Inside: Stephanie Rose on Preservation

WaterShapes

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Number 5
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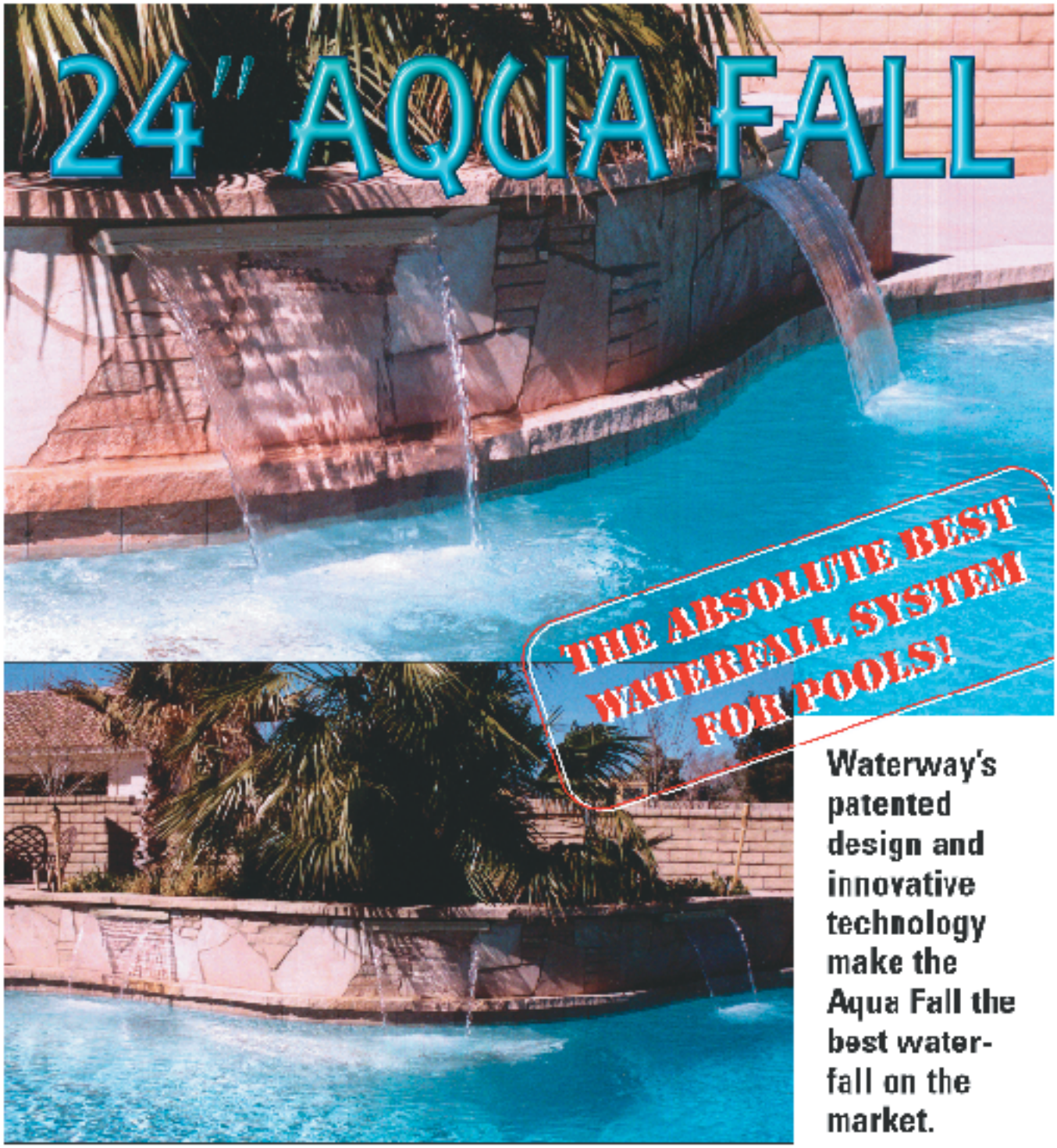

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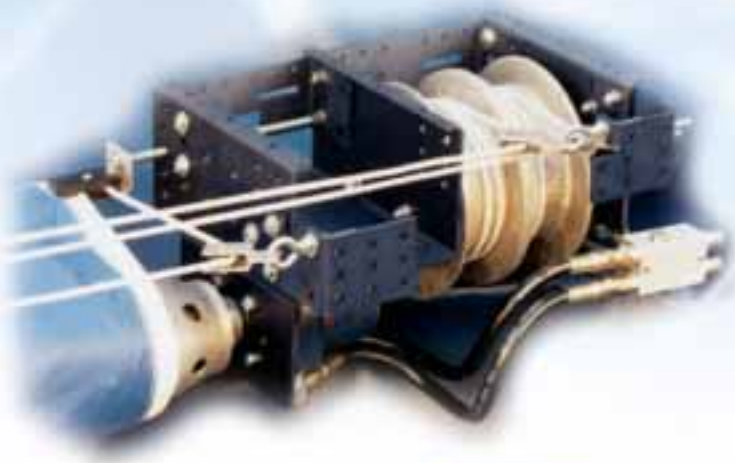

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Volume 6 • Number 5 • May 2004

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On the cover:
Photo courtesy Pacific Pools Inc., Alamo, Calif.

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By Eric Herman

Deconstructing a Trap

For the most part, we keep things positive in the pages of *WaterShapes*, and for good reason: With so much inspiring and amazing work taking place every day in all corners of the watershaping trades, negative subjects seldom rise to a level that necessitates coverage.

In some cases, however, there are topics that cannot be avoided, and I can't think of a stronger example than the troubling persistence of suction-entrapment incidents. Although rare by any measure – just a handful of incidents annually among millions of swimming pools and spas in everyday use – when lightning strikes and someone drowns or is injured by becoming trapped on a drain, the outcomes are so sad and awful that it is incumbent upon all of us to do everything we can to find workable solutions.

Inside on page 28, we offer "Reasonable Choices" by William N. Rowley, PhD, as a thoughtful point of departure for future discussions of this difficult subject. A mechanical engineer and designer of commercial pools and spas, Rowley has a résumé that spans nearly four decades and includes work on many of the world's premier aquatic facilities.

Concerned with the safety of his own designs as well as those of the industry at large, Rowley has long dedicated his considerable talent and discipline to the study of suction entrapment and has been a key player in code writing with many of the organizations and regulatory agencies that have sought to develop approaches to eliminating these incidents once and for all.

In his article, Rowley argues in favor of applying the science of hydraulics as well as a dose of common sense in developing solutions tailored to the needs of all designers and contractors who must grapple with this issue. In the process, he draws on his own experience as well as a range of significant resources. It is, in short, a definitive treatment of the topic that commands full and immediate attention.

To be sure, suction entrapment is a difficult, controversial issue, and we at *WaterShapes* are aware that there are others out there who may choose to disagree with some of what Rowley has to say. Knowing that, we encourage those with other points of view to join the discussion and deepen our understanding.

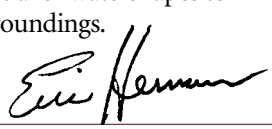
ttt

I'd also like to point out two additional articles – more upbeat, certainly, but no less informative.

The first is "A Recipe for Jambalaya" by Louisiana watershaper Les Ewen (page 44). It's about his efforts to restore two decorative watershapes that were intended to reclaim an abandoned sewage-treatment facility – an unusual project, but one that points out how watershaping can turn literal eyesores into works of art.

Then there's "Back to the Fair" by Kerry Friedman and Mike Perkowski (page 34), a restoration story of an entirely different sort. These fountain experts undertook the renovation and upgrading of two beautiful facilities created for St. Louis' historic Forest Park – site of the 1904 World's Fair – and demonstrate what's involved in respecting civic heritage while making facilities much more appealing and useful in the here and now.

Although this pair of features recounts projects that are quite disparate in nature, there's a powerful common ground here in the potential of watershapes to express and celebrate the character and history of their surroundings.



WATERSHAPES

Editor
Eric Herman — 714.449-1996

Associate Editor
Melissa Anderson Burress— 818.715-9776

Contributing Editors
Brian Van Bower
David Tisherman
Stephanie Rose
Rick Anderson

Art Director
Rick Leddy

Production Manager
Robin Wilzbach — 818.783-3821

Circulation Manager
Simone Sanoian — 818.715-9776

National Sales Manager
Camma Barsily — 310.979-0335

Publisher
James McCloskey — 818.715-9776

Publishing Office
McCloskey Communications, Inc.
P.O. Box 306
Woodland Hills, CA 91365
Tel: 818.715-9776 • Fax: 818.715-9059
e-mail: main@watershapes.com
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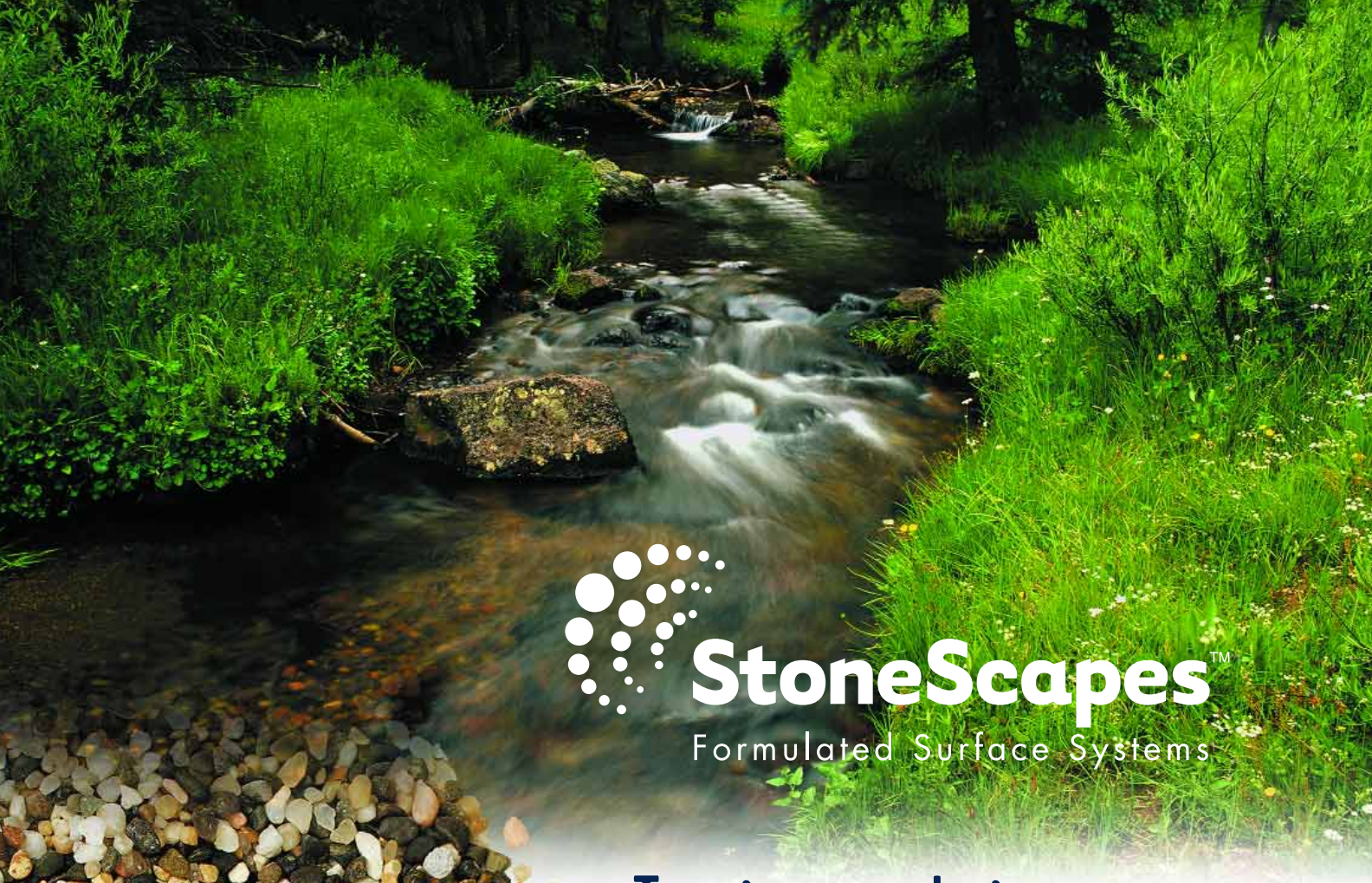

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May's Writers

William N. Rowley, PhD, is founder of Rowley International, an aquatic consulting, design and engineering firm based in Palos Verdes Estates, Calif. One of the world's leading designers of large commercial and competition pools, his most notable projects include partial designs for the competition pools used in the Olympic Games in Munich (1968) and Montreal (1972), and he acted as aquatic consultant for the design of the Olympic Pool Complex in Los Angeles (1984). His projects also have included a wide range of non-competition pools, including the White House pool in Washington, the Navy Basic Underwater Demolition Training Tank in Coronado, Calif., and the resort pool at the Hyatt Regency at Kaanapali Beach on Maui. Dr. Rowley is involved in a range of local, state and federal entities for which he consults on construction and safety-code requirements and was recently named a fellow of the American Society of Mechanical Engineers.

Kerry Friedman is vice president and general manager for Hydro Dramatics, the full-service fountain division of Missouri Machinery & Engineering Co. in St. Louis, where he oversees all projects, system designs, fountain start-ups and owner training. He holds a bachelor of science degree in engineering management and mechanical engineering from the University of Missouri in Rolla, Mo. With more than 30 years of experience in the engineering and design of fountain systems, pumping stations and electrical controls, he currently is involved as well in the computer animation and control of fountains. **Mike Perkowski** is a fountain consultant who has worked for Hydro Dramatics for more than five years and is respon-

sible for fountain-system design, planning, cost estimating and project management. He holds a bachelor of arts degree in economics from the University of Missouri in Columbia, Mo., and studied architecture and construction management at Washington University in St. Louis. He has more than 14 years of experience in the design and construction industry and is an affiliate member of the American Society of Landscape Architects.

Les Ewen is owner and president of Ascension Pools as well as Aquatic Creations of Louisiana, both based in the unincorporated rural region of Darrow, La. He has worked in the watershaping industry for 12 years, starting his own operations seven years ago when he recognized the demand for both decorative waterfeatures and swimming pools in his area. Ewen grew up in the landscaping trade, working with his father in the large-tree-transplantation business. He is also chief of the local volunteer fire department.

Steve Dallons is owner and president of Pacific Pools in Alamo, Calif. He established the firm in 1985 after spending five frustrating years working in a volume builder's design and sales departments. From the start, Pacific Pools has focused exclusively on creating quality, custom swimming pools and spas for residential clients in the San Francisco Bay area. Dallons prides himself on his hands-on approach to project management and his focus on offering clients the highest levels of service through all phases of the design and construction process. He has a background in design and architecture and is a graduate of the Genesis 3 Design School.

By Brian Van Bower

Pampered Perfection

I've always loved the word "pamper."

I love its meaning, I like the way it sounds and, most of all, I think it's the perfect verb for us Baby Boomers, because I know as we slide through middle age and head toward retirement, a word that means "to treat with excessive indulgence, gratify desires or coddle" will only grow in usage and importance.

As I've pointed out many times, I'm a big proponent of indulging in the good life and gratifying one's needs for pleasure and enjoyment. One of the places you can go to plunge headlong into such indulgence is what some people call a "pampering spa."

Also known as "day spas" or "health spas," these facilities are becoming increasingly popular with people who seek their health and relaxation experiences in beautifully appointed environments. Among the most popular forms of physical and mental gratification available in these spas are massage, hydrotherapy, exercise, healthy cuisine and all manner of mud and mineral baths, saunas and beauty treatments.

As you may have guessed, I'm all for these places and, although some might say their beauty treatments haven't done me enough good, I highly recommend the experience in some form or other for one and all. Moreover, as a watershaper on the lookout for significant applications of our "main ingredient," I can't think of a more fitting environment for the creative and expert application of the watershaping arts.

I'm a big proponent of indulging in the good life and gratifying one's needs for pleasure and enjoyment. One of the places you can go to plunge headlong into such indulgence is what some people call a 'pampering spa.'

distinguished by design

Let me boldly declare that the ways water can be used in these facilities cut right to the core of what watershaping is really all about.

I've worked on pampering-spa projects in the past and have always felt inspired by the idea that the watershapes in these places are so fully integrated into the environment, even in decadent ways. There tend to be multiple systems in such facilities, from decorative waterfeatures and fountains to swimming pools, spas and hot tubs.

To be sure, these projects don't come along very often, but when they do, I'm all too happy to jump on board.

That's why I smiled ear to ear recently when contacted by an architect looking for a consultant for the renovation and expansion of an existing pampering spa near Jacksonville, Fla. Even from our preliminary conversation, I could tell this would be an ambitious, complex job involving multiple bodies of water serving a range of purposes.

We exchanged the necessary paperwork and scheduled a meeting on site. By then, the team had developed an architectural plan with an overall layout for a large reception area, a restaurant, massage and therapy rooms, men's and women's locker areas and associated "wet areas" – whirlpool facilities, plunge pools, spas and a large, outdoor swimming pool overlooking a nature preserve. It was quite elaborate. It was

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also very clear that water was to play a role in just about every phase of the visitor's spa experience.

The architect was very thorough in defining his vision of the project and did a nice job of bringing everyone at the meeting up to speed. In this case, the facility is on the same property as an existing golf resort, and he made it clear that one of the major goals of the project was to distinguish the pampering spa from the rest of the resort and give it a separate, marketable identity.

