

Inside: Brian Van Bower on Aquatic Artistry

# WATER SHAPES

Design • Engineering • Construction

Volume 2  
Number 6  
August 2000  
\$5.00

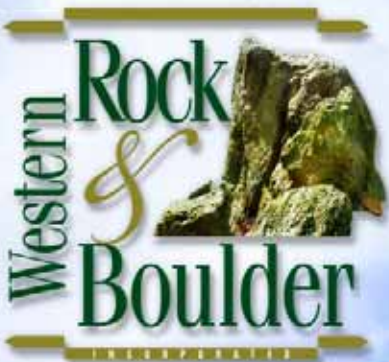
## RECTANGULAR RHYTHMS

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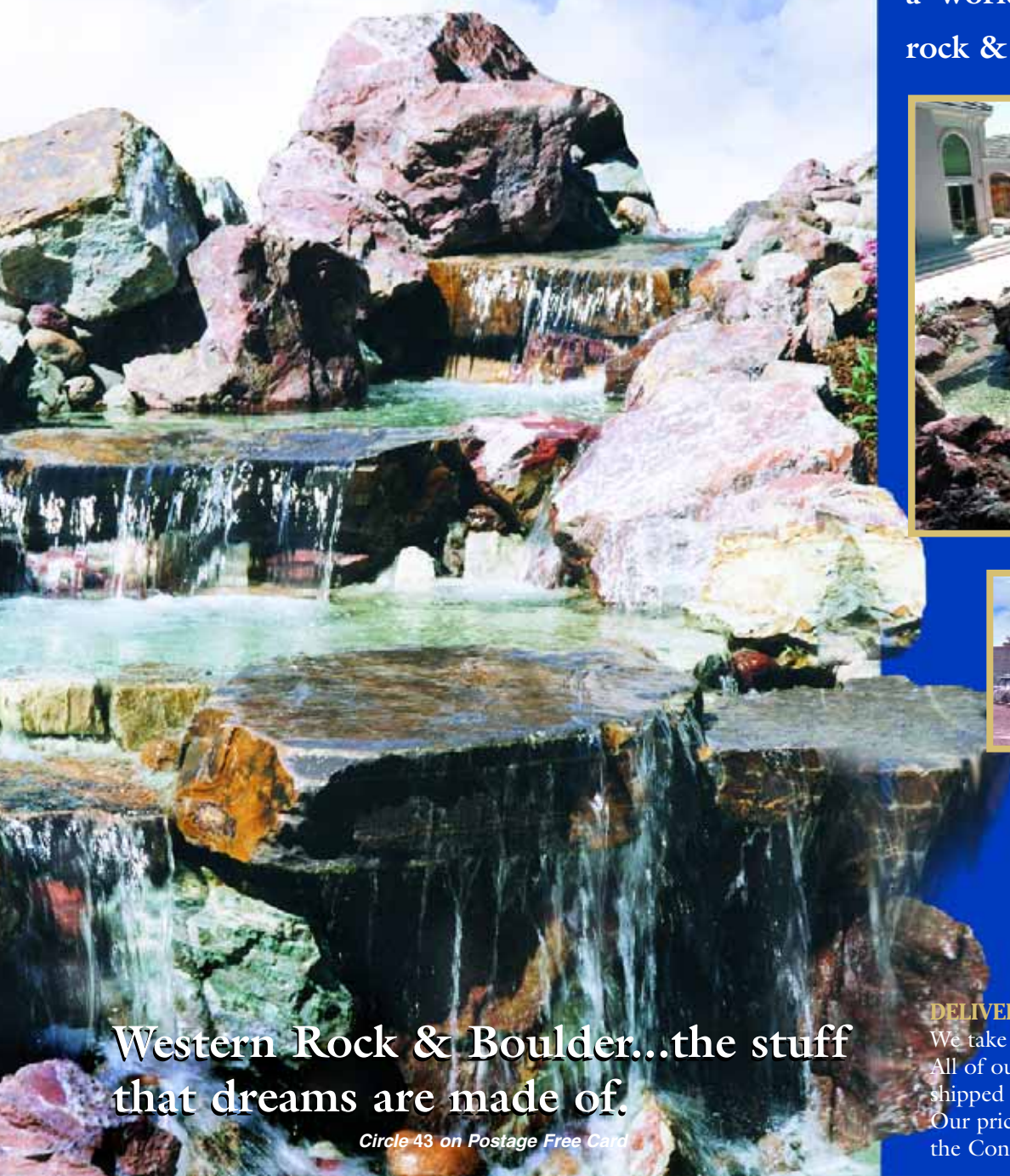
Wildlife habitats and  
the design challenge

**PLUS:**  
Defining a role for  
computers in watershaping



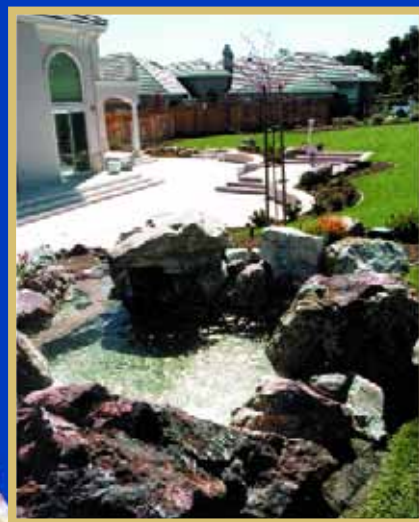
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Photo by David Tisherman, David Tisherman's Visuals, Manhattan Beach, Calif.

