systems. As we see it, maintaining water quality is important not only to the residents who invest in a home at Hampton Lake, but also for the whole area around the development and the wetlands, streams and rivers influenced by our stewardship of the land and its resources.

– P.W., M.B. & T.T.

way our community would interface with the overall area's natural hydrology.

Before we could begin any development, in other words, we had to go through the rigorous rounds of civil engineering involved in configuring a drainage system that would effectively and efficiently distribute and treat runoff from developed areas.

Human Interface

The other task in preserving wetlands in harmony with communities has to do with designing places where man-made landscapes interface with unspoiled environments. The goal here is to create spaces where people can be near the wetlands and enjoy the natural beauty of their flora and fauna without disrupting anything.

One of the primary measures we used at Hampton Lake involved deployment of "littoral shelves." Basically, we shaped the lake so that it had depths of around eight to ten feet and then brought them up to broad, shallow shelves where the water is 12 to 18 inches deep adjacent to the shoreline. These littoral shelves were somewhere in the vicinity of 20 feet in width and were spaces in which we planted a variety of grasses and other emergent plants.

By establishing these transitional shelves, we not only enhanced the physical beauty of the wetlands and lakes, but at the same time increased their ability to filter nutrients and sediments from the water before it could enter the primary flow pattern. In other words, because these areas could shoulder the burden of runoff from our developed areas, we effectively compensated for our intrusion at the fringes by increasing the wetlands' ability to provide natural filtering and purification of any runoff.

We used various edge treatments to stabilize and maintain the intersections of dry land with these littoral shelves. In some beach areas, for example, we installed bands of riprap along the edge. By contrast, in other areas where the pine forest meets the wetlands, we installed bands of lawn that can be mowed and easily maintained at the same time as we preserved some sections with natural woodland edges.

These treatments are meant to provide distinct visual and functional boundaries between what is wetland and what is surrounding dry upland area. Lawn or rock bands serve the dual purpose here of stabilizing the shoreline *and* establishing easily observed boundaries for human activity.

We also encouraged permissible interaction with the preserved environment by setting up a series of well-defined "wetland observation trails" that lead to a variety of scenic stopping points – and in some cases to boardwalks that move right through the wet-

The lake is a place of great natural beauty, with much of its 15-mile shoreline bordered by wetland plants as well as native hardwood trees. Access to views is provided both by placement of homes as well as by the network of pathways that lead hikers to many of the best viewpoints. Also by design, the lake is meant for both wild and human contact: The birds have taken to the water in large numbers, as have residents who use nonpolluting electric-powered boats to get around.

lands themselves. The idea here: We want the wetlands to be available as a primary community amenity and bring residents and visitors into close proximity with its plant and animal life. We want them to enjoy the beautiful trees, the water's reflections and various birds, fish, deer and even alligators – and do so in complete, non-intrusive safety.

In other words, this program serves our conservation mission by preventing disturbance of the wetlands and carefully controlling where people can and cannot go. For Hampton Lake, this has meant designing and installing more than nine miles of trails that give residents and visitors ample access to the wetlands – a contact we see as one of the primary benefits of being part of the community.

Lake Craft

For all of the care with which we approached the wetlands areas of the site, the primary challenge we faced in the pro-

ject was creating an environment in a dry pine forest that, from a real-estate perspective, would enable Hampton Lake to compete effectively with river- and ocean-front developments. Preserving the wetlands and providing access to them was certainly part of that program, but we had to take it several long steps farther.

The best way to do so, we thought, was to build a new lake that would provide shoreline spaces for residences as well as stretches we could dedicate to common areas and recreational amenities. (For a brief discussion of the lake's construction, see the sidebar on page 62.)

As the overhead view reveals, the resulting body of water is quite complex in layout: It features not only an irregular shoreline, but also a chain of islands and small waterways that all connect to large, primary thoroughfares. The role played by these various channels is so significant that we referred to terrestrial pathways as "greenways" while similarly referring to the systems of channels in the lake as "blueways."

This complex configuration maximizes shoreline relative to the water's surface area, which we thought essential. But it also creates a situation in which homes back up to the water and have small, private docks – a feature that has proved so popular that many residents are just as likely to travel from place to place by boat as they are to move about on foot or in their automobiles.

To be sure, the lake is man-made, but that says nothing about how well the planned community interfaces with its accompanying aquatic environment. In fact, its artificiality has key advantages in that the water level is controlled, so there's very little of the fluctuation that you'd find in a tidal area or even in some natural lakes that might experience changes in water level as a result of storm surges or drought.