I didn't say much as he talked, but I made careful notes and maintained my focus because, with all the time he spent talking about water, it was obvious that there would be a great deal for me to consider and encompass: Not only were there going to be watershapes for exercise, relaxation and therapy, but also watershapes of a purely decorative form, including fountains and possibly waterfalls, streams and pond treatments.

taking the tour

Appropriately, the project team had already determined that the impressions they wanted to make should begin with the entryway and the reception area and that water should be involved.

Beyond that, they were open to anything and had variously discussed sheeting waterfalls and other water effects for both sides of the circular driveway that provided access to the grounds – nothing specific beyond the notion that the water had to set the mood and make a statement about luxury.

Inside the front door at the reception area, they were similarly vague about their desires beyond the fact that they wanted visitors to be greeted by a subtle sort of water effect that would introduce a relaxing atmosphere. They also wanted to highlight the name of the facility, again with water as part of the package.

Just past the reception area will be a wide hallway leading to the heart of the facility. They talked about some sort of water effect on the sides of the space, and possibly a waterfeature in front that would lure people into the space while possibly serving as a divider that would separate foot traffic moving to different areas.

It was all pretty straightforward to that point, but as we "walked" through the rest of the project space, some obvious challenges emerged. Just beyond the watershape at the end of the hallway, for example, you could go to one side and into the restaurant or to the other side toward the locker rooms and a waiting area where patrons would be dressed in robes and slippers awaiting whatever treatments they had scheduled.

When we looked at this configuration, we all saw that there might be a problem in that one side would be quite noisy while the other would tend to be subdued. All they knew at this stage was that they wanted fireplaces in each area and were intrigued by the thought of in-

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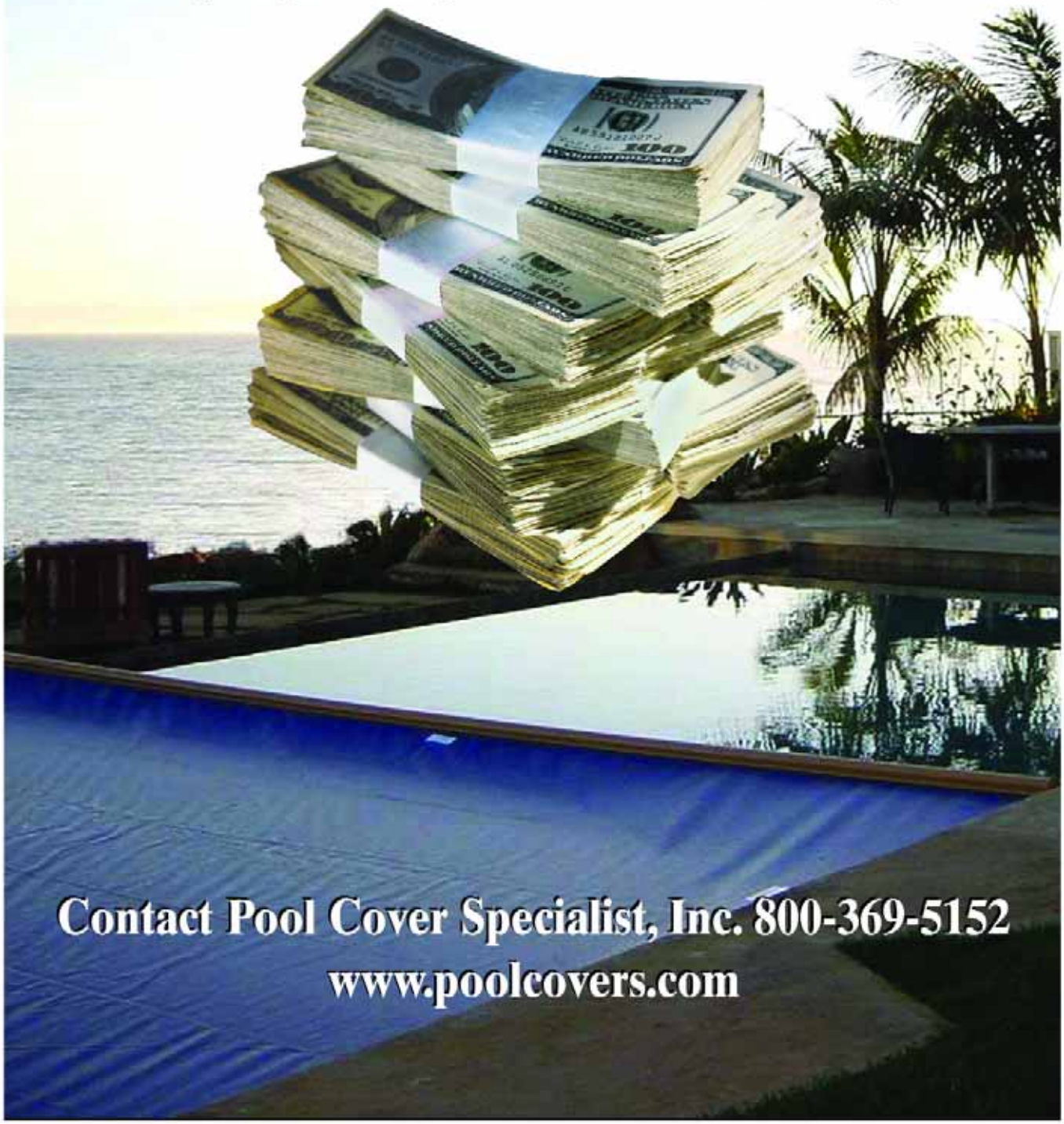

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tegrating watershapes of some sort with the fire.

Now we moved on to the locker rooms just beyond the waiting area, where they wanted some kind of wall-mounted waterfeature to separate the men's and women's spaces. Next came a wet area with an array of hydrotherapy spas, cold plunges, saunas and steam baths beyond which there was a large, quiet area that would house a large, communal spa for all patrons.

The big spa sits on a terrace that overlooks the same nature-preserve vistas as the large outdoor pool below it. Exploiting that view, the architect had already drawn in the spa with a vanishing edge.

Down a level, the swimming pool was to be tucked up against the building's exterior and would include four arched alcoves that would extend back inside the structure (and each of which would house various hydrotherapy systems). We discussed the possibility of a vanishing edge for the pool and foresaw setting up a stream and pond system beyond as an easy visual transition to the preserve.

We then turned around and discussed interior rooms with baths and massage tables as well as exterior spaces dedicated to outdoor massages, all of them to include intimate waterfeatures. And one space was *all* about water: a massage room in which the patron would lie on the table to be massaged by overhead jets. Dotted all around the place were to be small watershapes – water literally *everywhere*.

entering the discussion

I purposely withheld most of my comments until the architect had gone through the whole program, at which point we started the circuit again, this time with me offering preliminary ideas and suggestions. I did so knowing that there was so much going on and, at this stage, very little specificity about much of anything, meaning that whatever we discussed at this point was subject to much future discussion and a host of major adjustments.

Even so, I laid out my own vision of the way I thought things should go with the design.

◗ *The circular drive.* What they had was a circular space in the middle of the driveway measuring about 30 feet across. There had been some discussion of using this area for a substantial, naturalistic waterfeature – something with waterfalls, plants and rocks. I countered with a more architectural approach – perhaps a raised monolithic structure that would have water flowing gently over the sides with a fire element on the top – quite dramatic at night and a means of foreshadowing the fire effects visitors would find inside.

◗ *The reception area.* Stepping inside, I suggested that the watershapes in the

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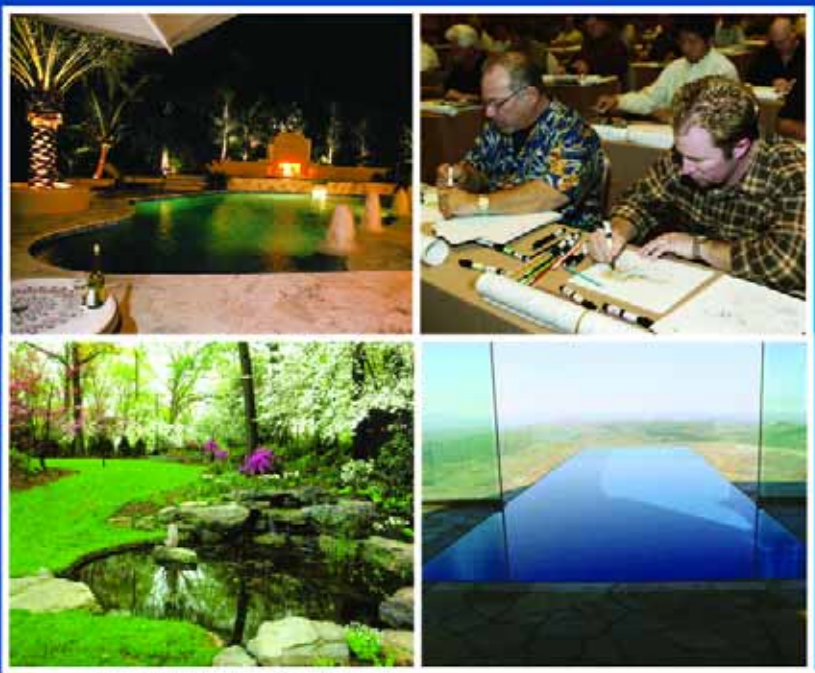

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entry area should be relatively subtle and simple, especially given the fact that this was a main traffic artery rather than a destination and that my inclination is to place significant waterfeatures in places where people tend to spend more time as opposed to "just passing through." I offered an additional suggestion that they wet the walls behind the reception desks so that a soothing mood would be set from the time of the visitor's first formal interaction with spa personnel.

◗ *Spa signage.* Responding to their desire to integrate water into "branding" the spa, I suggested using the central waterfeature that leads people beyond the reception area and etching the spa's name on a wetted glass panel. The architect then mentioned that "obscure" glass was being used throughout the facility, and I suggested etching the logo into the same material with water running over it. This would provide semi-translucent views of the restaurant and waiting area beyond and would further the objective of drawing visitors deeper into the spa.

◗ *Accessing the spa.* We continued our tour amid brief discussions of ways to integrate fire and water in features for the restaurant and the waiting area and with conversation about smallish water effects for the entrances to the locker rooms. As for the challenge of separating the restaurant and waiting area, I suggested sticking with the fireplace concept, but incorporating noise-reducing obscure-glass panels that could be retracted into the walls as needed.

Now we turned our attention to the core of the project and the spa's hydrotherapy facilities. I offered the observation, based on my own experiences with pampering spas, that these facilities tend to do a nice job of presenting an upscale, luxurious image – but when you actually got into the hydrotherapy aspects of the experience, the spas themselves were sometimes less than satisfying and poor competition for the kinds of jet action found in portable spas. I also pointed out that many of the spas or hot tubs I'd seen or used in these fa-

cilities tended to be poorly maintained and filled with water of less-than-perfect quality.

For the spas in the wet areas, I suggested they consider going with prefabricated stainless steel vessels customized with deck level overflow systems, both being approaches that I've used many times. Stainless steel shells are easily cleaned and stay that way because there are no grout lines or porous plaster surfaces. In addition, these spas are now made with all sorts of creative seating configurations and all sorts of hydrotherapy jets located at varying levels – effects that are difficult to replicate in concrete.

As for the perimeter-overflow system, not only does it have an elegant look, but it also offers the advantage of drawing water for the therapy action from a surge tank, which means you don't have to be sucking all that water through drains on the bottom of the spa. As for the big communal spa, I suggested a number of hydrotherapy configurations including an Italian-style system with stainless steel tubing that provides a full-body water massage as well as a "water alley" with deep water for toe-to-shoulder hydrotherapy among several other possibilities.

Finally, for the outdoor swimming pool, we discussed using the alcoves to provide a number of interactive hydrotherapy experiences in which guests can enter the alcove and activate waterfalls or even water cannons for the purpose of deep-tissue therapy.

nods of approval

Once we finished our second tour, the director of the facility, a woman with experience in managing pampering spas, spoke up and said that she was relieved to have someone in the loop who understood both the "pampering-spa experience" as well as the ins and outs of hydrotherapy and other water effects. This made me feel good and assured me that I would be playing an active role in the design team as the project moves forward.

Where all of this will end up and how all of the details will shake out is still to be determined in a great many cases, but based on what I've seen so far, it's clear to me that this particular pampering spa may well be on the way to joining my list of must-visit places when in the Jacksonville area – especially for folks looking for a bit of self-indulgence and pure pleasure. WS

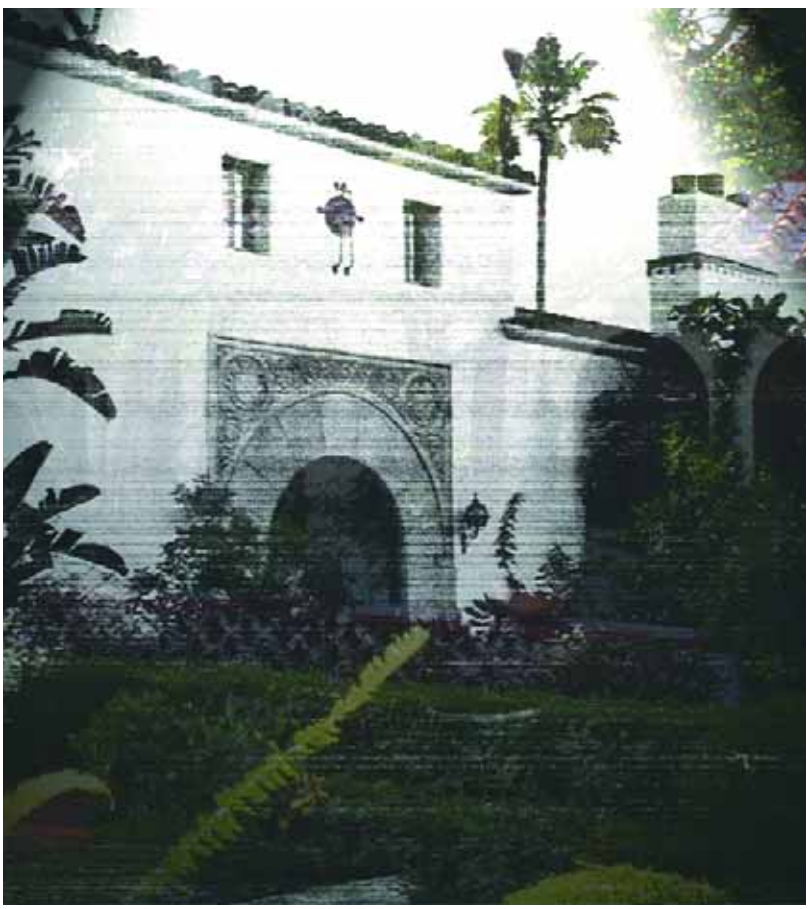
We'll check back in with this project in later columns as the work progresses.

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

By Stephanie Rose

Preserving History

'Preservation' and 'restoration' are terms open to broad interpretation. It's also a fact that architectural styles are subject to wide variation and that there's nowhere to go to find strict guidelines that define them.



Here in America, our idea of history goes back only so far.

That's particularly true in southern California, where "older" architecture is anything before about 1960 and very few structures date to a time before 1920. But it's also the case for most of the rest of the country with reference to architecture: We don't have the "ancient" structures that still set the tone and architectural vocabulary the way they do in Europe, Asia and other places.

For those who prefer modern or contemporary styles, this lack of history may be irrelevant. For those who feel an affinity to older styles, however, there's a tendency to cringe every time an older house is torn down to make way for something new.

To be sure, our building codes encourage teardowns by making preservation and restoration close to impossible, but I'm always happy to see or participate in projects where the client wants to preserve or restore a home in a style that reminds us of another place and time.

preservation attitudes

I'm lucky at the moment to be working on a project that epitomizes the desire to preserve what little we have left in Los Angeles by way of homes that were built here in the early part of the 20th Century. It's a Spanish Colonial home, one with a character that emanates from its setting, the architecture and the older-growth plantings that surround it. (Once again, "older growth" is a relative thing!)

The homeowners want to preserve the style and emotion of the architecture while infusing it with a functional practicality that fits their needs as a modern family with two young boys. To maintain as much of that heritage as possible while removing features that have modified it through the past several decades, they've stored or protected the original doors, hardware, floors and other key elements of the architecture.

They carried the same attitude outdoors. Where most people would simply plow down any plantings around the house as part of such an extensive restoration, we have all agreed to extend the preservation philosophy to include many of the plants on the property. Old roses, hydrangeas, tree ferns and old drifts of clivia have been potted up and placed in a "temporary nursery" until they can be reintroduced, while large trees have been protected and will be preserved as the "bones" of the revitalized landscape.

These are, in other words, exceptional clients. Most would say it's not worth the money or effort involved in saving these plants. From my perspective (and theirs), however, destroying these plants would detract from the unique character of the house as it was in-

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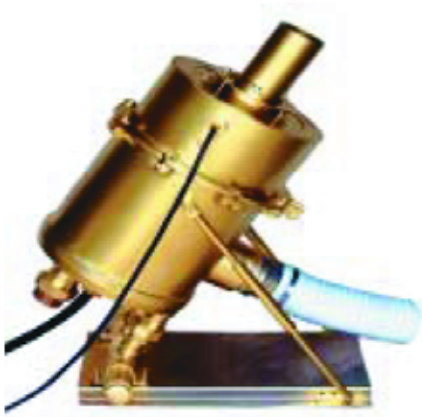
1" Stream Full Arch



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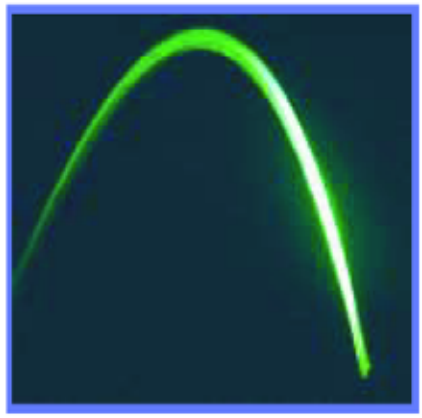

1" Stream Color Illuminated

1" Water Rod before Landing

1" Water Rod in Mid Air

1" Water Rod Leaving Jet

1" Water Rod Landing

1" Water Rod making Contact

1" Water Rod in Mid Air

Compact Stream 25.4mm (1.000") to 6.0m (20 Feet) or **Laminar Stream 18.0 mm (0.709")** to 20 Feet (6.0m) for internal fibre optic illumination (not included). This jet assembly was created for use in pond or out of pond with a 4" / 100mm drain leading back into pond, also for **quick & easy maintenance of public park installations , where more often cleaning without affecting the spray pattern is required.** The larger size compact stream is ideal for water parks as being highly visible and having a soft impact. Operate with oversize flow rated Cartridge Filter(s)

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tended and originally built.