WATERSHAPES (ISSN 1522-6581) is published monthly with combined issues April/May, June/July and November/December by McCloskey Communications, Inc. 6119 Lockhurst Dr., Woodland Hills, CA 91367. A controlled circulation publication, *WaterShapes* is distributed without charge to qualified subscribers. Non-qualified subscription rates in the U.S., \$30 per year; Canada and Mexico \$48 per year; all other countries \$64 per year, payable in U.S. funds. Single copies \$10 per issue in the U.S. and Canada. All other countries \$15 per issue. Subscription requests must include name, job title, business location, address information and a signature and date.

**POSTMASTER: Send address changes to *WaterShapes*, P.O. Box 1216, Lowell, MA 01853-9930.**

Periodicals postage rates paid at Woodland Hills, CA 91365 and additional mailing offices.

# Comfort, Fun and Beauty

Frank Lloyd Wright once said that architecture is the art form to which all others subordinate. That's a bold comment from a man whose amazing achievements were matched only by the massiveness of his ego – but his words hold a profound truth just the same.

Indeed, many have argued that the design and construction of our own environments is the highest expression of human creativity. These built spaces surround us and influence the nature and quality of our lives. Homes and workplaces, public venues and outdoor areas – all are places in which what we see, hear, touch, smell and taste are inspired either wholly or in part by the will of the man or woman who designed and coordinated the space.

That's why I see watershaping as being so compelling: Through your work, you create these influential spaces for human occupation. You create places to be, places where fun and beauty come together to provide distinctive experiences for all who walk to the water's edge.

If you think I've run off into some philosophical fantasy land, look at it this way: Whether you recognize it or not, the creative decisions you're making on the projects you're doing right now, in the waning days of the summer of 2000, will be a part of other people's experiences for years to come, time and time again.

When you look at it that way, watershaping is heady stuff, very much an embodiment of Wright's ultimate art form – and something worthy of philosophical reflection. What makes your work so powerful is not only that it involves all the senses, but that, like architecture, it's also a fusion of form and function.

This all came to mind as I took another look at Steve Lucas' story in this issue (page 36). Instead of human clients, however, Lucas was asked to create watershapes in a habitat for a pair of Bengal tigers. To do it right, he looked at the world from the animals' point of view and designed and built a space that served their physical needs while mimicking their native environment.

As Lucas reports, he and his team spent a great deal of time studying jungle settings and translating them as closely as possible to South Florida. On one level, it's a fascinating design/build story, but when you look at it from a broader perspective, what Lucas did for the zoo's two tigers is much grander – and something *you* are implicitly asked to do for your human clients every day.

In a sense, building "habitats for human beings" means looking at their needs and desires with both form and function in mind – and taking those requirements as seriously as Lucas and company did when it came to the tigers. It means considering interactive elements such as shade structures, footpaths, restrooms, cooking facilities and entry to and egress from the water. It means building an environment where the needs of a person at rest are considered alongside the needs of the person at play or exercising.

This process also entails your consideration of the needs of parents to supervise their children, to serve drinks to guests, to listen to music and to see at night. It means understanding and considering all the things that can go on in the space you create and factoring those needs and experiences into your creative output.

When you succeed in all of this, you provide your clients with an integrated habitat that satisfies both body and spirit. Not a bad day's work, I think.



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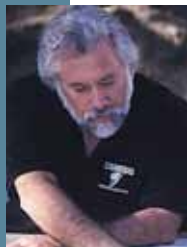
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# IN THIS ISSUE

## AUGUST'S WRITERS



**TISHERMAN**

**David Tisherman** owns and operates David Tisherman's Visuals in Manhattan Beach, Calif. A designer and builder of high-end custom swimming pools since 1979, he is widely known in the pool and spa industry as an advocate for the highest possible standards of design, engineering and construction. He has degrees and credentials in industrial design, scientific illustration and architectural drawing from Harvard University and Art Center School of Design and has taught architectural rendering and presentation at UCLA. An award-winning designer, he serves as an industry expert for California's Contractor State License Board and has been a member of NSPI's Builders Council since 1994. Tisherman is a co-founder of and principal instructor for the Genesis 3 Design Group

**Steve Lucas**, president of Innovative Pool Plastering in Coral Springs, Fla., has been in the pool-construction business for more than 20 years. He is no stranger to large-scale projects: While president and owner of Aquatic Concepts, a commercial and residential construction firm, he supervised all elements of construction for the \$1.5 million pool for the Marriott Hotel & Casino in San Juan, Puerto Rico. He also has worked extensively as a construction and hydraulic-design consultant and as a pool-chemistry instructor and field consultant. He also served on the supplier side of the market, working as national sales and technical-services manager for C.L. Industries, a supplier of interior surface materials, before founding Innovative Pool Plastering. Lucas has been active in both the



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Interested in writing for WaterShapes on design, engineering or construction topics? Contact Eric Herman at (714) 449-1996!