Given the reliability of the level, we were able to take full advantage of every available bit of shoreline in ways we couldn't have done with a truly natural lake.

At one end of the lake, for example, the community's amenities center has a series of docks and a large boathouse that has both covered and open-air dockage.

The Lakeside Amenities Center overlooks the water and serves not only as a community center but also as a general resource for fun of the sort you'd expect to find at a high-end resort. With ample dockage, beaches, shade structures, pools, spas and decks – not to mention a lazy-river feature and ample wet and dry play areas for children – the center offers many types of recreation while blending in beautifully with its waterfront setting and forested surroundings.

There are boats for rent here, as well as slips for privately owned watercraft – and there's never any worry about anyone running aground as a result of rising or dropping water levels.

There's also a campground on another part of the shoreline that residents and visitors can approach either on foot or by water. There are all sorts of trails and paved walkways that meander through the lakeside area, all organized around key viewpoints out over the water. Again, it's all part of our program to bring residents and visitors within easy proximity of the water.

It's important to note that all of the boats on the lake are electric-powered. First, the environmental standard we're working with is all about minimizing harmful chemicals in the water, so keeping gasoline, exhaust and other pollution out of the picture is important. Second, the electric-powered boats, some of which are quite large, move at a relaxing pace with minimal wakes, lending themselves to the developer's desire to banish loud, fast-moving watercraft and the safety issues that accompany them.

The Community's Heart

By combining a comfortable, engaging, community-oriented lifestyle with easy access both to the lake and the nearby wetlands, we've brought real meaning to the "It's all about the water" tagline: It's more than a marketing bromide; instead, it's a genuine description of what it's like to be here.

Completing the picture is Hampton Lake's Lakeside Amenities Center, which overlooks one end of the lake and has a number of facilities available to residents, including buildings housing a workout center and a multi-use indoor community center.

Outdoors in the same vicinity, we set up a resort-like environment featuring a range of aquatic experiences for all ages. On one end, for example, is a large play area for children with an array of dry-land play structures as well as shallow-water play areas outfitted with dozens of interactive features – sprays, wet um-

brellas, leaping jets and slides.

The shallows transition into a primary swimming area for adults and older kids. It has a meandering, curvilinear, freeform design and includes a variety of underwater benches and a broad water-lounging/deck area – just the features you'd expect to find in a luxurious, high-end resort. To one side of the pool, there's a massive deck/island that creates a lazy-river passage that moves under a large bridge and rolls by sunbathing areas.

Also, tucked away in a quiet corner of lakeside area (adjacent to a sandy beach) is the "adults only" pool. This serene environment features a separate free-form pool with underwater benches, shallow wading areas and umbrella-shaded decks and cabanas.

The program here involved seamlessly blending water, decks, landscaped areas, pathways and picnic areas into a free-flowing composition in which everyone has easy access to different types of recreation. That all of this works into the "all about the water" theme is no accident, right down to the safety-surfacing material chosen for the play area – a set of swirling blue and white shapes that are intended to represent moving water.

Hampton Lake has been a project of such scale and complexity that our firm expects to be involved on site for years to come. Our client deserves tremendous credit for approaching the development with the highest ideals of natural preservation on one hand and quality lifestyle on the other, with everything aimed at providing a residential area that adds real value to the region in more ways than can easily be counted. We look forward to building on a relationship that has, so far, produced exactly the results we've all been seeking.

Going forward, we're proud to have participated in a project that embodies such a progressive ethos and have been happy to see the principles we've applied being picked up and used elsewhere. When design firms and developers look for examples of properties that represent the best of environmental stewardship, we're hoping Hampton Lake will be a place that pops into mind for years to come.

Of Interest

The following information has been provided to WaterShapes by product suppliers. To find out how to contact these companies, look for the Product Information Card located on page 60.

Shell/Pebble Blend

Circle 135 on Reader Service Card

PEBBLE TECHNOLOGY has introduced Shimmering Sea, a shell additive for its line of interior pool/spa finishes. The small shell pieces add a special sheen to natural pebbles, and they can be added at client-specified levels to ten standard Pebble Tec, Pebble Sheen and Pebble Fina colors – or can be custom ordered with any of the company's 39 finish colors. **Pebble Technology**, Scottsdale, AZ.

Skid-Steer Loaders

Circle 136 on Reader Service Card

CATERPILLAR has introduced the B2 Series, a new line that includes six skid-steer and two multi-terrain loaders. All units feature improved ergonomic operator stations; reliable, high-performance power trains; advanced hydraulic systems for power and performance; and a wide range of standard features and tooling options designed to meet a variety of comfort and production requirements. **Caterpillar**, Peoria, IL.