In entering the process, we recognized, of course, that "preservation" and "restoration" are terms open to broad interpretation. It's also a fact that architectural styles are subject to wide variation and that there's nowhere to go to find strict guidelines that define them.

We were stepping into a realm where everyone can have a different opinion, and that's generally not unusual turf for a designer.

weighing choices

Case in point is a project I worked on about ten years ago – another Spanish Colonial-style home in the Pan Pacific Park section of Los Angeles. This area had been designated a Historic Preservation Zone, which means mostly that a group of people oversee architectural modifications within the specified neighborhood.

Before I came onto the job, the homeowners had painted the house a deep terra-cotta color with the trim a forest green. Most of the houses in the area were in light, pastel tones, so the neighbors, outraged by the color choice, contacted the Historic Preservation Board to make their feelings known.

The neighbors believed the house color was not in keeping with the feeling and intention of the original architecture of the area. For their part, the homeowners argued that this style of home traditionally used darker tones and produced mountains of evidence to support that claim.

The house had already been painted and wasn't going to change, so the neighbors' retaliation came in the form of a demand that the entire landscape plan be approved by the Historic Preservation Board. I attended meetings with the homeowners during which we were asked to justify each plant we intended to include in the landscape along with every last detail of the hardscape we intended to install.

We ended up feeling as though we had been tortured by the "taste police" and came to see that there was no clear logic or any sort of guideline for what constituted "historic preservation" in this specific neighborhood.

I'm all in favor of voluntary preservation and, in some cases, of the idea of specifying a particular architectural style that must be adhered to within a community (my thought being that nobody can make you live there if you don't like the style). In this case, however, I felt that the homeowners and I were being put through the wringer simply as a form of un-neighborly retaliation.

It was an ugly experience, but one from which I learned a good deal that I have applied to a variety of subsequent projects.

situational ethics

What I've learned is that there are two extremes when it comes to preserving classic architectural styles – voluntary on one side and legislated on the other.

As a member of a community of professionals who are paid to improve and

enhance the appearance of everything we touch regardless of those extremes, I see it as our responsibility to find ways of restoring and preserving the settings in which we work in ways that make sense and that don't intentionally serve to disturb or provoke.

We're working in areas of taste, opinion and perception that can make diplomacy difficult and compromise distasteful, but I'm suggesting on some level that all of us have a responsibility to negotiate our ways to reasonable outcomes. In that environment, I keep an eye on the following methods in striving for "positive solutions":

◗ **The value of collaboration.** There's strength in numbers, and I see working with a team of professionals and embracing a range of ideas and backgrounds as offering some assurance that if someone has an idea that is out of line, someone else will speak up and bring the design closer to acceptable stylistic standards.

◗ **The value of resources.** Finding historic references to assist in historically appropriate landscape design is the best way to observe what types of plantings are commonly present within a style and how they are used. Many libraries and bookstores have good architecture sections, and a few even have good collections of landscape references. Botanical societies, arboretums, botanical gardens and long-established local nurseries are also good resources. Be aware, however, that the subject matter is seasonal and that many plants aren't long-lived, so even historic references or photographs may be of limited help.

◗ **The value of precedent.** In using available resources, you may need to interpolate what was intended from images (often black and white) in books. With this imperfect record, you may need to look for an overall style and then find plants that fit that style. Absent solid information, I don't recommend "reinventing the wheel" in historic-preservation projects: You may end up with something that doesn't fit.

◗ **The value of subtlety.** A landscape is typically meant to enhance architecture rather than compete with or detract from it – to complement rather than overwhelm. I could cite examples in which gardens are extremely prominent features of an overall setting, of course, but the best approach to take when you're compelled to interpolate or interpret is to focus on plantings as role players, whether they serve to soften hard lines or to accent specific details of surrounding structures.

the task at hand

Cutting back to the specific project with which I'm now involved, we have identified some basic principles we plan to follow in designing both the hardscape and plantings. As we do so, our aim is to:

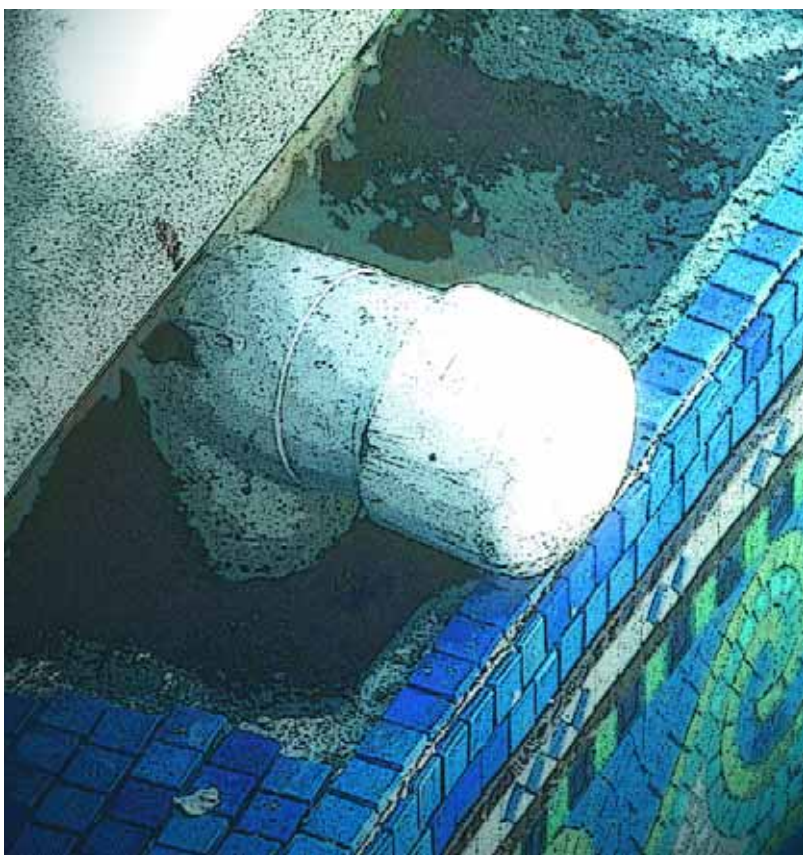
- Complement the architecture
- Avoid drawing too much attention to the plantings
- Maintain a simple plant palette
- Follow historic precedent, but take a slightly updated approach with the plant palette by adding in plants that are newer to our nurseries and work well in a historic context rather than sticking strictly to "historic" selections
- Maintain close collaboration among the whole design team – architect, interior decorator, key contractors and landscape designer
- Watch what we do and avoid taking things too far by maintaining steady dialogue between the homeowners and the design team.

Landscaping can be the most striking visual asset in any setting, or it can play a supporting role that enhances and supports the architecture. When it comes to preserving history, it's best to research the subject thoroughly and, in reasonable ways, keep history working with you rather than against you. WS

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

By David Tisherman

Completing the Impression



Now we come to the finishing touches – little details that make a big difference in the ultimate appearance of the renovated pool we've been watching develop here for the past several months.

Through those many months, we've taken a pool that's more than 70 years old, rerouted all of its plumbing through cores cut in the old shell, added a circular spa in the shallow end, raised the floor in the deep end, reshaped the steps, added lights in a new, pool-long bench, installed all-new equipment and laid down gorgeous glass tile throughout – all without disturbing the beautiful limestone decking that surrounded the pool.

As the project came to a close, we turned to a couple of final details: some trick work on the drains and on the aperture for the overflow line.

powder power

The standard approach with the three main drains in the pool and the four in the spa would have involved installation of off-the-shelf anti-vortex drain covers. These plastic parts come in multiple colors in different diameters to accommodate the needs of the plumbing and capably serve their purpose with ordinary projects.

For this sort of high-end project, however, stock drain covers would inevitably have disrupted the aesthetics of the finish. Particularly set against fields of glass tile, taking the easy way out here simply wouldn't have reflected a quality approach.

In this spectacular case, I found a source for old-style, solid-brass, anti-vortex main drains and had them powder-coated by a plating company in San Francisco. We colored the drains a gorgeous periwinkle color that effectively blends in with the surrounding tile.

(I found the brass covers through Reza Afshar of Afras Industries in Agoura Hills, Calif. He's a pool-industry veteran whose company manufactures classic bronze components and had invited me some months ago to make a presentation to a group of southern California architects – a good, insightful contact.)

To my mind, it would have been a travesty to invest so much money in a tile surface only to mar the tile field with ugly plastic dots. Yes, a powder-coated brass drain cover costs a good bit, and yes, in projects where the color of the plaster or pebble is more standard, you may be able to get away with using an off-the-shelf color. But our desire here, in the midst of a grand periwinkle field, was to make the drains as unobtrusive as possible.

With three drains in the pool and four in the spa, so many serious disruptions in visual continuity would have been unbearable. There are those who might argue that using fewer drains would have helped in meeting this higher aesthetic goal – after all, the fewer the drains, the lower the cost and the fewer the possible visual miscues. In my view, however, cutting back in this way would be pure insanity.

Deploying multiple drains is a safety issue first

For this sort of high-end project, stock drain covers would inevitably have disrupted the aesthetics of the finish. Taking the easy way out here simply wouldn't have reflected a quality approach.

and foremost – a sure-fire way to avoid any problems with suction entrapment. Indeed, anyone who knows about plumbing and hydraulics will tell you that one of the keys to avoiding entrapment incidents is to spread the flow out among two or more inlets and thereby reduce the risk.

These powder-coated beauties were quite expensive, especially when you consider that we needed seven of them. For less ambitious projects in which standard products are used, however, the cost is ridiculously low at $7 to $12 per added drain – a negligible cost considering the safety benefits.

This *should* be a no-brainer – and it *is* if you follow manufacturer instructions when it comes to basic hydraulics and the sizing of your pumps and plumbing. I won't dwell on this here; suffice it to say that installing multiple drains is a matter of common sense – and not a place to cut corners in the name of saving a few dollars.

goin' with the overflow

The final project detail is one of which I'm particularly proud and has to do with the way we set up the overflow line for this grand old pool.

Whoever it was who did the last major work on the pool (perhaps the original contractor, although I can't be certain of that) did nobody a favor by failing to include an overflow drain of any kind.

Any pool without one can have a problem when it rains, but in the case of this pool everything was made much worse by the fact that all of that prized limestone decking slopes *toward* the pool, easily doubling or even tripling the water-collecting surface and causing havoc whenever good-sized storms rolled in.

As I've mentioned in my reports on other projects, I usually install the off-the-shelf fittings made by Overflo (Tarzana, Calif.) in setting up this sort of drain detail, but in this particular case I had to develop a completely custom solution.

We saw that such a solution was needed right up front, so during the plumbing phase – when we were running lines all over the place so one more line through one of the many cores we'd cut in the shell didn't much matter – we ran an additional two-inch line up through a notch we cut in the wall to a spot above the existing gutter and waterline.

The gutter was filled in all the way around the rest of the pool's perimeter and now serves a strictly decorative, visual function. But in one spot in the shallow end near the new steps, we broke through the old gutter's base and ran the overflow line down and out through a core that also carries the plumbing runs for the spa blowers.

Not wanting to disrupt the beautiful tile work – especially not at the waterline, where the pattern is particularly gorgeous and *any* sort of disruption would be distinctly and regrettably awful – I convinced the homeowners to allow me to do something different.

Basically, I appropriated a concept from the deck drains and skimmer lids I use on other projects: We opened a conical de-

pression in one section of the old gutter, then waterproofed it thoroughly so it would serve to feed water into the two-inch overflow line below. I then turned to my amazing tile installer, Willie Villanueva, who did all I asked him to do in working a small bit of custom magic.

We started with a large piece of ceramic tile, cutting it to fit in the space over the drain head at a level about three-eighths-of-an-inch shy of the finished surface. Atop the large piece, we mounted the glass tile, continuing the pattern we'd used all the way around the top surface of the now-filled gutter. Next, we drilled holes through the ceramic tile between the pieces of glass tile – enough in all to provide adequate overflow service.

He did all of this working from detailed drawings I'd made. As I've stated before, the people who work with me are very good, but without my ability to communicate exactly what I want done, they'd be left to improvise and interpret – not something I want to leave to chance in any of my projects.

Ultimately, we had just the tile grate I wanted and set it into the recess above the drain line. The grate sits over the open-

minor disruptions

The two drain details discussed in the accompanying column are all about eliminating interruptions in beautiful tile work and give me an opportunity to stress a point that can't be emphasized enough: Take the time to consider the colors and trims on all the lines that penetrate to the interior of your shells!

I've seen more pools than I can count that have been visually ruined by pieces of white PVC sticking out for the fill line right in the middle of dark waterline tile or a white eyeball bulging into a field of colored plaster or pebbles. They look terrible!

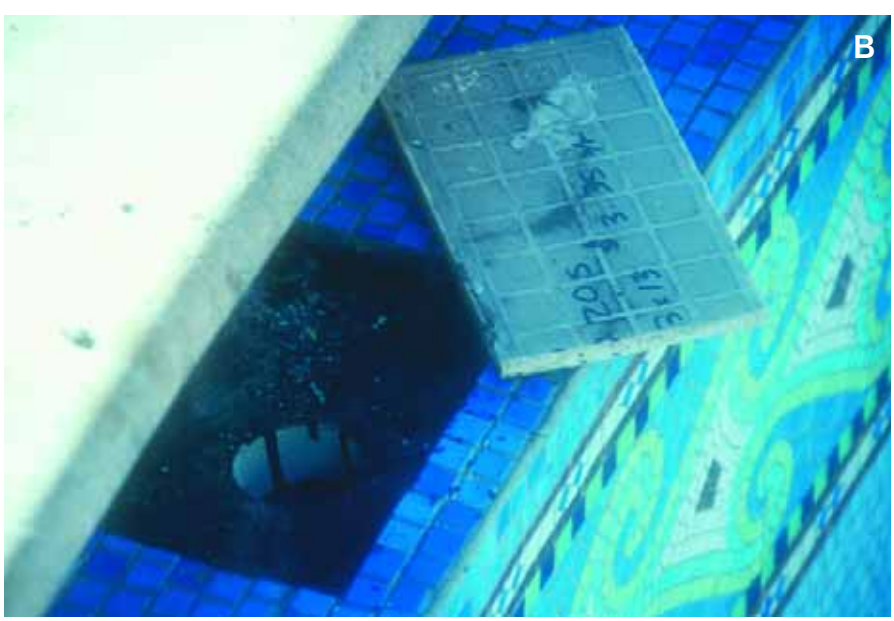
A better way to go is to take any piece of plumbing that's exposed and add another colored piece of pipe or some kind of colored finish trim over it. In the project discussed here, for example, we have a bluish/grayish tile. In setting up the fill line, we didn't want to leave behind the usual one-inch schedule 40 PVC pipe and its tell-tale white rim, so on the end of the line we attached a schedule 80 PVC coupling, which is gray and blends nicely with the surrounding finish.

I've found that the gray color of schedule 80 pipe works well with just about anything (with the exception of white finishes) and doesn't disrupt the visual impression made by the material that surrounds it. As with so much else of what I do, this treatment doesn't attract attention to insignificant details while helping me build a favorable overall impression.

– D.T.

It may be an expensive way to go, but coloring this pool's multiple brass drain rings with a powder coating makes them virtually disappear from the visual field when installed – a welcome feature in this well-appointed, all-glass-tile pool and spa.

We set up an overflow line when we re-plumbed the pool, positioning it to penetrate the base of the pool's old gutter system (A). After the tile was installed, we began the process of making the overflow disappear into the finish by cutting a ceramic-tile plate to fit into the opening (B).



The holes in the tiled "grate" and the slot around its perimeter ensure adequate flow to the two-inch overflow line below – all without disrupting the tile pattern in the slightest or in any way marring the aesthetics of the pool's beautiful surface.

ing and is not grouted (for easy removal), and the edges around the grate's perimeter also allow for steady flow around the sides. The whole assembly is just two by six inches, and it lines up perfectly with the rest of the gutter's grout lines so perfectly that it's almost impossible to spot, even when you're standing right by it.

It's a great finishing touch for a project that stands as one of the most unusual and beautiful renovation jobs I've ever done. WS

Next: A look at some of the sources for these beautiful drain details.

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

Reasonable Choices

By William N. Rowley

Suction-entrapment incidents and their causes have been of passionate interest to mechanical engineer and commercial pool designer William N. Rowley through more than 30 years of tests, investigations, debates and high-profile lawsuits. Here, he uses his standing as an expert to define what's involved – and to promote safe engineering and construction practices while offering a comprehensive look at ways of preventing these incidents.

It's one of the most horrific things that can happen to anyone who enters a pool or a spa: One moment you're having fun or relaxing, and in a terrible instant you're caught in a devastatingly painful and potentially fatal situation.