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**Chris Walton** is a designer for Florida Bonded Pools of Jacksonville, Fla. He's been using CAD systems in his work for more than four years, for the most part on residential projects in the custom mid-range to high-end market but with occasional forays into commercial design. An accomplished CAD operator, Walton has also worked as an independent consultant assisting other watershapers in implementing their computer-aided design systems. Walton's career began in the nuts-and-bolts end of the business: He has experience in steel installation, plumbing and concrete forming.

**Paul Ryan & E.C. Medley** are co-owners of Texas Pools in The Woodlands, Texas, and have been working together in the construction of custom residential projects for an affluent Houston-area clientele for more than 20 years. They didn't start out as partners, but they worked the same market using many of the same sub-contractors. Recognizing a common approach based on quality work, attention to detail and innovative design, they merged operations to form their current company, which now builds more than 150 pools each year and operates offices in The Woodlands and Spring, Texas. Many of the firm's pools have received NSPI Design Awards and have appeared in a variety of trade and consumer publications.



LUCAS

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# Wanted: Water Artists

By Brian Van Bower

**T**he way I see it, we watershapers can look at ourselves in one of two ways: as diggers of holes in the ground that hold water, or as artists working with one of the most exciting mediums on the planet.

For a lot of reasons, I like the second of those options, because the first is passive – the sole goal being to contain the water – while the second gets me more deeply involved with a truly amazing and malleable material.

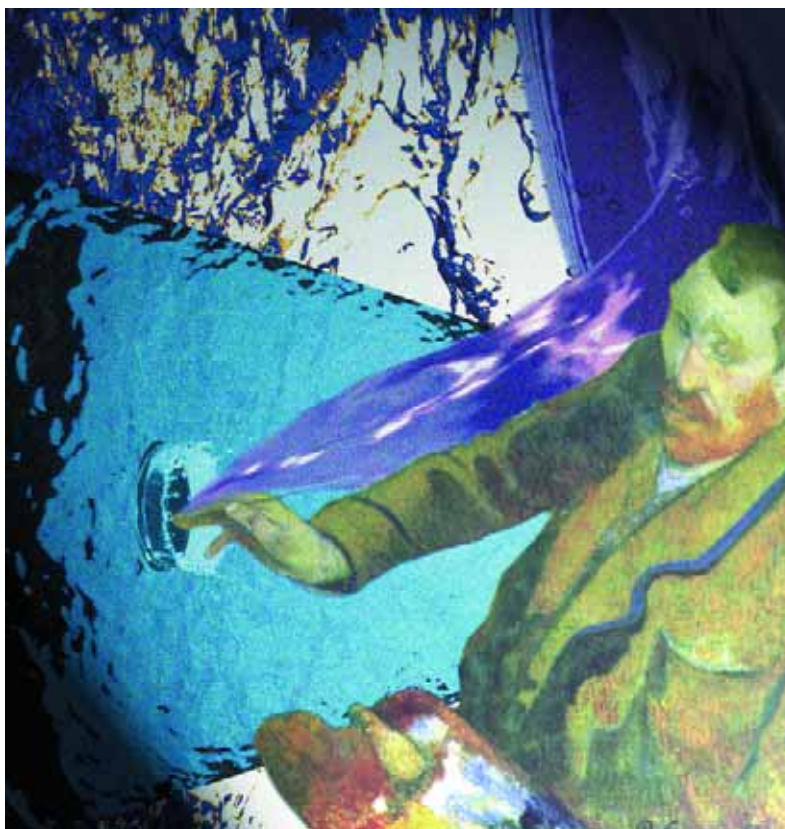
Once we look at water the way a painter sees pigment or a sculptor views stone, we see a potential for dramatic contrasts: Water has a soothing effect, for example, yet it can be tremendously exciting and invigorating. It can ease your tired muscles, or it can challenge you to intense exercise. It can cool you off when you're hot; it can warm you up when you're cold. It can float in the air like a butterfly or grind away a mountain.

For all of the beauty and interest we can add by using various construction materials in and around the water, that stuff is flattened without the key, central ingredient in watershapes – that is, good ol' H<sub>2</sub>O.

## Watercolors

It's that H<sub>2</sub>O that affords each and every one of us the opportunity to become a true artist, to create something that has a genuinely profound effect on everyone who ventures near it or boldly decides to take a dip.

To my mind, that profound effect is the hallmark of the true artist: He or she has an ability to translate a broadened and enlightened perspective into a work of physical beauty and emotional power. In other words, artists are able to look at the world and use what they see to create meaningful works within a given medium. And even though we may not exactly think of it this way very often, I believe that is exactly what hap-



**It's that H<sub>2</sub>O that affords each and every one of us the opportunity to become a true artist, to create something that has a genuinely profound effect on everyone who ventures near it or boldly decides to take a dip.**

pens with many watershape designs.