Ozone Systems

Circle 137 on Reader Service Card

CLEARWATER TECH offers the Apex and Apex A*e* ozone-generating systems. These corona-discharge devices are designed for pools ranging from 3,000 up to more than 100,000 gallons and use oxygen-based technology to produce ultra-clear water by eliminating organic contaminants, bacteria and viruses from pool water through a combination of oxidation and flocculation. **ClearWater Tech,** San Luis Obispo, CA.

Retaining Wall System

Circle 138 on Reader Service Card

VERSA-LOK RETAINING WALL SYSTEMS offers Weathered Standard, a material that brings a rustic look to landscapes while blending in beautifully with historic or traditional structures. The low-absorption, high-strength, top-pinning, solid-concrete units may be used in retaining and freestanding walls or columns and can be used to form curves, corners and stairs. **Versa-Lok Retaining Wall Systems**, Oakdale, MN.

Pool-Product Catalog

Circle 139 on Reader Service Card

SPECK PUMPS has released its 2008 catalog as a compact disk that opens access to Internet-based information on the company's history and product lines. Coverage includes pumps for spas, residential and commercial swimming pools, pool/spa combinations, vanishing-edge pools, fountains and waterfalls as well as filters, equipment packs and the Badu water treadmills. **Speck Pumps**, Jacksonville, FL.

Modular Slide Systems

Circle 140 on Reader Service Card

INTER-FAB offers the BYOS (Build Your Own Slide) system. The line features ten different flume sections that can be used in unlimited quantities and combinations as well as the Zoom Flume water-supply system, optional handrails and construction anchors. The units are available in a variety of earth tones and gray colors to fit in with handcrafted rockwork or concrete formations. **Inter-Fab**, Tucson, AZ.

Cedar Bridge

Circle 141 on Reader Service Card

INTERNATIONAL POND SUPPLY has introduced a double-rail bridge to bring a timeless Asian accent to backyard waterscapes. More than five feet long and handcrafted from White Cedar, the bridge can be sealed, painted or left to weather with the elements. All hardware is zinc coated for durability, and the clearance from ground to center of arch is six inches. **International Pond Supply**, Albuquerque, NM.

Large-Format Tiles

Circle 142 on Reader Service Card

ELIANE has introduced Contemporanea, a large-format series of technical porcelain tiles. Available in three neutral colors (chocolate, gray and off-white) and two bold colors (green with orange or navy with red) and suited to residential and commercial applications, the tile comes in 12-by-24-, 24-by-24- and 18-by-36-inch sections that can be customized with colorful 1-by-1-inch inserts. **Eliane**, Santa Katerina, Brazil.

Continued on page 68

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2008 Catalog

Circle 143 on Reader Service Card

QUAKER PLASTIC has published a 2008 catalog on its lines of deck drains, control joints, coping and pool stairs. Designed with an eye-catching, bright-yellow cover for quick and easy identification, the catalog features all of the company's product offerings complete with part numbers, drawing and specifications. There's also a separate section for the company's new paver-drain system. **Quaker Plastic**, Mountville, PA.

Inground Spa

Circle 144 on Reader Service Card

FABCOTE has introduced SunMate, a square-shaped spa that features a built-in, 360-degree vortex skimmer with reusable cartridge filters. The inground spa is designed for use in new construction or for addition to a poolscape during renovation and features 15 hydrotherapy jets, a pair of adjustable air controls and a deep foot well – with everything pre-plumbed and water tested. **Fabcote**, York, PA.

Deck-Drain System

Circle 145 on Reader Service Card

DECK-O-SEAL offers the Deck-O-Drain system for concrete decks. Quickly collecting and carrying water away from pool decks and other patio areas, the watertight units are made of PVC to resist wear and corrosion. They come in five colors and have a flat profile to fit tight against any wall. They also have a non-directional design that eliminates the need for right or left fittings. **Deck-O-Seal**, Hampshire, IL.

Measuring Software

Circle 146 on Reader Service Card

DIGI-CONTRACTOR has introduced iPhotoMeasure 3.0, a software program that accurately and efficiently measures anything in photos taken with digital cameras. Designed to speed calculations of job timing and budget estimating, the program functions as an electronic tape measure that sizes up three-dimensional planes and multiple two-dimensional planes in single images. **Digi-Contractor**, Los Angeles, CA.