Most people who become entrapped by pool, spa or wading-pool plumbing do survive, but all too often they suffer life-altering injuries. As with any aquatic safety issue, we all agree these incidents should be prevented, and a great many talented people from government, trade associations, research institutions, equipment manufacturers and consumer-safety groups have invested a tremendous amount of time in examining suction entrapment. For all of that effort, however, seeing our way to adequate solutions has proved a difficult and persistent challenge.

The fact that there are different types of suction-entrapment incidents that happen in varying combinations of conditions and in various settings is what makes determining exact causes and suggesting remedies so frustratingly complex. Furthermore, the fact that children are often the victims of these gruesome accidents makes emotions run so high that reason is often a second casualty.

But fortunately, suction entrapment is a matter of applied hydraulics: We can turn in the clear light of day to hard facts of science and engineering in searching for answers. By studying how and why these incidents occur and applying what we learn with scientific testing in controlled conditions, a much clearer picture of the problem – *and* its solutions – unfolds before us.

Lightning Strikes

Let's begin with a basic definition: A suction-entrapment incident is one that involves a bather becoming trapped on a drain. The bather is either injured by the force of the entrapment itself – or drowns or nearly drowns.

There are four basic types of suction-entrapment incidents:

- *Body entrapment*; in which (usually) the stomach, abdomen, hip or posterior becomes trapped on a "single-suction" main drain with a broken or missing cover;
- *Limb entrapment*, in which the person has a hand or leg sucked into the suction pipe in the sump of an uncovered, "single-suction" main drain;
- *Evisceration*, in which someone sits on an open or broken "single-suction" main drain and is disemboweled;
- *Hair entrapment (entanglement)*, in which a person is trapped by entanglement of his or her hair in a grate or a "single-suction" drain. This is not a result of suction alone, but rather has to do with turbulence caused by water velocity.

There is a fifth type of incident included by some who study these issues: This category is referred to as *mechanical entrapment*, in which someone gets a digit stuck in a hole of some kind and can't get it out. This doesn't have anything to do with suction, and the steps you'd take to prevent the four main types of suction entrapment have very little to do with preventing mechanical-entrapment incidents.

None of these incidents occur with any great frequency. From January 1985 to March 2002, the Consumer

Product Safety Commission (CPSC) documented 147 entrapment incidents, 36 of which resulted in death. Additional incidents may have gone unreported during that time frame, but it's safe to say that all *known* incidents – especially those involving serious injury or death – have been investigated in painstaking detail.

Many of these incidents have been the subjects of lawsuits, some resulting in huge monetary awards to victims. A small number of these cases have been covered extensively in the media and have generated lots of rhetoric from sources both informed and uninformed.

What stands out is that each incident, whether notorious or obscure, fatal or survived, involves a unique set of circumstances and highly individualized conditions having to do with exactly what went wrong.

Stepping Back

The most dispassionate way to examine this collection of incidents is to break everything down into statistical terms as matters of hazard/risk analysis. In simplest terms, *hazard* equals *risk* multiplied by *exposure*.

In applying such measures, it must be considered that entrapment incidents occur in three different types of bodies of water – swimming pools, spas and wading pools – with each presenting a different level of *hazard*.

Technically speaking, the *risk* in all three bodies of water is the same in that suction-entrapment risk can be defined as occurring anytime someone comes in contact with an open main drain – more specifically with a single-suction main drain in which only one line is plumbed to a pump.

Bear in mind, however, that the *exposure* represented by these three categories of bodies of water is completely different, which is why the *hazard* is different between them. For example, you would expect a child playing in an 18-inch deep wading pool to sit on a drain. Likewise, it's not unexpected for someone to come in contact with an open drain in a three-foot-deep spa.

In a swimming pool, however, main drains are typically (but not always) found in deeper water, so the *exposure* is not the same. You won't typically see people sitting on main drains in deep ends of pools; what you *will* see, with far greater likelihood, is someone who sticks his or her arm into an open drain.

Each type of incident in each type of vessel carries its own set of statistics for different sorts of circumstances. For example, I personally know of only one hair-entanglement incident that has occurred in a swimming pool. We also know that most hair entanglements occur in spas, while limb and body entrapments (but not eviscerations) occur in pools. Eviscerations typically only happen to small children, and almost exclusively in wading pools.

How you approach the study of these problems and how you weigh the statistics must depend on the conditions that influence the hazard.

As you look closely at how these incidents occur, key observations emerge that can be used in drawing important conclusions. I've looked quite closely at these incidents and have participated directly in several studies on entrapment – including various tests in which I have used my own body as a test subject, deliberately "trapping" myself on exposed drains under carefully controlled conditions.

What We Know

One of the important things we've learned through such testing is that when you get near an open drain, you can't feel any suction at all, even when you're just a few inches away. To become trapped, you have to get right down on the drain, at which point lightning strikes and you're in trouble.

We've also learned that with a drain cover in place – be it an anti-vortex drain cover or a standard drain grate – it is virtually impossible to suffer a body or limb entrapment or an evisceration. Moreover, we've observed that in systems with *split* main drains, you cannot become trapped even if a grate or cover is missing.

The facts observed from incidents in the field are consistent with these findings: In every case of suction entrapment (with the exception of hair entanglement), you'll find a broken or missing main-drain cover combined with single-suction plumbing.

That's a huge problem, given how many pools built through the years have been plumbed with single-suction drain configurations, and the hazard is compounded when the drain covers are missing in these vessels. (It's important to note that testing as well as anecdotal evidence show that entrapment incidents simply do not occur in pools, spas or wading pools equipped with dual or multiple main drains.)

Controlled studies and field data also indicate that proper flow rates established in conjunction with appropriate drain covers and grates will prevent suction entrapment. I don't know of a single incident in which a cover approved by the American Society of Mechanical Engineers (under ASME/ANSI A112.19.AM-1987, "Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathtub Appliances") and operating within the specified flow rates has been involved in any kind of entrapment incident.

A study conducted by the National Swimming Pool Foundation (NSPF) in 1997 concluded that maintaining a pump suction velocity of less than six feet per second with covered drains (either single or dual) will relieve entrapment concerns. To be sure, excessive flow rates may result in hair-entanglement incidents even if the cover is in place – but *only* in situations in which the flow rate exceeds the cover's or grate's specified operating conditions.

Obviously, flow rates are a different issue in systems with extremely large plumbing, such as those you might find in a waterpark, lake or reservoir. In these systems, where plumbing might measure 18 or 24 inches in diameter, you run into a condition where, even at slow flow rates, the kinetic energy of the water's flow can suck a person into an uncovered pipe.

Within Bounds

Moving back to residential and commercial pools, the maximum-flow standard of six feet per second is endorsed by CPSC, NSPF and the National Spa & Pool Institute and has been accepted by a majority of health departments throughout the country.

There has been less consensus among the experts, however, when it comes to whether or not anti-vortex drain covers provide a greater level of safety than do

To determine what happens in suction-entrapment incidents under observable, recordable conditions, we developed a test stand that features drain lines set up with a variety of covers and grates. (There are also open sumps to replicate situations in which a cover or grate is missing.) The stand was placed in the shallow end of a pool for actual testing. During these tests, valves and flow rates were precisely monitored and controlled.

grates – and no statistical evidence to support the superiority of either type.

In my view, both grates and anti-vortex covers are effective safety measures, the key being whether or not they are properly attached. I've always been somewhat concerned that, in shallow-water applications, anti-vortex drain covers present a tripping hazard because of their slightly raised profile, but the bottom line is clear: Both systems work in preventing accidents – and no expert I've ever encountered has ever questioned that assumption.

Keeping any drain cover attached is the key to long-term safety and is essentially a service/maintenance issue of simple but profound importance. Indeed, it is possible that the number of entrapment incidents could be reduced by an ongoing campaign to encourage service technicians, health-department inspectors and certified pool operators to make the checking of grates and drains a top priority.

(Along more mechanical lines, it has also been suggested that manufacturers could help by making bolts or other fasteners for their drain covers in a different color from the drain itself, making for easier visual inspection from the surface of the water.)

What is increasingly clear in most conversations about entrapment issues is that drain configuration is the other key component here, and the one that has proved most controversial. For my part, I am a strong advocate of the concept of split main drains and see them as a logical remedy for entrapment problems. At the same time, I see opposition to split drains as ill founded and a denial of statistical data and information gathered from the field.

Categorically, I do not know of one suction-entrapment incident that has *ever* occurred in a system with a functioning split main drain, regardless of the presence of a grate and even in a system with an excessive flow rate. In my view, this simple fact means that every pool, spa and wading pool built should be equipped with split drains at least three feet apart (as defined by a number of studies).

I've conducted tests and investigations in the field during which I've tried to trap myself onto drains with missing grates in the presence of flow rates well in excess of six feet per second. So long as the drain is split, *absolutely nothing happens.*

Legal Momentum

All of this is why, in 1997, the California legislature passed Senate Bill 873, a law requiring that all wading pools be plumbed with split main drains. So compelling was the reasoning behind it that the law was actually made retroactive and closed all existing, non-compliant wading pools until they could be remodeled.

A great deal of controversy and debate surrounded passage of this bill, largely because of the key provisions that made it retroactive. But some aggressive lobbying on the part of the pool and spa industry, a good bit of late-minute politicking and the fact that there really aren't *residential* wading pools ensured the bill's passage.

It is worth noting that there has not been a single entrapment incident of any kind in any California wading pool since the bill became law. Also in California, the legislature passed Senate Bill 1726 in 2002. This law requires split main drains on all new spas and pools.

The challenge of passing legislation of such clear merit points up the difficulty of mandating the split-drain solution as a virtual cure-all for the entrapment problem: There are literally millions of pools and spas out there that were built with single-drain configurations, and there's no practical way to mandate retrofitting for every single one of them. As a consequence, with single-drain systems we must rely on proper flow rates and especially on covers to prevent entrapment incidents.

In some circumstances, a drain can become plugged – a point often made by those who go on to claim that split drains plug more easily than do single drains. Nothing in the data suggests that this is the case, although I know of one case in which a single pressure-test plug was left

Breaking the Circuit

Suction vacuum-release systems, or SVRSs, encompass a relatively new category of sensitive mechanical or electro-mechanical devices designed to sense a change in suction pressure and, in response, either open a vent valve or turn off the pump to prevent suction-entrapment incidents.

My own exploration and evaluation of these technologies leads me to believe that they are yet to be perfected, but it is nonetheless sensible to suggest that such devices provide yet another layer of safety. And certainly, such systems may prove useful as an aftermarket item for use on pools with single-suction drains.

I do not, however, view SVRS technology as the magic bullet some system promoters have suggested. To my mind, there is no substitute for sound hydraulic design and proper construction practices in preventing suction entrapment.

More specifically, because SVRS systems operate by sensing a change in suction pressure, they do nothing to prevent hair-entrapment incidents, which do not always result in complete blockage of a drain grate or cover. Furthermore, medical data indicates that in evisceration incidents, disembowelment occurs almost instantaneously, and SVRS systems will never be able to deactivate a pump in time to prevent injury: Shutting off the pump does nothing immediate to stop the inertia of water flowing through the system.

Proponents of these technologies are working hard in legislatures and courts to make their point that equipment manufacturers should be required to rig their pumps with SVRS devices. It is my view that this is the wrong solution for suction entrapment: Pumps do not cause suction entrapment; rather, improper hydraulic design, installation and maintenance do.

To my mind, prevention is best achieved using the principles of hydraulics and what science teaches us about the physical characteristics of the human body.

– W.N.R.

in a split-drain system, causing it to function as a single drain. To that point, it is a matter of common sense to note that two or more drain lines must be open for split drains to be effective.

Also, it's important to note that testing has revealed that the skimmer does *not* function as a second drain when it comes to preventing suction entrapment. This means that a single, uncovered drain sharing a suction line with a skimmer can still invite entrapment. We've found that because skimmers are set at different elevations from the main drain, they function differently than do drains at the same elevation and therefore do not provide the safety of split drains.

The design standard we use, as called out in the California legislation, is based on the simple idea that if one of the drains is plugged, the other will continue to operate within design parameters with respect to flow rate through the grate or cover.

As mentioned above, these drains must be three feet apart. This is based on anthropometrics of the human body: With the drains set three feet apart, human beings are simply not big enough to lie across and block both drains. In addition, the T for the split between drains needs to be far enough away from both drain apertures so that a person can't reach down into the drain and get his or her hand caught in a single-flow situation if one of the drains is open.

In any new installation, it is in my opinion simply dangerous and obsolete to install single drains. Furthermore, retrofitting existing bodies of water with split drains should be suggested, promoted and encouraged at every turn and in any way possible.

Margins of Safety

All of this anecdotal and statistical data boils down to some straightforward assumptions about situations that are dangerous: Specifically, swimming pools, spas and wading pools with broken or missing drains covers or grates and single drains combined with excessive flow rates are all conditions common to the vast majority of entrapment or entanglement incidents.

At the close of its 1997 study of suction entrapment, NSPF stated flatly, "Only if all three hazardous conditions are prevented does a safe condition exist." I agree wholeheartedly with the inescapable logic of that conclusion and the attendant notion that safety must therefore be defined as redundancy within any given system.

According to CPSC, NSPI, NSPF and ASME, the first safety measure required to prevent suction entrapment is a grate or cover in good operating condition, attached so that it can't be removed except with the use of tools, meaning a screwdriver or a wrench of some kind. Second, the cover should be approved and should operate as designed. (ASME established these operating standards in 1987 – a development that stands as one of the key advances in the fight against suction entrapment.)

By most definitions, split drains are a second layer of protection, and it's important to point out that they needn't be limited to two in number. I've heard some people argue that using two drains simply means that two people can drown instead of one in the unlikely event that two people could get stuck on two uncovered drains at exactly the same instant.

This has not happened to my knowledge, but there's nothing that says three or four drains can't be used instead of two. I would argue that the likelihood of three or four people sticking on three or four open drains at the same time is so incredibly unlikely that it represents no measurable hazard.

As stated above, suction flow rates at or below the threshold of six-feet-per-second are crucial. With commercial pools, the situation changes somewhat because you can end up with designs with enormous pipes and massive pumps turning over hundreds of thousands or even millions of gallons of water in a matter of hours. At that level, attention to line velocity and plumbing configurations is even more critical, which is why, in typical 50-meter competition pools, we'll install up to four main drains, each covered by a pair of 18-inch-square grates, giving each a total of 36 by 18 inches of grated coverage. These grates are so big and the flow through them is so slow that there is no chance that anyone could become trapped on them.

A further safety measure that can be

employed with any sort of drain system, commercial or residential, involves the use of atmospheric vent tubes – essentially standpipes that are plumbed to the main drain line and that, in the event all drains are blocked, allows a pump to pull air into the suction line. This causes the pump to lose its prime rather than dead heading and is a proven solution to entrapment problems; obviously, however, it can only be used with new installations or in the event of major renovation.

Shut-off switches are another measure of safety, and they've been successfully employed in numerous spas and wading pools. With large commercial pools, however, you run into the problem of people shutting the pool off for other than emergency reasons, be it a prank or just a mistake. When you deal with the cost and time involved with restarting some of these complicated systems, many of which run on three-phase power, these infrequent shutdowns can become a maintenance and operational nightmare.

Finally, there is a new class of devices known as *suction vacuum-release systems* (SVRSs) that can also be used as an added measure of safety in single-suction systems. For more on this technology, see the sidebar on page 32.

Pounds of Prevention

The encouraging and abiding truth about suction entrapment is that it is entirely preventable. For all of the complexities and case-specific intricacies of these incidents, we know what solves the problem: proper covers or grates, split drains and specified suction-side flow rates. Based on what we know today, to argue against these measures is to resist the preponderance of evidence and the weight of reason.

The problem, of course, is that the real world is rife with bodies of water that are lacking one or more of the necessary safeguards and can and will regrettably become sites for future entrapment incidents. For that reason, it is incumbent on everyone in this industry to work in any way we can to promote and insist on these fundamental solutions and to continue to study the problem with the further objective of refining our understanding of this vexing issue.

For the testing, I entered the water and positioned myself over the operating test stand, attempting to entrap myself on individual grates, covers or open sumps under a range of test conditions. Those conditions were quite realistic, as the welts on my midsection testify. What we determined is that entrapment occurred only with single-drain configurations; no such entrapment occurred with split-drain systems.

Back to the Fair

Working on historic fountains is a specialty that calls for sensitivity to the original designers' intentions as well as a capacity to integrate modern ideas, say Kerry Friedman of Hydro Dramatics and fountain consultant Mike Perkowski. As cases in point, they report here on projects for two facilities in St. Louis' Forest Park – the restoration and augmentation of large fountains in the Grand Basin and the addition of a small pool and jets in the Jewel Box.

By Kerry Friedman & Mike Perkowski

To residents of St. Louis, Forest Park is a civic treasure on the order of New York's Central Park – which, locals are quick to point out, is smaller than their favorite park by 500 acres. Established in 1876 at the heart of the city, Forest Park has a similarly grand and glorious history, including service as the site of the renowned 1904 Louisiana Purchase Exposition & World's Fair, which drew more than 20 million visitors from across the globe.

Through the years, the park's 1,370 acres have become "home" to such major attractions as the world-famous Saint Louis Zoo as well as the city's art museum, science center, planetarium, history museum and The Muny, the nation's largest outdoor theatre. Forest Park is also home to the Jewel Box, an Art Deco gem and the nation's first hail-proof greenhouse, and to the sprawling lake-and-fountain complex known as the Grand Basin.

For a century, the park's rolling green hills, winding paths and handsome lakes, ponds, fountains and waterfalls have been enjoyed by generations of picnickers, bicyclists, runners, walkers, horseback riders, golfers and boaters. Not surprisingly, many parts of the park have shown signs of time, the weather and the wear-and-tear caused by 12 million annual visitors.