If you doubt it, take a moment to consider all the ways that we see water in our environment, both man-made and natural. Now consider how those influences have already shaped our work.

The pool industry is full of dramatic examples: The sight of water spilling over a dam wall first inspired the vanishing edge. Zero-depth entries were created to mimic beaches and shorelines. Waterfalls and streams come from nature, too, while distinctly architectural forms such as fountains take their inspiration in natural forms such as rainfall, surf crashing into the shoreline, geysers and natural springs.

Not long ago, I was contacted by a potential client in the Midwest who wanted to know if he could have a wave pool in his backyard. Took me back a step, I must say, because these extremely sophisticated hydraulic



systems – designed to mimic one of nature's most dramatic aquatic forms – cost waterparks and resorts hundreds of thousands of dollars.

As I considered this inquiry, my mind rambled back to experiences I had as a young man (well, bum) taking care of a swimming pool for a local seaside resort. Every now and then, I'd spend the night in the pool house and invariably end up listening to the sound of the waves lapping against the shore just a few feet away. Sometimes it was gentle, other times it was intense. Both ways, those are among my most pleasant memories.

As I think about beach entries in swimming pools, these memories have inspired me to consider ways that, even if I can't introduce three-foot 'combers into this client's backyard pool, I can recreate the sound and effect of surf lapping onto the shore. I'm not quite sure how to do it just yet, but I know it can be done – if not for this particular client, then for another.

That pool, when it comes, will fall within my definition of a work of art.

### Drawing on Experience

Earlier this year, I designed an elaborate watershape for a client who wanted a waterfall that created a flume that would spill into a swale that would feed a stream flowing beneath a cantilevered deck.

This, to say the least, was an elaborate design and resulted in a beautiful set of drawings – but it was one of those situations where the package far exceeded the client's budget. I was paid for the design; the customer took the drawings and went off to consider her options.

Several months went by before she called me back. When she did, she was really excited, she said, because she had found a sculptor by the name of Bart Rubenstein who created amazingly elaborate sculptures that all use water in one way or another. She had seen several of his pieces on the Internet, bought one, and wanted me to meet

with the artist to discuss how we could work together in using her acquisition.

What she had found in a single piece of sculpture, compact and efficient, conjured enough of that sense of waterfall, flume, swale and stream combined that it satisfied her desire and brought me back into the loop to help bring it all together. I have to say I was pleased to be asked to participate.

So I met with Mr. Rubenstein and had the pleasure of reviewing his portfolio and watching a video on his work. I was completely blown away by his inventiveness and creativity in blending water, metal and other materials into complex, kinetic structures. After the meeting, he sent me a letter that contained a single passage that I believe really sums up this entire issue of water-as-artistic-medium:

"As if some mysterious primordial force were at work," he writes, "the sounds of water and its flow penetrate and mesmerize one's soul like no other

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material. Whether it be water gliding around the stones of a river or a raging waterfall, water can elicit a sense of delight or pensive introspection. These seemingly contrasting responses originate from a common emotional core."

What struck me most about my experience with Mr. Rubenstein and his sculptures was watching the way that

my client responded to his work. It wasn't that she was taken by the technical complexity of these moving structures. Nothing about the hydraulics, engineering or sheer inventiveness impressed her the way it impressed me. Rather, it was the beauty of the water itself: She was simply fascinated, utterly transfixed by watching it move.

## Brushes and Palettes

That brings up a point: I think that sometimes, we watershapers sort of fall in love with the engineering and technology available to us.

Let me be clear: I'm in no way implying that technical skill isn't of huge importance; rather, what I'm saying is that we tend to pursue technology with the thought that bigger is better and more is better and that the virtue is in the technology rather than the effects it can create. With this approach, artistry is a weak cousin – and I don't think any watershaper should let that happen.

Last year, when I attended The Whispering Crane Institute in Nelsonville, Ohio, a few of us took off and toured a canyon that was first carved by glaciers and then sculpted through eons by streams and rivers. I described this visit in detail in a previous column, but it bears mentioning again because of what it says about how watershapers *should* look at water and how our clients *do* look at water.

We all walked through this amazing landscape half expecting to find dinosaurs just around the bend. It was so clearly ancient, but also clearly a work in progress as you could see where flooding had washed out a walkway or bridge. As we moved along, I caught myself staring at a tiny waterfall.

We knew from the signage that this was in fact a major cascade and tourist attraction in winter and spring, but we were there in August (and in the middle of a terrible drought besides), so just a trickle was on view – probably no more than runoff from irrigation in the parkland above.

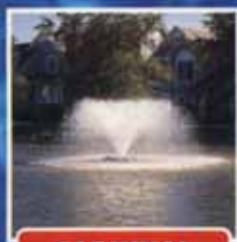
I thought to myself, if a pool builder designed and built a similar feature with these huge boulders and dramatic elevation changes, it would invariably be made with an aggressive flow of water and the biggest pumps and piping he or she could lay hands on. But when I stepped back and considered things from an artist's perspective, I drank in the subtlety of this small flow and appreciated the way it made the effect even more captivating.