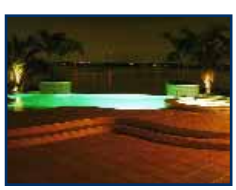
Soft-Start Lighting

Circle 147 on Reader Service Card

CAST LIGHTING offers No-Surge, a soft-start transformer technology designed to prolong lamp life in landscape lighting systems. The technology works by absorbing the initial current spike and slowly releasing it over a period of ten seconds. Lights in the system gradually increase in brightness instead of popping on, thus preventing nuisance trippings of panel breakers. **CAST Lighting**, Hawthorne, NJ.

Paver Systems

Circle 148 on Reader Service Card



ARTISTIC PAVER MFG. offers sand-set pavers made to resemble natural stone, coral and shell-infused materials. Available in several standard colors and designed for commercial or residential applications, the pavers are cool to the touch, slip-resistant and easy to maintain. The company also offers coping to match, with bullnose details on one, two, three or all four sides. **Artistic Paver Mfg.**, North Miami Beach, FL.

Architectural Railings

Circle 149 on Reader Service Card

C.R. LAURENCE CO. has published a catalog on its line of architectural railing systems. The full-color catalog covers structural glass railings, aluminum railing systems, post railing systems, windscreens, windbreaks and more, including cap rails, handrails and accessories. It also describes the company's engineering, fabrication and finishing services and custom fabrications. **C.R. Laurence Co.**, Los Angeles, CA.

Heating/Misting Palms

Circle 150 on Reader Service Card

COOL HEAT offers outdoor climate-control systems in three models. Designed to provide all-season comfort, the products each include 40,000 Btu radiant heaters and tri-nozzle misting/cooling features along with adjustable thermostats and one-touch electronic-ignition devices. The Bistro Palm offers seating for four; the Casual Cocktail Palm has a 24-inch table, and the Patio Palm stands alone. **Cool Heat**, Rancho Cordova, CA.

Pool-Design Software

Circle 151 on Reader Service Card

STRUCTURE STUDIOS offers Pool Studio – a powerful software system designed for use even by those with little or no computer experience. The system includes presentation tools that turn flat, two-dimensional designs into realistic, three-dimensional renditions that let clients move through and explore the environment. These drawings also become build-ready construction plans. **Structure Studios**, Las Vegas, NV.

Pond-Product Catalog

Circle 152 on Reader Service Card

AQUASCAPE has published the 2008 edition of Aquascape Pro, its catalog of professional-grade products and systems. The 56-page, full-color booklet covers aerators, lighting, plumbing, pumps and water treatments as well as pondless waterfalls, skimmer/filtration systems, complete pond kits and more. It also highlights new products and a new line of decorative items. **Aquascape**, St. Charles, IL.

Watershape Pumps

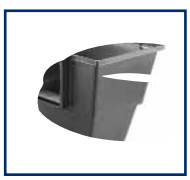
Circle 153 on Reader Service Card

VM PUMP CO. offers the VMC and VMB Series of iron and bronze pumps. Available in nine models ranging from five to ten horsepower, the units feature double-volute casings that allow for rapid air separation and water circulation in the priming cycle – thereby reducing radial thrust on the closed impeller system. The units also have trouble-free mechanical shaft seals. **VM Pump Co.**, Cambridge, Ontario, Canada.

Waterfall Kits

Circle 154 on Reader Service Card

DANNER MFG. has added two Pondmaster continuous-waterfall kits to its product line. Featuring all components needed to create self-contained waterfall features without the added construction associated with typical backyard pond installations, the kits come with either 1,200 or 700 gph pumps and include a pump vault, a waterfall box, a liner, PVC tubing and various connectors. **Danner Mfg.**, Islandia, NY.



Outdoor Stereo

Circle 155 on Reader Service Card

PROSPEC ELECTRONICS offers the JBL MR140 AM/FM receiver/CD player. Designed specifically for outdoor use, the device delivers the fidelity and signal required to drive a four-channel-by-45-watt system and is also equipped with an auxiliary input for an iPod, MP3 player, satellite radio or DVD. All circuit boards are encapsulated by a coating that resists moisture **Prospec Electronics**, Mt. Pleasant, SC.

Rail Polisher

Circle 156 on Reader Service Card

CS UNITECH offers the LRP 1503 Air Boa Pipe Sander, an all-around polishing system for handrails, pipes and tubing. With a sanding arm that snakes up to 270 degrees around the radius of a pipe, all it takes is a simple rotation to achieve full 360-degree coverage. Powered either pneumatically or electrically, the tool has a pair of deflection rollers for simple operation and quick progress. **CS Unitech**, Wilton, CT.