With an eye toward reversing the damage and celebrating the centennial of the World's Fair in 2004, the city and the Forest Park Forever foundation forged a $90 million plan in 1995 to revitalize the park's facilities.

Glimpses of the Past

While the revitalization plan covered a huge range of park improvements, two of the most prominent involved our colleagues and us at the St. Louis fountain-consulting firm of Hydro Dramatics: the renovation of the Grand Basin – an eye-catching waterfeature first established during the World's Fair and ever since one of the most popular destinations within the park – and a reworking of the Jewel Box, built in 1936 as a flower conservatory and now redesigned with an unusual interior fountain.

We'll cover each project in turn.

Centennial Tune-up

The hundred-year-old Grand Basin is one of Forest Park's oldest and most prominent features. Located just below the St. Louis Art Museum, it sits at the bottom of Art Hill, a popular sledding site for a century's worth of St. Louis children.

It was the ambition of the Forest Park Forever foundation to restore the site as fully as possible to the original World's Fair appearance. At the same time, latitude was given to introduce new fountains as appropriate – whatever was needed to bring luster back to the basin.

We at Hydro Dramatics were caught up in the excitement of being part of such a high-profile and historically significant restoration and all of the hometown nostalgia that came along with it. We joined a design team that included the architects at HOK Planning Group and the engineers of CH2M Hill, both prominent St. Louis firms, and all agreed that the restored fountains should be modeled after those seen in archival World's Fair photographs discovered in a book.

No original fountain plans or drawings were to be found, so the old images became our guide and inspiration.

True to the Original

Visitors who look across the Grand Basin toward the Art Museum today are treated to a glimpse of what the area must have looked like a century ago in its World's Fair glory. The two main fountains feature center jets that propel water up to 50 feet high, while spouts from smaller fountains climb to 30 feet. In all cases, the big jets are surrounded by spray rings with multiple nozzles.

These Grand Basin fountains are a happy blend of elegance, simplicity and practicality in form and function. In addition to offering eye-catching aesthetics courtesy of various spray patterns, the fountains also serve as a natural, environmentally safe, highly effective tool in water-quality management.

At full thrust, the system turns over water at approximately 6,400 gallons per minute, sending oxygen-rich droplets skyward before they return to the surface, create helpful wave action on the surface of the lake and release their oxygen. The system also draws debris off of the lake's surface,

Photo courtesy HOK Planning Group, St. Louis.

Photos by Robert C. Mitchell, Frank C. Mitchell Co., St. Louis.

Photo courtesy CH2M Hill, St. Louis.

The Grand Basin sits at the bottom of a hill below the St. Louis Art Museum, where the sculpted symmetry of the watershape offers a perfect mirror to the grand formality of the architecture.

The site was in need of significant attention when our work started on the Grand Basin, and we had little more than old photographs to guide us in restoring the fountains and facilities to their former glory.

pulling the water through two large submersible pumps and into air-injection venturis that keep the water moving and aerated.

This aeration process is very important, addressing a wide range of water-quality issues related to algae, aquatic weeds, bottom sludge, bad odors and insect infestation. In other words, a beneficial side effect of the great beauty of the new fountains is greatly improved water health and clarity within what was once a rather tepid, stagnant lake.

The basin's current serenity, however, belies all the work that was involved in renovating this watershape, with some of those challenges having to do with *boats*.

Indeed, boating in the Grand Basin is a century-old summertime activity in St. Louis that had declined in recent years. To revive that tradition, a new boathouse and adjoining restaurant were under construction. To handle this increased traffic, we had to address boater safety in designing the fountains.

Early on, it was decided to add guard rings around the fountains, but this meant that, in addition to installing all of the fountains, the construction team would also need to install eight large concrete piers to support the new features – a big job under any circumstances but particularly challenging on a lakebed.

Pier and piping installation was directed by Robert C. Mitchell, president of Frank C. Mitchell Co., the site's plumbing contractor. They drained the lake, excavated for the concrete structures, buried almost a mile of intricate piping in the lakebed and, most important from our perspective, left behind eight independent concrete piers – six of them at seven feet in diameter, two at 15 feet in diameter.

Up and Running

Once that construction was complete, our custom-fabricated spray and guard rings were mounted directly onto the piers. As part of the same process, we positioned an array of water-cooled, 500-watt lights on the piers – all in keeping with the original design – to create a dramatic night appearance for the fountains.

Mechanical and electrical equipment for the fountains was installed in sub-grade vaults adjacent to the Grand Basin during the construction process. A special water make-up system was also set up to ensure maintenance of proper operational levels for the new fountains.

When the renovated Grand Basin went into operation in October 2003, park visitors and local residents immediately embraced the facility just as they had in 1904 and have made the area one of the most visited locations in the park – and the entire city to boot.

Photos courtesy HOK Planning Group, St. Louis.

In a boat or on the promenade, by day or at night, the restored Grand Basin reminds residents and visitors of a time when St. Louis hosted the 1904 Louisiana Purchase Exposition & World's Fair while offering them all the visual and social amenities of a 21st-century urban park.

Polishing a Gem

The recent restoration of St. Louis' beloved Jewel Box, a stunning, glass-walled, 1936-vintage structure designed as a floral conservatory, has transformed a diamond in the rough into a shining gem of a building.

A popular attraction for generations of St. Louisans, the Jewel Box was designed by St. Louis engineer William Becker and is listed in the National Register of Historic Places. The 7,500 square-foot Art Deco conservatory sits on a 17-acre parcel in Forest Park and is a textbook example of good greenhouse design, featuring unconventional, cantilevered vertical glass walls that rise to a height of more than 50 feet.

The $3.5 million renovation of the Jewel Box is another part of the $90 million Forest Park Improvement Project developed by the Forest Park Forever and the City of St. Louis – a key component in an overall plan of restoring Forest Park to the grandeur it had during the 1904 World's Fair.

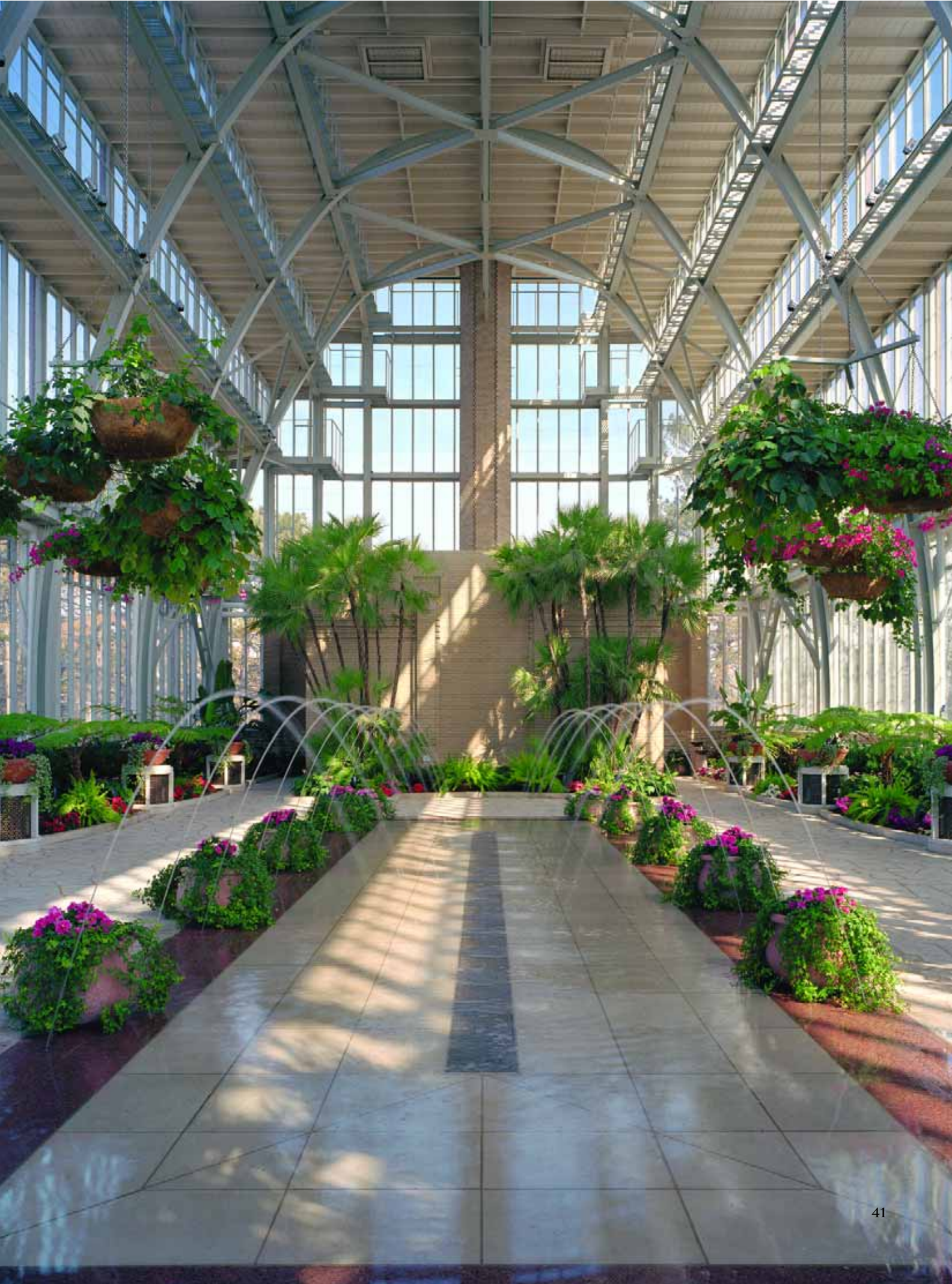
A Dual Program

The overall renovation of the Jewel Box included replacement of its mechanical systems; improving the floral display area; and adding a catering area so the building could be rented out for events such as wedding receptions, corporate meetings and parties. The plan also included addition of a new heating and air-conditioning system to make the indoor space comfortable in the coldest and hottest weather.

What was novel in the renovation was inclusion of a new fountain with an ingenious dual personality: When the public visits the Jewel Box to enjoy its floral displays, the fountain's waters and reflective qualities enhance the ambiance; but in keeping with a goal of making the Jewel Box both a practical as well as a beautiful setting, the fountain can be turned off and the pool drained, leaving be-

Photos by Alise O'Brien, courtesy of Christner Achitects & Planners.

The Jewel Box was a 1936 addition to Forest Park, but the interior deck-level fountain is a thoroughly modern enhancement – one that, on the one hand, lets the building pull its fiscal weight as a meeting space when dry and, on the other, become a decorative masterpiece when the waters begin to flow.



hind a nearly-level floor area that is capacious enough to seat 160 to 250 people for dinners, meetings, parties and receptions.

In realizing this vision for the space, Hydro Dramatics worked closely on the fountain concept with Christner Architects & Planners, Inc., BSI Constructors, Inc. (construction manager and general contractor) and Merlo Plumbing, which handled the installation of the fountain equipment along with Conti Electric. All of these are St. Louis-area firms.

The reality of the space before the project began was somewhat grim. With no air conditioning, no display lighting, no catering facilities and a bunch of aging plants, the Jewel Box had lost its sparkle and become decidedly dingy inside. To enliven the space, new plants were added, and the glass walls and other surfaces were restored.

As mentioned, a new air-conditioning system and a restructuring of the conservatory to accommodate special events were at the heart of the project, basically to ensure that the Jewel Box would be positioned to generate its own revenues and support itself for years to come.

Our part in the project had to do with designing a shallow 13-by-20-foot reflecting pool and jet system that could be made to disappear as needed. The pool holds just an inch of water to allow for quick and easy draining. Despite its small size and limitations the plan placed on what could be done, we knew the fountain had to be as beautiful and enthralling as its surroundings.

To fit the bill, we developed a design that features graceful arcs of water that span the width of the reflecting pool – a beautiful effect accented by a wide stone walkway surrounding the watershape.

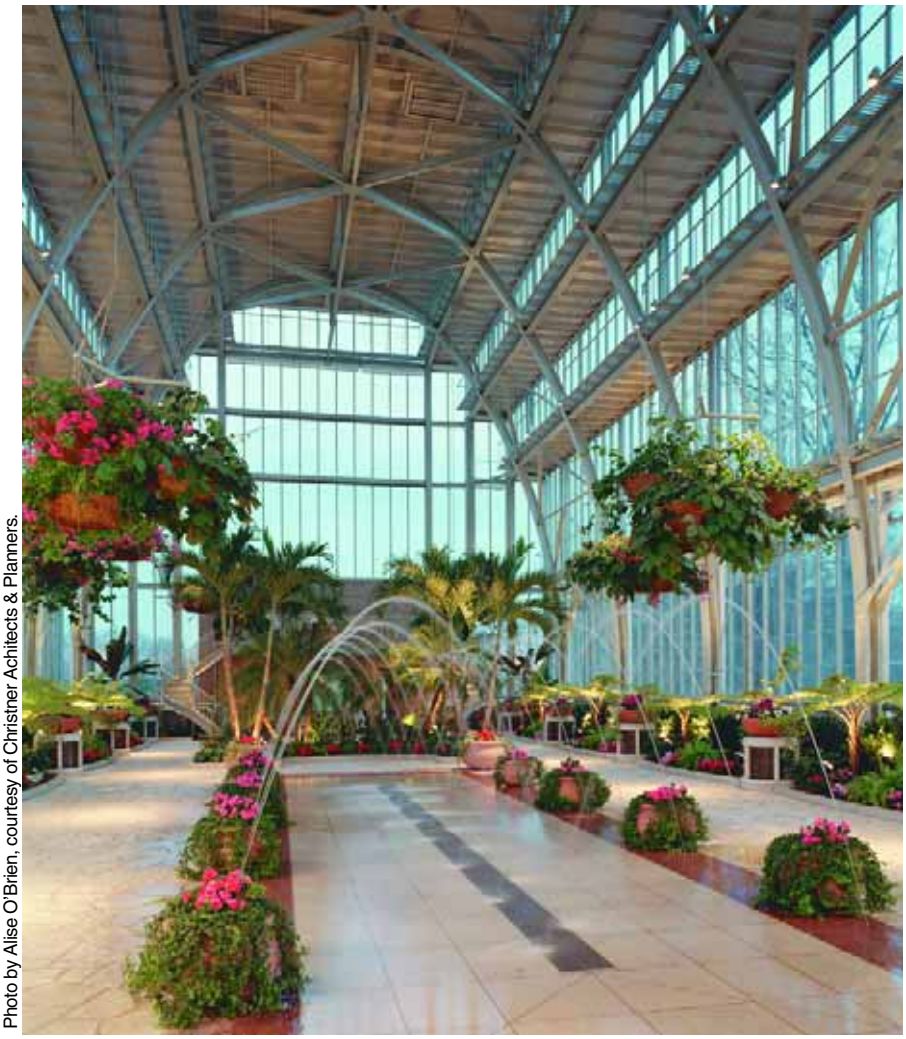


Photo by Alise O'Brien, courtesy of Christner Architects & Planners.

Before renovation, the Jewel Box lacked air conditioning, display lighting and catering facilities and did little beyond harboring an array of aging plants. Now, with new plants, restored glass walls and a festive watershape, the facility sparkles like the gem it really is.

The Hard Work of Simplicity

Everything having to do with the Jewel Box watershape seems simple, but the effect was actually difficult to create.

First, the team had to determine how to install fountain equipment – and keep it accessible for maintenance purposes – within a space that was just an inch and a half deep. Second, we had to consider splash and noise factors: Water striking water generates distinctly different sounds and visual effects than does water striking a hard surface, such as concrete.

Basically, we wanted to ensure that the arcs of water would span the pool gracefully while creating pleasurable visual and aural effects. Achieving that goal involved extensive on-site testing and an incredible number of minute on-site adjustments to nozzles and other equipment – a whole lot of "fountaineering" that went into making the effect look as simple and elegant as it now does.

Streamlining the appearance of the fountain and dealing with limited space for equipment were challenges as well. After due consideration, for example, we installed our water-level sensors and other necessary electronics in nearby planting beds rather than within the confines of the watershape. Also, rather than placing water nozzles in their traditional locations on the floor of the vessel, we set them under special slotted pavers just above the water level.

Special decorative grates on the bottom of the pool mask the mechanical fittings, while the pump and filtration equipment was installed in a room located beneath the vessel.

The result of the design team's coordinated effort is the dramatic restoration of a treasured public space. At the same time, we all made the Jewel Box more functional through a design that captures its former grandeur while increasing the modern-day utility of this unique and special building.

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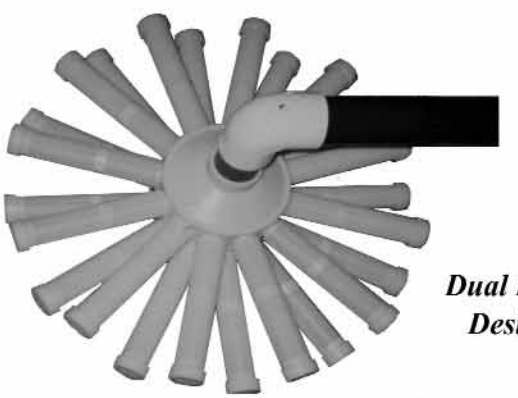

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A Recipe for Jambalaya

Once the site of an abandoned sewage plant, Jambalaya Park in Gonzalez, La., stands as testimony to just how ambitious a renovation project can be – and of how tangled the path to success sometimes becomes. As watershaper and watergarden specialist Les Ewen reports, the first attempt at installing the park's fountain and Koi pond ended in a shambles, at which point he and his staff stepped in to put the city's plans for the park back on track.