Try it on for size: These moments of personal epiphany can happen at al-

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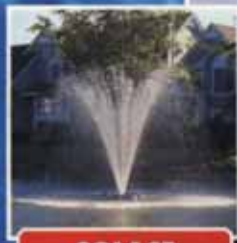
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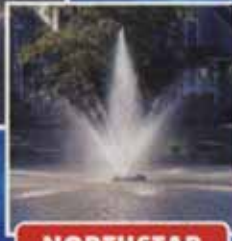
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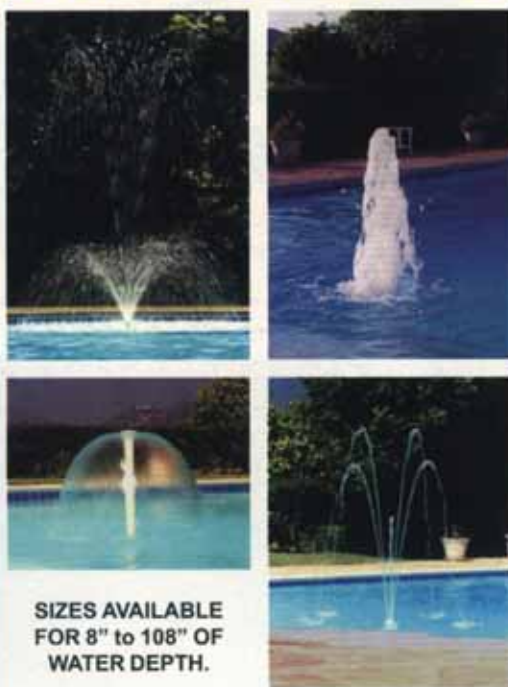
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Continued from page 14

most any time.

My wife and I went sailing recently. At one point, becalmed at anchor, I noticed that Gina was quietly staring off into the distance. At first, I was worried that maybe I was in trouble and getting the silent treatment, but when I asked, she told me that she was enjoying the way the light from the sun was reflecting on the water's surface.

"It looks like millions of sparkling diamonds dancing on the ocean," she said, which started me thinking about the way light reflects off the ripples on the surface of a swimming pool and how, as a watershaper, I have this wonderful opportunity to use such an effect to excite and delight my clients. I thought about the way the moon looks when it rises over the ocean or a lake, or the way a single light source can either dance on the water - or reflect and capture the stillness of a glassy surface.

### The Play of Light

It wasn't long after Gina's observation that I met a client who asked if I could manipulate lighting so that the water would reflect a rippling effect on the ceiling of an overhang near the pool. Again, I was struck by the thought process at work here.

We've all seen the ripples of light reflecting on walls, trees or trellises, but I had never before considered *deliberately* using this effect in a project. It's another instance in which a client had been inspired by an incident to seek out a way of repeating the pleasure or that experience over and over again.

The artist in me appreciates that level of insight in other people, while the businessperson in me increasingly realizes that there is real currency - emotional, financial and aesthetic - in this sort of rapture.

I've had experiences of my own that I'm now thinking about recreating in my watershapes. One in particular is the effect of mist and fog, something I've enjoyed often during Genesis 3 schools at Morro Bay on California's central coast. Morro Rock is amazing - a mountainous boulder that erupts from the bay. Most mornings it starts off draped in fog, and I'm fascinated by the various ways in which it gradually



reveals itself. Combine that with a bit of New Age or classical music and it's an experience I'm happy to pay for — truly evocative on an emotional level.

Sure, we may not have that sort of dimensionality or weather and tides to work with in our watershapes, but I'm now bound and determined to find evocative ways of using mist and fog on a smaller scale to conceal and reveal rockwork or landscaping adjacent to the water's edge.

One last example: I've used mist and rain effects for many years in some of my spa designs. Recently, I've been thinking about how these effects might be used on a larger scale with pools to create a new sort of evocative experience, and I was happy to see several fixtures at the NSPI Expo in Las Vegas in 1999 that would serve the purpose.

Just think what an amazing thing it is to be caught in the rain and the feelings of exhilaration it evoked in you when you were a kid. That in mind, this idea of creating rain and using the *sound* of rain to add yet another layer to the backyard experience really takes shape for me. It's yet another remarkable aesthetic effect that's there for anyone who chooses to use it.

### The Real-World

I think there's an understandable tendency to regard discussions like this as pretty esoteric — interesting, perhaps, but not all that useful to people wrapped up in the day-to-day world of designing, engineering and installing watershapes. It's a steel and concrete thing, they say, not an abstraction.

I used to feel that way, believe me, and I'm still known to share a humorous remark or two at the expense of the overly artistic among us. As I've delved further and further into the importance of purely aesthetic issues, however, I've found that there is tremendous practicality in understanding the emotional impact of water, and I now realize and proclaim with confidence that this is, in fact, what our clients are *really* after.

At first, the idea of our being artists may not fit so neatly on a group of people who toil in the sun laying steel, setting boulders and shooting gunite. Some of you might even get a chuckle thinking of yourself or the local pool builder down

the street putting on airs and trying to become some sort of Picasso or Michelangelo, but I say enjoy the thought.