Reinforced-PVC Decking

Circle 157 on Reader Service Card

AZEK BUILDING PRODUCTS has introduced AZEK Deck, a low-maintenance substitute for wood or composite decking. Made of cellular PVC reinforced with flax fiber, the planks are designed for strength and resistance to expansion and contraction. Easy-to-install, the material comes in five colors, is as workable as wood and is about 40 percent lighter than composites. **AZEK Building Products**, Scranton, PA.

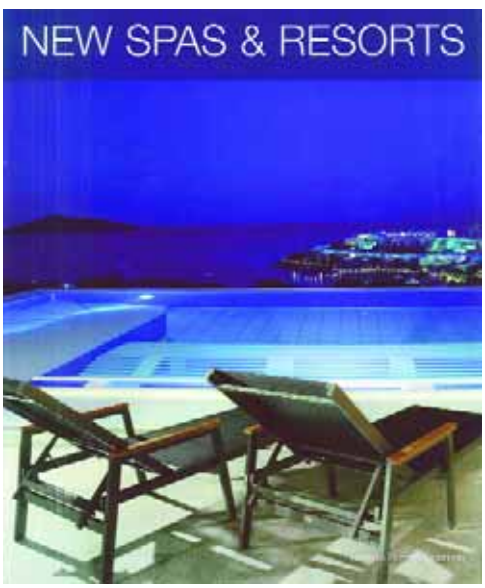
Reservoir Cubes

Circle 158 on Reader Service Card

EASYPRO POND PRODUCTS offers Reservoir Cubes – oversized, stackable, milk-type crates that fill in spaces in the reservoirs at the bases of waterfall systems that would otherwise be occupied by solid, water-displacing rocks. These units support a lot of weight and reduce the required size of a reservoir while also saving on the time, cost and effort involved in placing stone. **EasyPro Pond Products**, Grant, MI.

By Mike Farley

Seeking Wellness



You don't have to be a physician to know that watershapes offer profound benefits when it comes to health, fitness and wellness. Indeed, most people know that swimming and other forms of activity in water are, along with hydrotherapy, among the healthiest of all activities known to us mere mortals.

Unfortunately, and for reasons that escape me, promoting the value of that connection has never spent much time on our industry's front burner.

My own curiosity about the topic recently led me to seek published resources, and I'm sad to say that my search hasn't yielded much. It reminds me of my early days in this industry and a time long ago when I craved books that would inspire my design work: For a long time, there wasn't much to find – but that's all changed now. My hope is that the case with water-related health and wellness is the same and that it will soon become a topic as celebrated as stylish watershape designs are these days.

On a recent trip to my local library, however, I *did* manage to find one book that was water/health-related – but not exactly in the way I was hoping. Called *New Spas and Resorts* (Loft Publications, 2007), this richly illustrated 240-page book by Daniela Quartino covers spa facilities of the sort found at luxury hotels, resorts and natural hot springs. In other words, it's not about "spas" as we apply the term in our industry, but instead refers to full-service facilities where members or guests can enjoy a massage, get beauty treatments and, of course, spend time luxuriating in water both hot and cold.

In picking up the book, I was reminded that, just about everywhere I go these days, I see places promoted as "day spas" or "pampering spas." As Quartino demonstrates in her coverage, these establishments *always* have watershapes – most often in the form of hydrotherapy spas but also as swimming pools of all shapes and sizes.

Even in flipping through the pages before checking the book out, I was immediately struck by how elaborate and varied these installations can be. Right away, I began wondering why this genre of watershaping hasn't come to occupy a more prominent place among our watershaping specialties, because it's apparent that, around the world, some of the most beautiful watershaping I've ever seen is to be found in these facilities where people go to seek comfort, luxury and measures of self-indulgence.

Quartino divides her coverage into five distinct categories: day and fitness spas, hotel spas, thermal spas, unique spas and resorts. In each, she presents a generous selection of facilities that represent the broadest possible range of styles and details. The majority of these facilities are in Europe (Spain, Italy, Holland, Germany), but they also appear in Turkey, Chile, Brazil and Canada. Only a few are in the United States, and the "mostly overseas" nature of the coverage seems to indicate that this is an area where other cultures are a few big steps ahead of us.

The text offers no technical descriptions of the facilities, but the high level of the finish and detail work is immediately evident in the photographs, making the book useful as an idea book and source of design inspiration. Helpfully, the styles on display range from the classical to the naturalistic and sleekly modern.