By Les Ewen

Truly a large-scale project full of unique technical challenges in an unusual and important civic setting, the renovation of the watershapes at Jambalaya Park in Gonzalez, La., is easily the most unusual project our firm has ever tackled.

The park covers seven beautifully wooded acres in an older section of town that's mostly residential but sits directly behind City Hall and several other smaller civic buildings. It takes its name from the fact that the city is known as the world's "Jambalaya Capital" and annually hosts a week-long festival celebrating the Cajun stew that has become a star in the firmament of Louisiana cuisine.

Through the rest of the year, Jambalaya Park is a well-used space – especially since the city undertook extensive rehabilitation of an area whose history was anything but appetizing or inviting: For decades, the site was home to a sewage-treatment plant that had been abandoned several years previously when the city built a much larger facility on the outskirts of town to accommodate its growing population.

This left behind a bunch of large concrete basins that had been used to filter and treat wastewater. Years after the space had been reclaimed as a park, civic leaders finally decided to take the major step of expressing the site's potential by transforming the basins and associated structures into a variety of watershapes and other amenities, including an Olympic-size swimming pool, a playground and a splash area. They also converted two of the most centrally located basins into a fountain and a Koi pond, respectively – at least, that's what they *intended* to do.

From Wastewater to Wonder

Unfortunately, within months of commissioning the new watershapes (and for a variety of reasons discussed below), both the pond and the fountain failed and became as broken and fetid a mess as I've ever seen. Early in 2003, we at Ascension Pools of Darrow, La., were asked to bid on "renovating the renovation" and began a long process that would be surprising, challenging and, ultimately, quite gratifying.

The two systems were contained in identical poured-in-place concrete basins measuring 57 feet long, 30 feet wide and 18 feet deep, both divided down the center lengthwise by a 24-inch-thick wall. Situated end to end and 20 feet apart, they were wonderfully positioned in the park and were particularly valued for the fact that they stood 24 inches above grade, providing lots of seating area.

The first renovation, which took place in 2001 and included these central watershapes, was the work of an engineering firm and a local pool contractor. In

concept, the plan of transforming these rough, utilitarian structures into highly visible points of pride was quite fine and spoke volumes about the small city's spirit, but the execution proved a problem.

As originally designed, the fountain was a beautiful thing possessed of great civic significance. At its center was a large "Jambalaya cauldron" that housed dramatic vertical jets. (Such cauldrons in cast iron are the traditional choice for cooking jambalaya and a distinctive local icon.) Surrounding the fountain's cauldron (which is actually fiberglass) were rings of lower jets and other water effects.

The original Koi pond was a bit less ambitious in design, but was nonetheless a wonderful re-appropriation of the other central basin, with the addition of dozens of colorful fish making for interesting up-close observation by anyone sitting at the water's edge or strolling over the bridge that had been built at one end.

During the initial transformation from sewage basins to watershapes, both vessels had been filled with a mix of broken concrete and dirt topped by a thin concrete "floor" that contained no structural steel or wire mesh. Not surprisingly, this inadequate construction played a significant role in the fountain's failure.

In an adjacent equipment room, two 25-horsepower pumps that had functioned for the original treatment plant had been overhauled and sent back into service in powering the fountain effects, the business end of which had been designed and manufactured with blameless expertise by Hall Fountains of Fort Lauderdale, Fla.

Damage Assesment

By the time we began our involvement, neither system was functioning. The Koi pond had reverted to sewage containment, full of murky water and utterly devoid of fish. The fountain, too, was inoperative: Its structure had been broken into pieces by a disastrous leak.

We began by working with city officials and engineers to identify exactly what had gone wrong. Both situations had proved destructive, but, as it turned out, the problems with the two vessels were quite different.

In the fountain, for its part, a plumbing fitting on the main line feeding the water effects had separated below grade. When the line broke, the fill material was saturated with water and expanded, placing tremendous upward pressure on the thin concrete floor.

The treatment plant's original floor and walls were monolithic, heavily reinforced concrete, so the water moved along the path of least resistance and literally erupted through the overmatched floor – at one point creating a geyser that cruelly mocked the beautifully designed water effects.

The fountain was indeed a pitiful sight when we arrived: The cauldron and jets and manifolds for all of the equipment had been removed and set at one end of the basin. The place where it had stood was now a pit of dirty water, muck and chunks of broken concrete.

The Koi pond had suffered a different but equally nasty fate.

We softened the hard edges of the pond by introducing plants of various heights at spots along the perimeter. We also used lilies and arrangements of stones to add visual interest to the open sections of water and increase the drama – especially in views from the wooden bridge.

We reintroduced a large number of Koi to get the pond up and running again. They seemed to appreciate the rock formations we'd added – perhaps seeing them as camouflage in hiding from birds and other creatures who targeted the fish as 'snack food.'

Among a variety of plumbing problems was a critical mistake with a check valve on the suction plumbing that had been installed to prevent backwash effluent from flowing back into the pond when the biological filter was being cleaned.

The valve, it turns out, had been installed horizontally rather than in the proper vertical configuration and never worked: Whenever the filter was pulled off-line for a cleaning, all of the muck was dumped right back into the water, choking it with nutrients, promoting algae growth and forcing a toxic environment on the fish.

A Fix for the Fish

Our work began with the Koi pond. Although it had not suffered a structural failure as had the fountain, the water was so bad that it basically qualified as a health hazard. The fish were long gone: A few were rescued, but most had died. Moreover, the original renovation had done little to lend visual interest to the pond: It looked like a shallow swimming pool with a black bottom, leaving the hapless fish to serve as the only "decorative" elements.

As we dug in, we found another problem with basic hydraulics. The biological filter should have been all that was needed to clean the water, but in addition to the improperly installed check valve, the pipes were too small and didn't allow proper flow through a 25-foot "bead" filter designed with a capacity of about 250 gallons per

minute. In our testing, we found that the actual flow rate of the initial installation was less than 50 gpm!

Another big problem was that the original contractor had "improvised" with the aeration system, using nothing more than landscaping soaker hoses running down the sides of the basin's center wall (which had been topped with brick coping and had been intended for service as a walkway). That didn't work at all, so we pulled the soakers out and installed two-inch pipes to feed 20 aerating bubbler stones – in other words and for a change, products that were actually designed to function as aeration devices.

To correct the flow to the pump, we ended up using a three-inch plumbing run that had initially been installed to drive the system's air lines. This took some fairly clever reworking of the plumbing between the main circulation pump (located just outside of the basin in a small, sub-grade vault) and the system's filter (located about 100 feet away).

Where the two-inch plumbing that had been running to the filter was undersized, the aeration system's three-inch line was just right, so we took the pair of two-inch lines that had formerly been the suction and return lines, linked them as a single suction source between the pump and the filter, then returned the water via the three-inch line.

The wooden bridge at the end of the basin gave us all the cover we needed to re-purpose all of these lines, which involved a good bit of core drilling and

Reinstalling the fountain was straightforward, but given the history we were certain to pressure-test the lines on a continuous basis. A key system addition: pressure-release lines set in the corners to keep the concrete from buckling and alert staff to the recurrence of the kinds of problems that destroyed the original installation.

reworking of connections. Before we were through, we'd managed to increase the system's flow rate from less than 50 gpm to just under 200 gpm – and it all works beautifully now.

Plants, Rocks and Fish

Just as important to the Koi pond's rehabilitation was the addition of a variety of aesthetic elements to the space, all aimed at creating a more formal watergarden appearance through the use of rocks, water plants and the reintroduced Koi.

To help with this part of the work, we brought in Peter Nelson, a friend of mine and a landscape architecture student from Louisiana State University. He provided us and the city with a highly detailed set of drawings showing the revamped garden with rocks and plants in place – a great presentation that enabled city personnel to visualize how striking the pond might be.

Using the renderings as a rough guide, we brought in 20 pallets of rounded, eight-to-ten-inch Arkansas River rocks and distributed them in spots throughout the pond to create subtle rock formations along the perimeter, where they went a long way toward softening the appearance of the edges. We also brought in hundreds of water plants, including a wide variety of water lilies and grasses, and placed them throughout the vessel. (The plants came from Nelson Water Gardens & Nursery in Katy, Texas.)

Finally, it was time to reintroduce fish. The city purchased several hundred smaller specimens and a few dozen large specimens in a variety of spectacular colors and color combinations.

As we stepped off the pond and turned our attention to the fountain, we couldn't help noticing that the fish seemed to be disappearing. It wasn't until the later stages of the work on the fountain that we discovered, after the sun went down, that egrets and some enterprising raccoons were hunting up some supper.

By the time we figured out what was going on, a large number of the fish had been snatched. We removed the remaining fish and housed them temporarily in facilities offered by LSU's Department of Veterinary Clinical Sciences. Next, we installed four systems known as "scarecrows," which are essentially water-spray systems activated by motion detectors. Any time a bird or land animal comes near the water's surface, it gets hit with a stiff stream of water.

We were more than a little interested to see how that system worked and were happy to see egrets and other predators make quick exits after getting their sudden baths. With the Koi pond restored and beautified and its inhabitants secure, we turned our full attention to the fountain.

Fountain Foundations

When first installed, the park's fountain had been quite the buzz around town. Although it only ran for a few short weeks before trouble began, its water effects really caught people's attention. The featured cauldron – six feet across and some four feet high – has an inside lip with 28 brass jets with 3/8-

We were determined not to revisit the inadequacies of the original fountain basin, so we compacted the substrate, added rebar and steel mesh and tied what little was left of the original structure into the new work.

The restored fountain, with the cauldron at the center and dramatic fan jets in the corners, is now doing what it always should have done in adding drama and spectacle to Jambalaya Park both day and night.

inch nozzles that shoot water up in a ring that converges about 20 feet in the air. The pot also has fixtures that illuminate the effect from inside the ring for spectacular nighttime displays.

Just outside the pot is another ring of three-inch nozzles that entrain air and send frothy jets 10 feet into the air, creating a second layer surrounding the cauldron. Beyond that ring are 16 cascade jets that send thick plumes of shaggy-looking water a couple of feet into the air. The four corners of the watershape have jets that send beautiful, wide fans of water back toward the center. Finally, there are 22 submersible halogen lights on the floor. All in all, it's a great display, day or night.

When we arrived, however, the fountain had been out of commission for nine months, and all that was left was a muddy hole choked by sludge and weeds. The concrete was broken, partly because of the initial ruptures caused by the leak but also because the original contractor broke out much of the floor hunting down the leak. What should have been a civic focal point was an utter ruin.

We started by cutting and removing all of the broken concrete and cleaning up the worst of the mess before we evaluated either the condition of the plumbing or of the fountain fixtures, which had been moved off to the side of the vessel. With the exception of the broken coupling on the main line and several upright pipes that had been damaged in demolition, most of the system's plumbing proved to be in useable shape.

Much of what we did from that point on was about ensuring that the sort of disaster that had befallen the vessel could never recur. For starters, we installed a field drain on the outside of the basin in the form of a trench filled with gravel and perforated pipe, giving water someplace to go in the event of another plumbing failure.

We also put pressure-relief standpipes in the corners of the fountains, topping them with pop-off valves. This served the dual purpose of giving water below the floor someplace to go and of providing

staff with a visual indication that something needed attention.

We repaired all of the plumbing per Hall Fountains' original plans, replacing the majority of the risers connected to the various jets and jet rings. We then pressure-tested the whole system over and over again for a week straight, far exceeding limits the system would experience during normal operation. Then we went to work on the structure.

Lessons Learned

In one of our original proposals, we had suggested removing all of the fill material from the fountain basin and starting from scratch. The city didn't want to go that far and settled on a plan that left most of the broken concrete and dirt in place while completely revamping the approach to the floor.

Ultimately, we *did* dig out about two feet of the original fill material in areas beneath the plumbing runs for the jet manifolds, replacing it with layers of crushed limestone in six-inch lifts to provide a stable substrate for the new construction. Atop the compacted material at strategic points beneath the manifold plumbing, we poured concrete support blocks: Basically, anywhere the pipes turned, we supported the intersection with 18-inch concrete cubes. We also built new pedestals for the cauldron using sonotubes.

After drilling holes into the original basin walls and inserting structural steel dowels, we tied the steel into 12-inch concrete footers we poured around the perimeter. In addition, we poured 12-by-12-inch sub-grade footings at intervals of ten feet along the length of the basin. We also exposed the top of the basin's center wall (which had previously been chopped just below grade during the first renovation). Atop that wall, we built an additional footer and tied it into the new floor.

The new floor is reinforced by a grid of #4 rebar on twelve-inch centers, and the whole system is further reinforced by steel mesh. In truth, we overbuilt the whole thing, but between the hydrostatic relief pipes and drains and the structural floor, there is little worry that the fountain will suffer a repeat performance of its initial demise. Suffice it to say, it's been built to last.

Once the floor was poured, we used "cold temperature" rubber – a liquid product applied with an airless sprayer – in three coats to create a 45-mil barrier. We had to do this work after sunset because the hot summer sun "boiled" the material – but we had to work quickly, because as the evening air cooled, dew would settle on the material and cause problems of another sort. (It was during this after-hours phase of the work that we spotted the hungry egrets and raccoons in the adjacent pond.)

We also reworked the vessel's basic circulation system, installing a 2-hp Challenger pump and 36-inch sand filter from Sta-Rite Industries (Delavan, Wis.). The filtration system runs through a stream-and-trough assembly that runs the length of the basin and is fed by a series of brass overflow fittings.

Restored to Glory

Now we were ready to reinstall the jets and jet rings and bring the fountain back into operation.

We conferred with the support staff at Hall Fountains on a couple of occasions to be absolutely certain of how to proceed with reassembly, but for the most part we worked from their original plans, which were quite comprehensive and worthy of far better initial results. All of the manifold plumbing and the nozzles were there, but we ended up having to replace many brass couplings that had been lost at various stages of breaking and removing the original floor.

The fountain system was so well designed that the process of reinstalling it was not at all difficult. Just beyond the basin was a vault full of gate valves that routed all the water, enabling us to adjust flows to the various jets and fine-tune the overall performance of the reinstalled water effects.

Minor tweaks aside, turning the system back on was a magnificent experience. Even more important, we were aware that we had restored an object of civic pride to its rightful glory.

The author thanks the city inspector of Gonzalez, Alvin Broussard, for his unyielding support and effort throughout the renovation process described in the accompanying story.

Classic Cauldron Jambalaya

2 tbsp vegetable oil
1/2 lb andouille or hot, smoked sausage cut into 1/2-inch slices
1/2 cup chopped celery
1 small chopped onion
1 small chopped green or red pepper
1 clove minced garlic
1-1/4 cups chicken broth
12 ounce can of whole peeled tomatoes, undrained and coarsely chopped
1 bay leaf
1 cup rice
1/4 tsp Tabasco sauce
1/4 tsp dried oregano leaves
1/4 tsp dried thyme leaves
1/8 tsp ground allspice
3/4 lbs shrimp, peeled, de-veined and cut in half lengthwise (Note: other meat or poultry may be used)
Celery leaves for garnish

In a large, heavy saucepot or Dutch oven, heat the oil over medium heat. Add the sausage, celery, onion, green pepper and garlic. Cook for five minutes until the vegetables are tender, stirring frequently. Stir in the broth, tomatoes, bay leaf, Tabasco, oregano, thyme and allspice. Bring to a boil.

Reduce heat and simmer uncovered for 10 minutes. Stir in the rice. Cover and simmer for 15 minutes. Add the shrimp, cover and simmer for five more minutes – or until the rice is tender and the shrimp has turned pink.

Let stand for 10 minutes. Remove the bay leaves and garnish with celery leaves.

Serves four.

– L.E.

A Cantilevered Dream

By Steve Dallons

Set on a mountaintop in Solano County, Calif., and designed by architect Helena Arahuete of Lautner & Associates, the sculptural qualities of this magnificent home are difficult to convey in words or images – and that's not even considering the breathtaking watershape installed by Steve Dallons. The cantilevered swimming pool juts from the second level of the structure's southwest side in a way that doubles the meaning of 'high-end custom work.'

It's a setting of searing beauty and now features a home that is unquestionably a work of art.

Designed by renowned architect Helena Arahuete of Lautner & Associates (Hollywood, Calif.), the structure sits on a privately owned, 2,000-foot-tall mountain known as Twin Sisters Peak – just part of an 1,800-acre estate in Solano County, Calif., that offers clear vistas of the Pacific Ocean, Golden Gate Bridge, San Francisco Bay, the Sacramento Valley, Napa Valley and the Sierra Madre Mountains as you turn around the compass.

In the great tradition of "organic architects" from Frank Lloyd Wright through to Arahuete's mentor and long-time collaborator, the late John Lautner, the home takes full advantage of its setting, crowning the mountaintop with a glass-and-concrete hexagon that at once beautifies and harmonizes with the landscape. So fascinating is this structure and so prominent its location that, during construction and ever since, private airplanes drop down and circle the site at eye level to get better looks.

For an up-close view, you have to take a long, rough, private dirt road onto the property and up the mountain, a journey that takes a full 15 minutes through a rolling landscape of meadows and live oaks. When you finally reach the summit, the home is very much alone – the bottom floor recessed below grade, the upper floor rising over the landscape with glass-enclosed rooms that in most cases offer views in all directions. Dramatic cantilevered decks encircle the structure, and on one of them in a southwest-facing spot sits a new swimming pool.

From the Top

The project started in 2001. Arahuete had contacted my friends and colleagues, Skip Phillips of Questar Pools in Escondido, Calif., and David Tisherman of David Tisherman's Visuals in Manhattan Beach, Calif., to consult and perform technical-design work for the water-

One of the quirks of this construction process had to do with the fact that the equipment for the pool and spa systems had to be integrated within the footprint of the home – no pad off to the side or hidden behind a low wall or a clump of downslope bushes. This meant we were on site from the start of the project – and stayed there pretty much for the duration.

shapes she wanted. What she had at that point were basic shapes for a pool and spa and a sense of how they should work with the house. She left it to them to work out the details.