I say enjoy the thought and let the path to true artistry begin with the water by allowing yourself to see it for the amazing thing that it is — and the amazing thing your customers want it to be in their projects.

*Brian Van Bower runs Aquatic Consultants and is a partner in Van Bower & Wren, 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.*



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## From Eyesore to Asset

By Stephanie Rose

Is one person's trash really another person's treasure? That's a concept we tested on a recent *Surprise Gardener* episode, where we ran into a strange backyard "centerpiece" and, as the designer with final say, I had to decide whether to cover the thing up or make it stand out.

The challenging *objet d'art* was an old truck chassis, abandoned and sunk into the yard many years before. Because of its location, it was something of a focal point. The homeowner had tried sticking an old whiskey barrel in the middle of the truck as a planter in hopes of "beautifying" it, but no such luck.

Once I surveyed the scene and gave the yard some thought, however, I knew we could have fun with the truck by turning it into a watershape.

### A Little History

The great part about this yard is that it's a snapshot of California history. The chassis practically leans up against the original house built on the property in the early 1900s.



The house is no longer a residence, but the owners still use it for storage. As you can see in the "before" photos on this page and the next, it has a rustic charm.

The property originally was surrounded by thousands of acres of citrus groves that blanketed the San Fernando Valley of Los Angeles until the 1950s. At that point, land values drew in the developers and drove out agriculture. Some of the citrus trees that were planted in the early 1900s still exist, and you can still spot a substantial grove here and there, but, unfortunately, most of the farms and organized groves have been pulled out to make way for far too many strip malls and housing tracts.

I offer this quick history lesson to set a stage: Upon seeing the original house and its weathered "accessory," the last thing I wanted to do was cover up that chassis. I saw it as an opportunity to play off of the feeling created by this historic setting, rather than level everything and start fresh.

I also was lucky in this case that, as part of the *Surprise Gardener* show, I was able to design a yard without much input from the homeowner beyond an expression of general preferences, like "a cottage garden." (Of course, it's best if the homeowner is *happily* surprised at the end of the show. I'd much rather hear "Oh my, this is incredible," rather than "What's this?" – if you know what I mean.)

As I contemplated the overall design, I conjured a vision



of what this truck might have looked like on an old farm road many years ago – sort of like *The Grapes of Wrath*, with hot, dry landscapes and trucks breaking down with overheated radiators – and I had my basic concept. Then I thought about where the water would go and conjured a little pond. (My vision was pre-antifreeze, so we're not talking day-glo green.)

Now came the tough part: getting the crew excited about creating a watershape from an old truck whose radiator had overheated and sprung a leak that flows into a puddle-sized pond – and persuading them that it was not only “doable,” but that it could be done all in one day. (That's our *Surprise Gardener* promise.)

It would definitely take ingenuity and some open minds.

### Keeping It Simple

The final design called for an irregular-shaped pond, playing off the idea of the leaky radiator leaving a puddle in



front of the truck.

I marked off an irregular shape. The crew dug the entire pond down one foot and then dug about a third of it down an additional six inches to give us enough depth to vary water-plant sizes. (Generally, the larger the container, the more depth is required for

the plant to sit at the correct level.) We later could make any necessary adjustments by placing some of the containers on bricks.

Next, we placed a PVC liner in the hole and filled it with water. We used river rock to hide the edge of the liner. This was appropriate, because riv-



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er rock also had been used on a decorative wall in front of the house alongside the truck and helped to tie the new watershape in with existing elements – always an important design point.

After trimming the PVC liner, we planted around the perimeter of the pond, hiding any traces of the liner and softening up the edge and further helping to blend the pond and truck into the rest of the landscape.

Finally, we placed the pump in the pond and ran tubing up through the truck and out one of the existing holes in the front panel. Additional river rocks were used to hide the tubing at the base. We then attached a decorative nozzle on the end of the tubing; this not only created a nice stream of water, but also secured the tubing to the truck.

We found some decorative lanterns that made great headlights for the truck. In just a few hours and as you



can see in the “after” picture (above), we turned what was basically an eyesore into a beautiful, fun and creative feature in a landscape that now had a story to tell.

It’s safe to say that most of the yards you’ll be working in probably won’t

have an old truck chassis stuck in the ground, but I’ve told this story to make a point: You don’t have to start with bulldozers and a clean slate to make a design work. In fact, if you work with what you have and keep an open mind,

Continued on page 20



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you might be surprised yourself at the interesting watershapes you can create.

By the same token, if a yard has an old sculpture, arbor, architectural feature or some other prominent feature that, for some reason or other, the owner can't bear to tear out, don't start by thinking of ways to cover it up. Instead, spend some time thinking about ways to play off it and the themes it suggests.

As you go, remember it has been said that there is no original thought, only new ideas that play off existing ideas!

*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 this season in four episodes of "The Surprise Gardener," airing Tuesday evenings on HGTV.*

## Getting Creative

If you're faced with a unique yard that poses unusual design challenges, consider these few suggestions for injecting your thought processes with some creativity:

First: Have fun with your design. If you're lucky enough to have a client with a sense of humor (and it's rare to find someone who doesn't), there are countless accessories such as lawn gators, garden ornaments and statues that can turn any watershape into a conversation piece.