This beautiful book doesn't directly make the case for valuing the relationship between watershapes and health, but it certainly serves to reinforce the idea that wellness and water are able at least to go hand in hand. WS

Mike Farley is a landscape architect with more than 20 years of experience and is currently a designer/project manager for Claffey Pools in Southlake, 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.

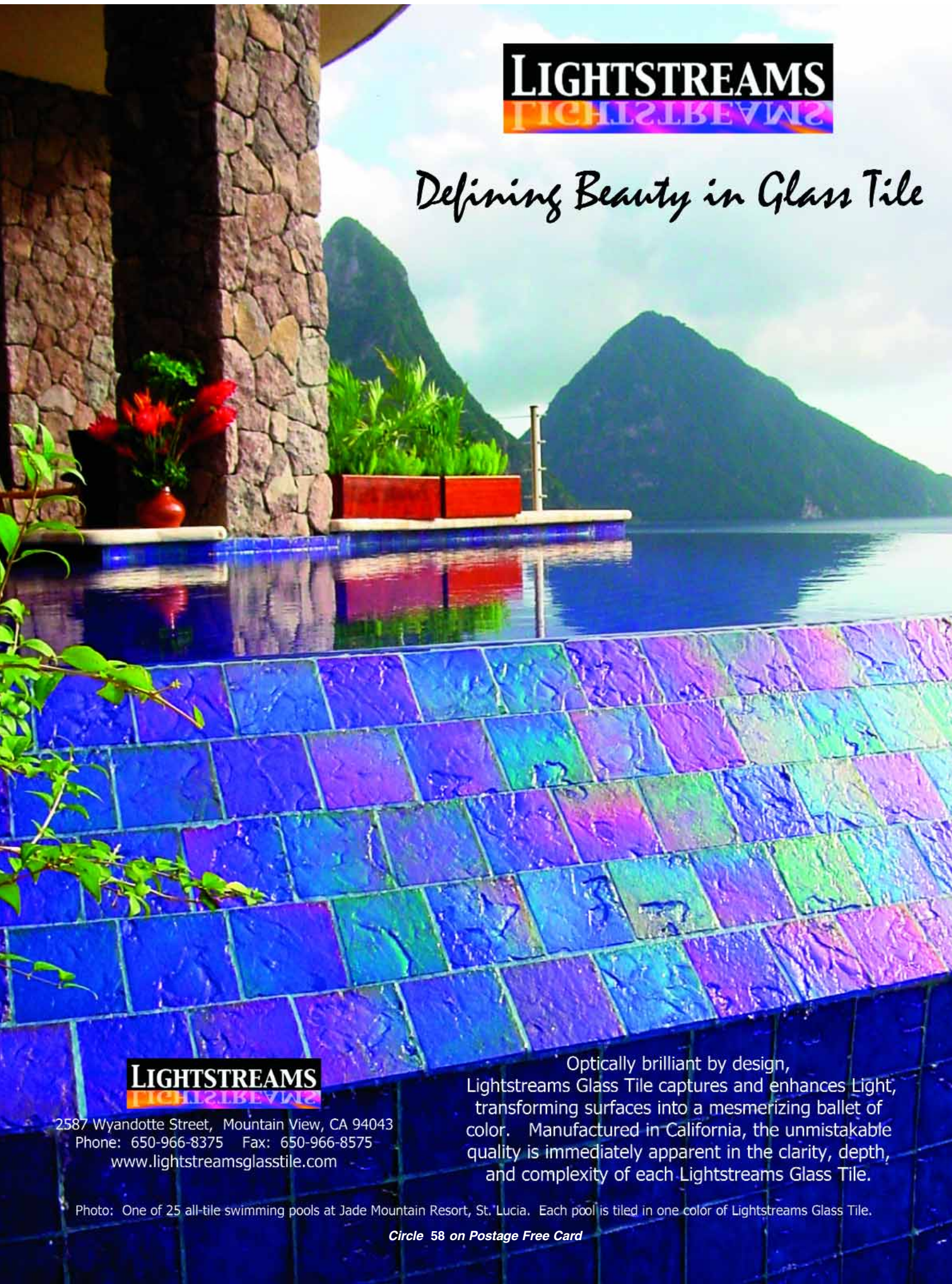

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Photo: One of 25 all-tile swimming pools at Jade Mountain Resort, St. Lucia. Each pool is tiled in one color of Lightstreams Glass Tile.
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