They developed the plan and recommended our firm, Pacific Pools, Inc., of Alamo, Calif., to execute it. We all gathered in Monterey that fall and, after submitting our bid, we were awarded the job. Phillips' firm served as the general contractor for the watershape, with Pacific Pools operating as a sub-contractor and doing all of the physical work and Questar providing expert supervision and consultation as the project unfolded.

Although the job would turn out to be incredibly challenging at times, it was made entirely enjoyable by the fact that it was such an amazing design and by the pleasure of collaborating with Arahuete and Phillips, who left the majority of onsite decisions to me and my staff.

At first glance, the pool is a marvel of simplicity: a perfect rectangle 14 feet wide by 50 feet long, with about half the length cantilevered out from the structure of the house and with a slot overflow on all sides. The depth ranges from 3-1/2 to 8 feet, and part of the deep end extends about 12 feet into the house in a space between the master bedroom and the living room that is separated from the exterior by a sliding glass panel. (See the sidebar on page 57 for more on the panel.)

Each face of the hexagonal home has about a 35-foot span, with the pool, spa and deck taking up the entire southwest face.

The equipment for the pool is positioned a level below the deck, which made for an interesting construction process and intense coordination with the home's general contractor (Winter Schram & Associates of Santa Monica, Calif.) in arranging to install the equipment room and the surge tank long before the pool was constructed on the upper level.

In fact, we had to install our plumbing piecemeal as home construction progressed. And because much of that plumbing had to be imbedded in the poured-in-place concrete walls of the home itself, we had only one shot to get things right. As a result, we took incredible care and conducted extensive, repeated pressure-testing.

This meant that, for all intents and purposes, we were onsite through the *entire* construction process and had to snake our way through an incredibly rigorous schedule involving virtually every contractor on site as we worked our way up from

The first steps in pool construction took place well below the level at which the vessel would eventually appear. The crushed rock sits atop the massive support beams that are tied to and eventually will support the whole structure. We began our direct work on the pool by inserting pipes to act as plumbing chases beneath our arm of the hexagonal superstructure.

the structure's foundation and toward the second floor.

Integral Strength

Early in the project, the pool's location was an imaginary nest of points way up in the air.

This took some getting used to: A huge and unusual degree of planning, visualizing and measuring were required in nailing down the plumbing locations, and a large portion of the circulation system had to be fully intact before *any* part of the pool itself began to take shape. This process included, among other things, installing the surge tank for the perimeter-overflow system as well as all of the plumbing runs to and from the pool, with everything tied to exact equipment locations.

The work of structural engineering for the watershape was completed in-house by Lautner & Associates. Basically, they set up a cantilevered superstructure inside of which we were to form and shoot our gunite shell. Two massive support

The pool is actually a self-contained vessel set inside the cantilevered deck structure. The floor and walls-to-be seen here aren't meant to hold water: What we did, basically, was craft a shell inside the cantilevered structural shell – a fact that put incredible emphasis on making certain everything we did was absolutely sealed and watertight.

Keeping control in the face of incredible complexity became part and parcel of our work on this project. With all of these lines crisscrossing the big decks, wrapping around and under the pool and ending up in various equipment rooms on lower levels, it may seem amazing that it all came together as smoothly as it did.

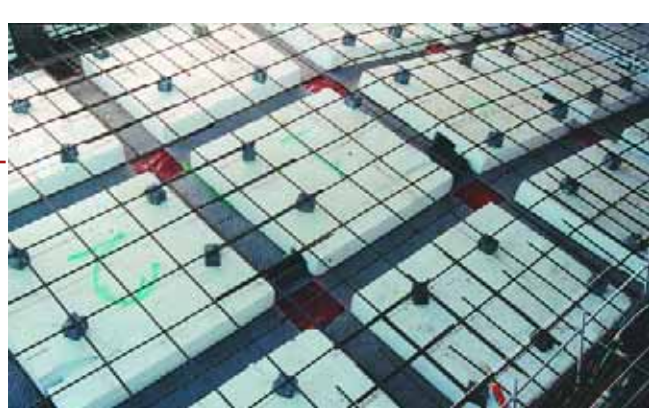
beams ran beneath the vessel and included six runs of #18 rebar – that's 2-1/2-inch-diameter steel, the grade used in freeway interchanges, bridges and overpasses. Structural floors and walls below the pool shell were tied into the beams, which extended back into the house itself.

As heavy duty as the beams and steel were for the base structure, the floor and side walls had a lightweight design to minimize the overall load. In fact, the wall at the outer end of the pool has numerous Styrofoam inserts to lighten the burden at the edge of the cantilever.

Complicating all of this construction work was the fact that, with the perimeter-overflow slot, the level of the deck surface and the pool edge had to be held to a tolerance of 1/32 of an inch. This meant that all of the structural work had to accurately accommodate *and anticipate* the weight not only of the pool shell, but also of the decking and the water the watershape would contain.

To further minimize weight, we installed more foam panels in the spaces between the poured-in-place concrete of the base structure and our gunite shell. Our floor and walls were minimums of six inches thick. The gap between the shell and the substructure gave us adequate room to insert channels between foam panels for our plumbing runs.

The base construction gave us footings running in both directions on five-foot centers – an assurance of overall strength that let us put our pipes and conduits



We "floated" our shell atop foam panels that lightened the load on the cantilevered structure. Conveniently, this gave us a multiplicity of open spaces in which to set our plumbing runs. As can clearly be seen in the pentagonal spa, this made for some unusually intense configurations of foam, steel and schedule 80 pipes and fittings.

Behind the Glass

As mentioned in the accompanying text, interior and exterior portions of the swimming pool are separated by a pair of sliding-glass panels spanning the 14-foot width of the pool.

One of our big concerns about this arrangement involved currents and waves that would inevitably develop when the wind started blowing across the mountaintop – occasionally at velocities up to 100 miles an hour. Given the slot-overflow design, we had to wonder if the one-inch rubber membrane at the base of the panel would be sufficient to keep the surface waves, which we'd observed to be as much as four inches high, from sloshing into the home.

To everyone's relief, we found that when the winds did come up and with the panel closed, the water surface behind the glass panel was remarkably calm, with only the slightest ripples, while the water on the outside churned and sloshed: There was virtually no transference of turbulence beneath the panel.

The weather raised another, related issue and had to do with the fact that the pool was positioned without consideration of prevailing winds. We soon noted that the winds generally blew in from the northeast, which lets the house shelter the pool to some degree. But when the winds really started blowing, we observed that they pushed so much water to the overflow slot that the pool's level would drop several inches in a matter of minutes. This exposed the bottom of the glass panel and let wind blow into the house.

As a result, we adjusted the system to include a high-water sensor in the surge tank. Whenever the water level reaches a pre-set level, the pump automatically activates in order to maintain the water level – thus preventing the formation of a void beneath the panel.

– S.D.

The need for precision to within 1/32 of an inch made setting the edge for the perimeter overflow a particular challenge made somewhat easier by using precision-cut jigs. The amazing thing about all of this is that we had to build the edge without knowing exactly how much the cantilever would deflect when charged by the weight of the stone decking and water.

Spa on the Side

Looking out from the house and to the right of the pool is a spa we installed with its own deck-level, slot-overflow design to match the swimming pool.

The hexagonal vessel comfortably seats up to eight people. Although it shares the pool's surge tank, the spa runs separately and has its own pumps, filter and heater. Its equipment includes a High-E 350,000 Btu gas heater and a simple, four-function, spa-side control system, both from Jandy (Petaluma, Calif.). The spa has jets on three levels – two in the bench and one in the foot well.

Before construction, the clients were measured for precise sizing of the seats, accurate setting of the water level and prime location of the jets. We angled back the top of the spa at neck level for comfort and, using an innovative detail designed by project architect Helena Arahuete, angled the footwell wall back from the front edge of the seats, enabling her clients to tuck their ankles beneath the bench.

– S.D.

where they needed to go without inviting structural problems.

The half-inch slot for the perimeter overflow system opens onto a gunite trough six inches deep and five inches wide. The water then flows into a four-inch, schedule 80 PVC manifold pipe connected to the trough via four-inch tees and two-inch reducers at every seven feet all the way around pool.

Fine Tuning

With this perimeter-overflow design, we had to be concerned about the sound of the water flowing into the slot and spilling into the channel below, especially given the fact that a large portion of the pool sits inside the home. We managed this issue by using a single 1/2-horsepower pump to flood the entire edge. This cut down the gallonage flowing over the edge per minute and significantly reduced the noise level.

Making such a precise effect work with so little horsepower was primarily a matter of good hydraulic design. In this case, we used four-inch suction-side plumbing and three-inch return lines to drive water over the edge and set up a separate system for primary circulation using a second 1/2-hp pump, 2-1/2-inch suction lines and two-inch returns. The perimeter-overflow system is filtered by a pair of 150-

Continued on page 62

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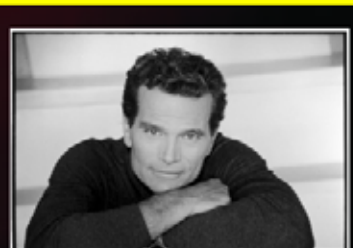

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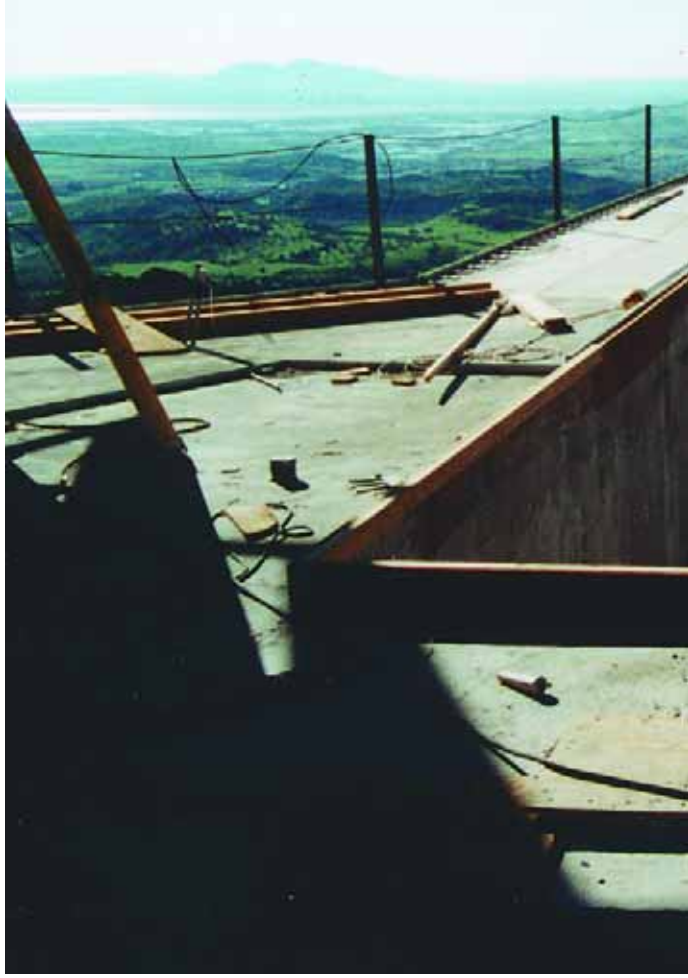
square-foot cartridge units, while the primary system has a pair of 200-square-foot filters (all four from Pentair Pool Products, Sanford, N.C.).

The fine points of this hydraulic design were all worked out with Phillips' careful guidance, but there were a number of minor adjustments we made as the plumbing installation progressed. The most detailed work in the entirety of the project (and the most critical adjustments) had to do with maintaining a perfect level for the perimeter-overflow system: The final calculations for the positioning of the pool edge could only be done following a dramatic experiment we conducted just after the pool shell had been shot.

To simulate the ultimate stress conditions on the cantilever, we loaded the deck with weights duplicating the mass of the rock and tile that were eventually to be installed and then filled the unfinished pool with water. Our goal was the accurate determination of how much the cantilever would deflect with all that weight bearing down on the structure.

To our amazement (and in stark testimony to the basic soundness of Lautner & Associates' engineering), we found that, with all that weight, the cantilever deflected about an eighth of an inch. That's not much by usual standards, but given our 1/32-inch tolerance it was actually quite significant, and the tweaking we did at that point was critical to the eventual performance of the perimeter-overflow system.

Of course, we couldn't know the adjustments we made based on the experiment were correct until the pool was finished and filled with water. Jumping ahead just a bit, we were all thrilled to see that, up and running, the perimeter of the pool is dead on, probably to within something close to a 1/64-inch tolerance. We set the line using a water level, which we've found to be far more precise than laser levels.



Additive Drama

The pool is finished in one-by-one-inch Bisazza glass tiles in a rich, medium blue. That in mind, everything was squared off inside the shell to allow for perfectly straight grout lines from the floor through to the top of the beam. There, the tile interfaces with a precise coping/slot detail involving 12-by-12-by-1-inch Brazilian blue granite cut into 6-by-12-inch pieces and shaped into a bullnose on the top edge, right at the waterline. The granite pieces angle slightly away from the pool edge and into the slot.

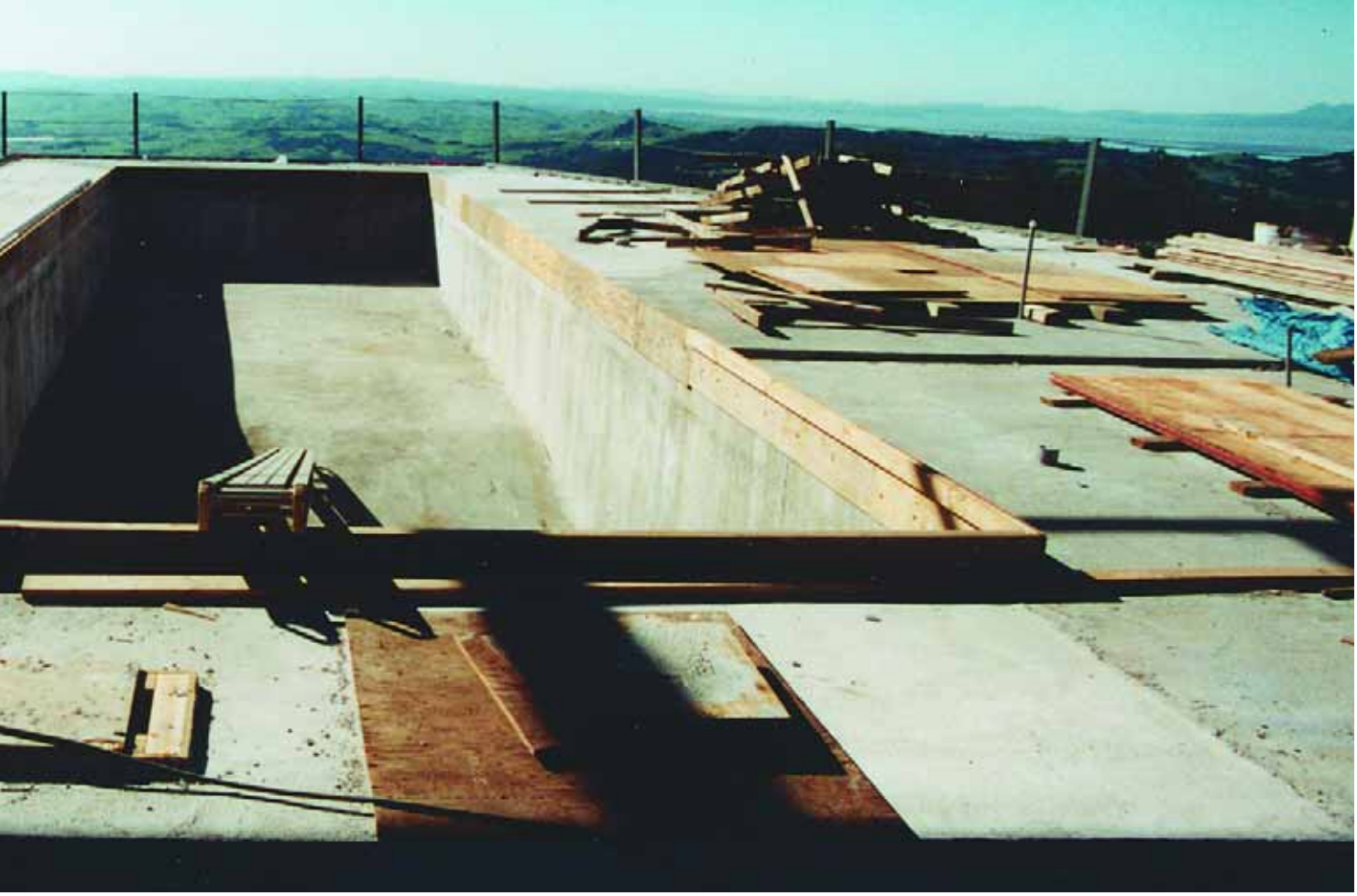
The deck material has a natural flagstone pattern and uses the same multi-colored African slate found as flooring throughout the house. It's a soft-looking material with medium colors and a host of rich earth tones in browns, grays and tans – relatively smooth with a slight natural texture that offers slip resistance.

All told and in just about every single one of its myriad details, this project stands as the most challenging and satisfying we've ever built.

There were no utilities on the site when we started, which meant that all power for all of the crews on site came from generators. There were no land lines for phones, and our cell phones worked only sporadically. The wind and weather were quite wicked at times during the two-year project.

For all of the inconveniences, however, not a soul working on site ever grew tired of the setting or the spectacular views. In fact, I found that anytime I was tired or frustrated, a few minutes gazing in any direction was usually enough to restore my enthusiasm.