Second: Think about color. Depending upon your clients, this factor alone, whether introduced through plantings, tiles or accessories, can add fun and interest to any watershape.

Third: Look at any available object as a potential addition to your watershape. We've used urns, pots, watering cans, wheelbarrows and other unusual objects to create watershapes, and I loved the work of the water-shaper who used a mist machine and spout-

ing teapots to accent the wall behind one of his watershapes (see the Jan. 2000 issue, page 22). Touches like these add fun and turn an ordinary watershape into a knockout.

Fourth: Don't let yourself be bound by "strict design principles." Some of the best and most creative designers buck the system and willingly suffer the blows of critics while breaking ground for others of us who can't stand the thought of anyone criticizing our work.

If we want to shape the future of water-shaping and move it into a new dimension (as all of us associated with this magazine hope), it is critical that we think creatively and do not fear to suggest to clients ideas that may get laughed at or simply turned down. After all, the worst thing they can say is, "No, I don't want that in my yard."

And if they fired you for your ideas, you probably didn't want to work with them, anyway.

—S.R.

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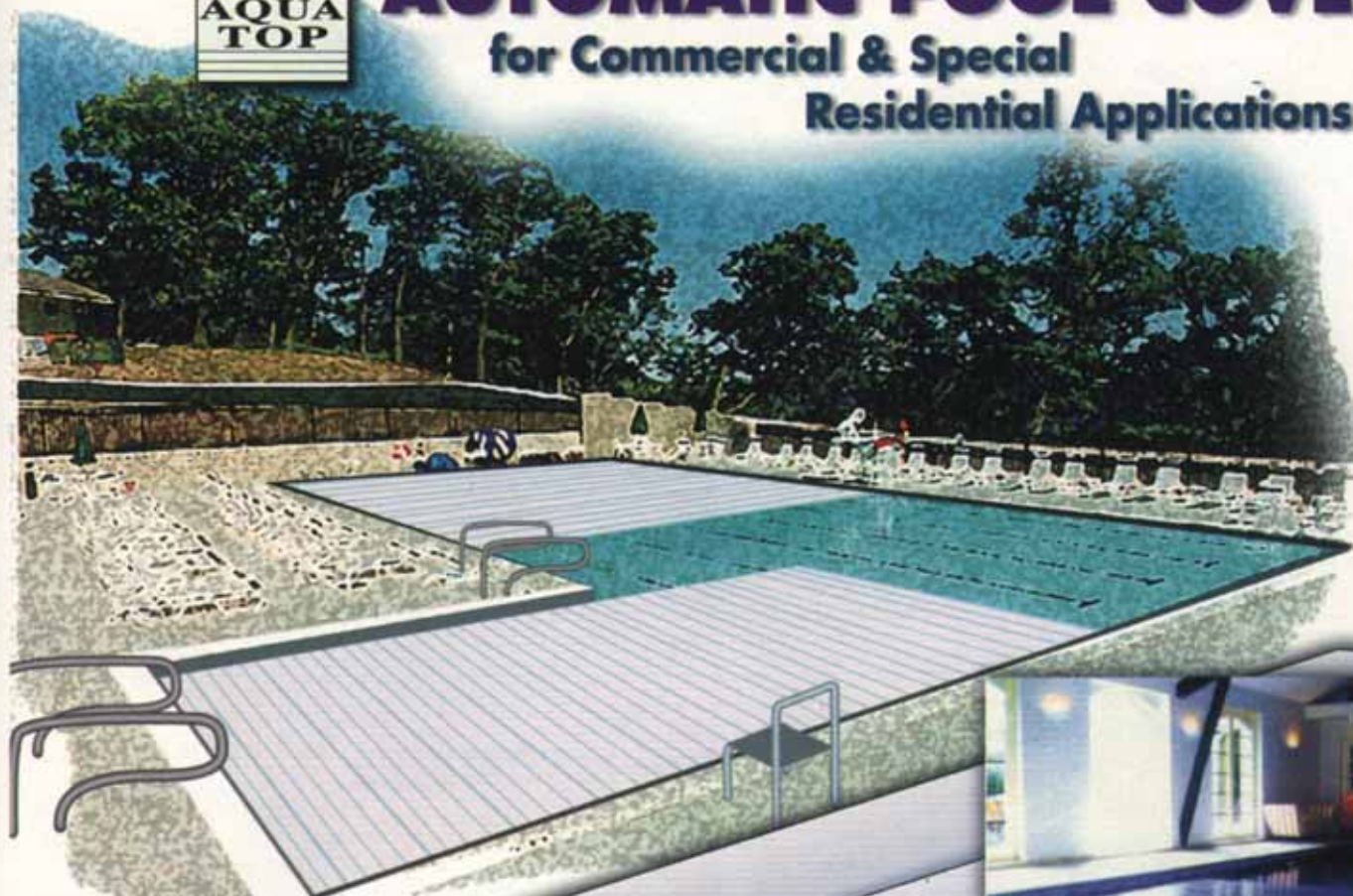
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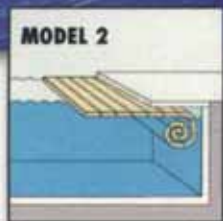