Next, we'll conclude our coverage of this project with a pictorial on the finished product.



Eventually, the cantilevered deck and all of its features broke free of the various forms and supports that held them in midair through the project's early phases. Even unfinished and with the home still a skeleton, it's possible at this point for just about anyone to visualize just how spectacular this home and setting will be.

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.

Deck Sealer

Circle 135 on Reader Service Card

DECK-O-SEAL has introduced Deck-O-Grip, a non-yellowing, acrylic-based, high-solids, transparent, easy-to-apply liquid cure and seal for the protection of colored-concrete and exposed-aggregate surfaces. The sealer provides a clear, durable, abrasion- and stain-resistant film that specifically withstands common pool chemicals. The compound also contains a slip-resistance additive. **Deck-O-Seal**, Hampshire, IL.

Equipment Catalog

Circle 136 on Reader Service Card

HAYWARD POOL PRODUCTS has published its 2004 Buyer's Guide. The 230-page, black-and-white, soft-cover book covers the company's full line of pumps, filters, heaters, controls, automatic cleaners, fittings and other plumbing components. Full specifications are provided along with product descriptions and illustrations. There is also a complete parts list. **Hayward Pool Products**, Elizabeth, NJ.

Pool Construction Forms

Circle 137 on Reader Service Card

SWIM-CRETE POOL PRODUCTS manufactures a complete line of aluminum forms for construction of all-concrete pools. Wall forms are available in straight and radius configurations in a range of lengths, with additional forms available for corners, pilasters (for setting skimmers) and swimouts or benches. Offset forms for stone facings or raised details are also available. **Swim-Crete Pool Products**, Shawnee, KS.

Plaster Additive

Circle 138 on Reader Service Card

IMERYS offers MetaStar, a pool-plaster additive designed to optimize performance and provide a smooth, white plaster finish. An amorphous alumino-silicate pozzolan, the material reduces the amount of lime by-products present in the plaster through chemical reaction, thereby limiting the amount of lime that is able to leach from the surface during the curing process and weaken the plaster matrix. **Imerys**, Roswell, GA.

Outdoor Sound Equipment

Circle 139 on Reader Service Card

SONANCE offers outdoor speakers in a range of styles, including the SoundHenge Pedestal enclosure and the Outdoor Planter Speaker – both designed to provide superb sound along with sophisticated aesthetics for deck, patio, porch, garden or poolside applications – and Symphony Extreme, made to weather high humidity and extreme temperatures. All are durable and have water-resistant enclosures. **Sonance**, San Clemente, CA.

Natural Marble Products

Circle 140 on Reader Service Card

SOFIKITIS MARBLE supplies a full range of standard or custom marble products for use as coping and decking material or as an interior watershape finish. Imported from Greece and available in four basic shades, the company's imported offerings include natural-stone deck grates for use in perimeter-overflow systems as well as non-slip surface materials for use both in and around the water. **Sofikitis Marble**, Marina, CA.

Continued on page 66

Portable Pool Lift

Circle 141 on Reader Service Card

AQUA CREEK PRODUCTS has introduced a portable version of its Pro Pool Lift. Designed for ADA compliance, the device offers stainless steel construction for durability; features a counterbalanced weight stack to make it easy for operators to maneuver the lift into place as needed; has a UV-resistant powder-coat finish; and comes with either water or battery-powered actuation. **Aqua Creek Products**, Missoula, MT.

Laminar Deck Jets

Circle 142 on Reader Service Card

JANDY has introduced Laminar Jets. Designed to produce an arc of clear water that quietly enters a pool or spa, the jets' water flow can be adjusted to arc up to seven feet high and to project out eight feet into the water. Units can be installed in almost any combination, and fiberoptic lighting can be added for night displays. Decorative lids are available in three colors to blend the units into the landscape. **Jandy**, Petaluma, CA.

Misting Systems

Circle 143 on Reader Service Card

FOGCO makes misting systems for use in outdoor cooling and landscaping applications. These devices atomize water into billions of tiny droplets that evaporate in a flash to cool outdoor temperatures by up to 40 degrees Fahrenheit without a noticeable increase in humidity. They also add a unique touch to watershapes and garden areas by shrouding surfaces in a decorative fog. **Fogco**, Gilbert, AZ.

UV Sterilizers

Circle 144 on Reader Service Card

EMPEROR AQUATICS offers multiple-UV-lamp sterilizers for adjustable sterilizing in large applications – that is, those requiring water flow rates exceeding 100 gpm or waterfeatures larger than 15,000 gallons. Features for the UL-listed devices include fixtures for multiple GPH/T5-style, 65-watt UV lamps with 9,000 hour lamp life; sealed, watertight power supplies; and UV-resistant construction. **Emperor Aquatics**, Pottstown, PA.

Pipe-Pulling Grips

Circle 145 on Reader Service Card

KING INNOVATION makes grips for pipe pulling and boring pull-backs. The devices offer easy coupling and quick release and rugged designs for trouble-free service. Parts are easily replaced, and a minimal grip on the pipe eliminates wasted material with either PVC or poly pipe. Designed for pipe sized 3/4 to 4 inches, the tools are plated for rust prevention and fit all pipe-pulling equipment. **King Innovation**, St. Charles, MO.

Ionizing System

Circle 146 on Reader Service Card

CLEARWATER ENVIRO TECHNOLOGIES offers the R-40 copper/silver ion generator. Designed to control algae, bacteria and viruses in pools up to 20,000 gallon in warm climates (and up to 40,000 gallons in cool climates), the device offers economy, simple operation, a see-through electrode chamber and a weatherproof enclosure along with a test kit and 2 and 1-1/2 inch fittings. **ClearWater Enviro Technologies**, Clearwater, FL.

Pool/Spa Heater

Circle 147 on Reader Service Card

PENTAIR offers the MiniMax NT TSI, a pool and spa heater that runs on natural gas and is equipped with a two-stage ignition system for a reliable ignition sequence and dependable flame stabilization. Other features include digital control to within half a degree Fahrenheit, lightweight insulation, non-corroding jacket construction, reversible headers and easy remote connections that need no special wiring. **Pentair**, Sanford, NC.

Cover Rocks

Circle 148 on Reader Service Card

REPLICATIONS UNLIMITED offers Urestone, a line of artificial rocks designed to cover unsightly irrigation valves, telephone and cable boxes, electrical transformers, well vents and other obstructions. The 12 rocks in the series vary in size and shape to accommodate all applications and can also be used as landscaping rocks with a fraction of the weight of natural material. **Replications Unlimited**, St. Louis, MO.

Continued on page 68

Submersible Pumps

Circle 149 on Reader Service Card

MULTIQUIP has introduced three dewatering pumps designed for value, performance and ease of operation. The ST-2037, ST-2040T and ST-2047 models have two-inch lines and feature flow rates from 73 to 87 gallons per minute. Designed for removing water during construction and other jobs, all models have automatic thermo-overload protectors, stainless steel hardware and carrying handles. **Multiquip**, Carson, CA.

Waterplay Systems

Circle 150 on Reader Service Card

COM-PAC makes an array of waterplay systems, including spray features, a range of slides (from tube to raft slides) and several play elements in the Spray 'n' Play line. Designed for safe, stimulating play, the structural components are polymer-coated stainless steel and can be used with the company's own collector tanks, filtration systems and zero-entry/deck-level gutters and gratings. **Com-Pac**, Jacksonville, FL.

Pool-Equipment Signage

Circle 151 on Reader Service Card

SNAPMARK offers the Poolmarker system of plates for use in labeling various lines on equipment pads – complete with directional arrows to mark the direction of air or water flow. The markers simply snap around standard residential pool pipes; the installer then adds peel-and-stick labels to indicate various system components – pool or spa suction and return, cleaner lines, blower lines and more. **SnapMark**, Ormond Beach, FL.

Natural Stone

Circle 152 on Reader Service Card

TRIBECA STONEWORKS offers a collection of the hardest and densest of all available limestones in a variety of unique finishes and colorations. Imported from sources around the world, materials are selected in accordance with standards of the Marble Institute of America and include Ramon, Jerusalem, Canaan, Benjamin, Galil, Hebron and Corton stones cut for use in a range of patterns. **Tribeca Stoneworks**, New York, NY.

Heat Pumps

Circle 153 on Reader Service Card

AQUA COMFORT TECHNOLOGIES offers heat pumps for swimming pool systems. Designed to extend the swimming season, the devices use cheap, available heat that would otherwise be wasted to keep pool water warm with no harmful emissions. They also feature digital control for one-touch programming, more efficient performance and easy use and maintenance. **Aqua Comfort Technologies**, Sykesville, MD.

Low-Voltage Lighting

Circle 154 on Reader Service Card

CAST LIGHTING manufactures low-voltage lighting fixtures for outdoor applications. Handmade from solid, sand-cast bronze, the fixtures are nearly impervious to corrosion and physical abuse and take on a soft greenish color with age unless sealed to maintain the bronze color. Internal components and connections have been selected for durability and reliability. **Cast Lighting**, Hawthorne, NJ.

Spa-Jet Catalog

Circle 155 on Reader Service Card

ITT HYDROAIR has introduced jet models 10-4100 and 10-4100S – improved versions of its HydroJet. Designed specifically for use in concrete spa and pool construction, the jet body is available with either a threaded socket or a slip socket that accepts standard 1-1/2-inch PVC pipe. Made of clear PVC, the assembly includes an extended nozzle and works in a standard wall fitting. **ITT HydroAir**, Brea, CA.

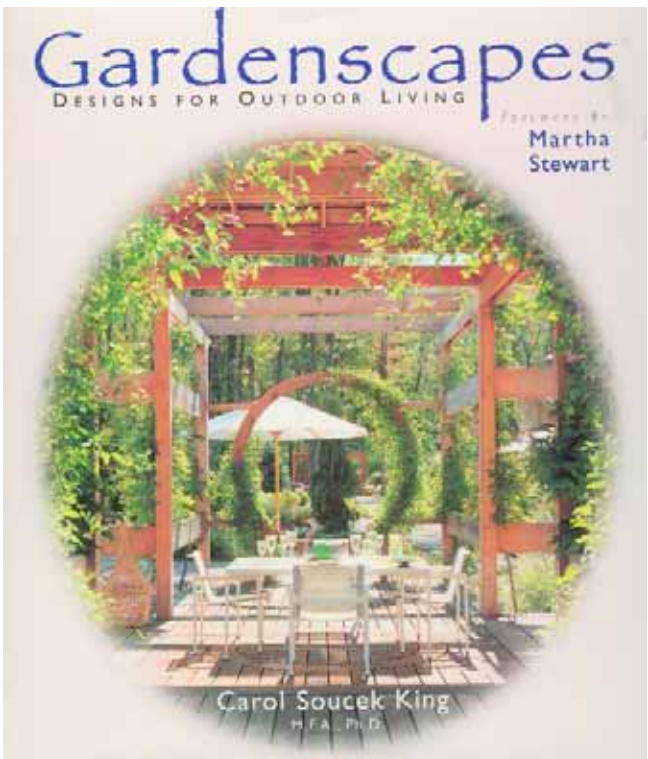
Ceramic Aggregates

Circle 156 on Reader Service Card

COLORED AGGREGATE SYSTEMS offers Aqua Gems ceramic colored aggregates. Designed for use in standard plaster mixes, the material increases visual appeal while providing long-term color stability and greater chemical resistance. It comes in three grain sizes, with eight standard colors for the smallest size and two for the largest. Custom colors are also available. **Colored Aggregate Systems**, Leesburg, FL.

By Mike Farley

Guided by Style



The famous landscape architect Thomas Church was known to proclaim, "I have no style." What he meant was, rather than impose a style that was characteristically his on a project, he preferred to let the home, site and clients guide the stylistic details of his work.

I've always admired Church and other designers who are willing and able to move comfortably across the style spectrum in accordance with the situation. This is certainly how I've chosen to approach my own design work, even when I find the huge range of possibilities a bit perplexing.

To be able to work in such a malleable way, of course, you need to be familiar with an array of styles and comfortable with the nuances of classifications stretching from traditional to contemporary. Carol Soucek-King's *Gardenscapes: Designs for Outdoor Living* (PBC International 1997; distributed by Rizzoli International) offers watershapers a wonderful survey of landscapes in five of the most common of these classifications.

A well-educated and accomplished designer in her own right, Soucek-King uses a series of case studies and interviews with prominent designers to focus on residential landscapes. Along the way, she breaks down the elements of the most familiar styles and establishes a working vocabulary that expands the reader's options.

The book's five sections cover Eastern inspirations (which features a look at one of the most beautiful Japanese gardens I've ever seen); Mediterranean classics; naturalistic settings; formal elegance; and country style. The text is beautifully illustrated, with scores of images generously spread over its 175 pages and including a range of specific ideas and treatments under each of the five main headings.

One of the things I find most useful is the author's attention to spaces that are on a scale most of us run into most commonly: Rather than focus exclusively on sprawling high-end estates (as too many books do), the majority of the projects here are in spaces that align with middle- and upper-middle-class homes. To be sure, there are some large-scale projects here, but there are also wonderful treatments of small spaces in courtyards and small gardens.

Although nothing in this book comes across as particularly earth-shattering or revelatory, you'll find a nice variety of treatments within each style. It's also interesting to see how differently the designers she includes will interpret something as familiar as "country" style, for example. She also includes wonderfully descriptive passages about planting palettes, and because the book encompasses projects from across the United States (with just a few from overseas), there are useful discussions of micro- and macroclimates.

I particularly enjoy the way she defines the potential of garden structures, including some extremely creative treatments for fences, gates, paths, shade structures and swimming pools – and the fact that she pays special attention to some of the interesting materials selections made by the designers she interviews.

Watershapers take note: Most of the projects in the book feature water, and about two-thirds have swimming pools. These watershapes are not the primary focus, but the author certainly does a nice job of showing water used within the bigger design-style picture. WS

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

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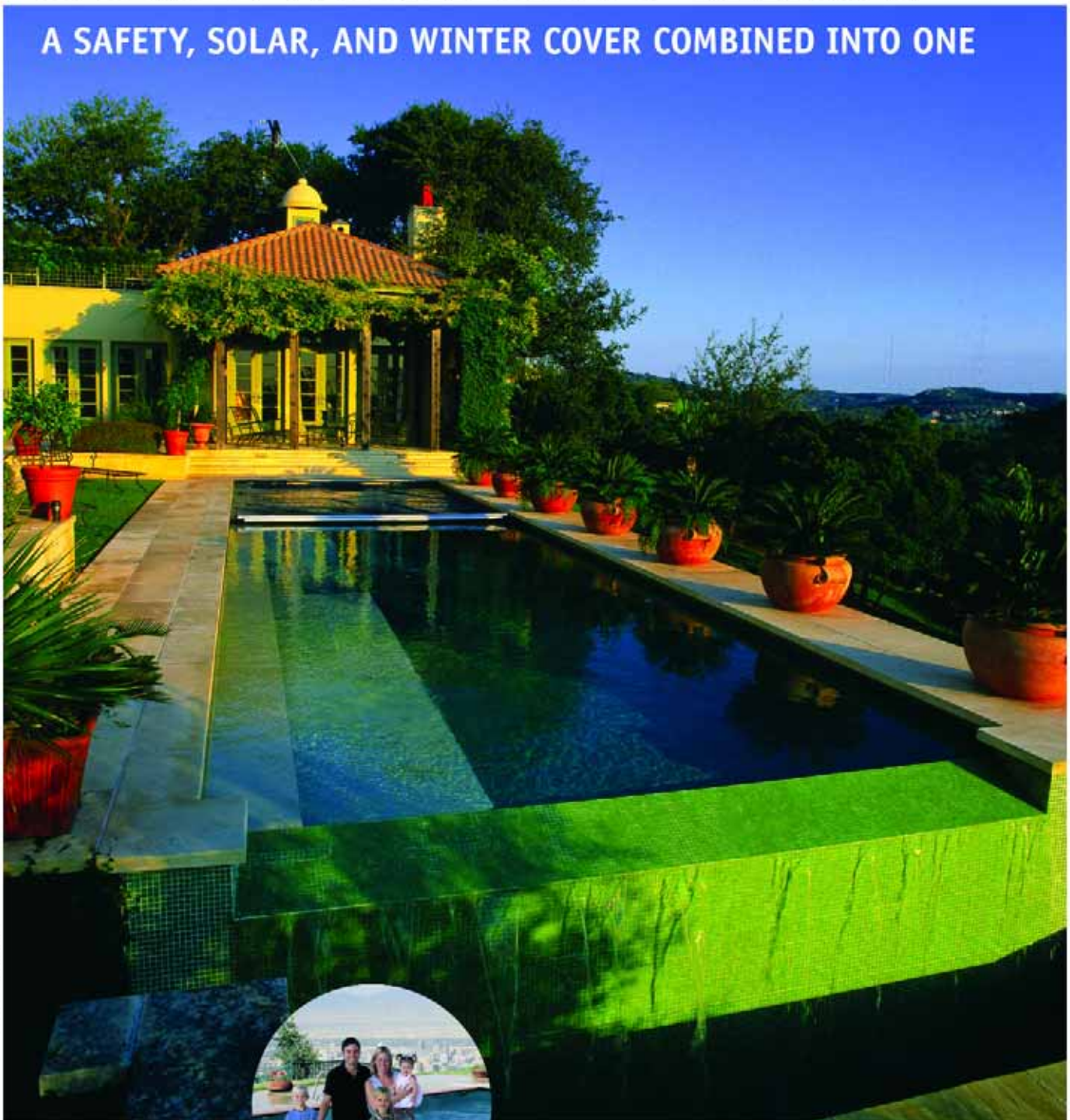

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