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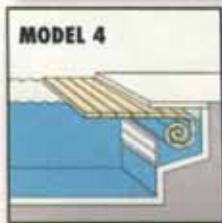
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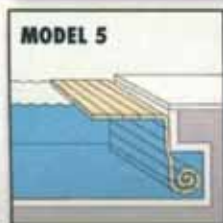
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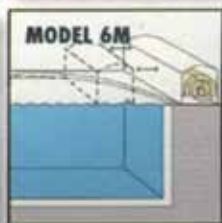
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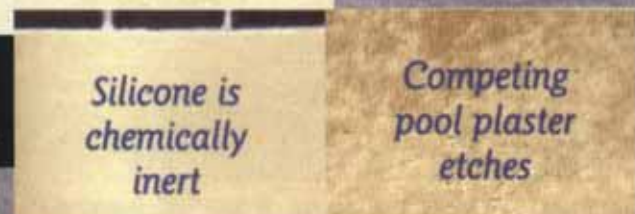
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# The Art

A large, rectangular swimming pool with a blue and green mosaic tile border and steps. The pool is surrounded by a stone deck and lush greenery. In the background, there are trees and a pergola structure.

The pool and spa are simple in shape, says builder David Tisherman, but the project was anything but: Built on a wildly unstable Southern California hillside and intertwined with extensive remodeling of the clients' home, the serene finished product contrasts starkly with tales of change orders and complicated decision-making processes – not to mention a desire on the part of client and designer to strive for nothing but the best.





# of the Rectangle

By David Tisherman

**T**his really wasn't a job for the timid. The ground was unstable, access was limited, and the customer could afford to make massive changes along the way.

Other than that, of course, the project was a piece of cake.

The truth is, I enjoy a good challenge. People who know me well are aware that I revel in tackling jobs that test my mettle—and this was definitely one of those cases. Ultimately, it turned out to be one of the most satisfying and beautiful projects I've been involved with in a long while.

The site is located on a hillside in West Los Angeles, just a hike downslope from the magnificent J. Paul Getty Center. It's a picture-perfect spot, and the setting absolutely called for something special. Working closely with the customer, the design we landed on was a stretched, 21-by-49-foot rectangular pool with an attached spa set with a cantilevered deck that juts out into the canyon's lush greenery.

Yes, you might call it a "basic rectangle." But as a designer with an appreciation of classic architectural forms, a strong feel for geometry and a sense of design history, I absolutely love that shape and know that it brought out the best in me and my crews as we worked alongside the team the customer had assembled to transform her home.

## DRAMATIC VARIATIONS

It comes as a surprise to some that I think the rectangle is the most perfect and beautiful of all pool shapes. To my eye, rectangles are striking in their simplicity and elegant in just about any space. Surrounded and enfolded by beautiful decking, gorgeous tile and warm surface materials, the clean parallel lines of rectangular bodies of water can be absolutely stunning.

Despite their visual simplicity, however, rectangles can be challenging to build. (I've heard



it said that kidney-shaped pools evolved because mass-market pool builders couldn't hit square dimensions on the nose.) Even so, I'd argue that if you can't build a perfect rectangle, you truly don't belong in the business.

In the case of this particular rectangle, there were several factors that made this job a challenge well beyond the fundamental need to build a vessel that was square and plumb. Soil conditions were awful, which meant we needed a massive concrete-and-steel substructure to go along with some top-flight engineering. And because of the limited access, we'd have to fabricate the 60-foot piles on site and reach over the home with a crane to lower them into the ground. Also, I knew we'd have to form the outer portion of the pool in thin air above a steep slope.

None of these things are terribly unusual, although it does add up to a huge amount of work that needs to be done with a high level of precision. What really took this project to an entirely different level, however, were two *massive* changes the customer asked for midstream.

The first came after we had excavated the pool, set the forms and were well into the process of setting up the piles. That's when the customer decided that she wanted something "different." Before long, everything had changed but the basic shape of the pool: The elevations, size, depth – the works.

Luckily, the change afforded some advantages: By raising the level of the pool relative to grade, for instance, a segment of an adjacent structural deck could be used as the roof over part of a wing of rooms that were being added to the lower floor of the home behind a ten-foot retaining wall and the pool. This also let us expand the space available for an equipment room to be located beneath the cantilevered spa at the southern end of the pool.

## NOTHING COMES EASY

Of course, we were right in the middle of things when the first

change order came through. The rise in elevation also meant that we had to raise the pool two more feet out of the ground – that is, raise the floor, stretch the piles, rethink the grade beams and revisit the plans for the cantilevered deck. It was the right decision in design terms, but it put us to work in a big way.

At this point, we ran into about a month of steady rain, so we had to pull off the job just before the piles were to be set. Actually, this gave us the time we needed to regroup visually and rethink the job.

Because the pool and deck structure were now to be integrated (in part) with the structure of the new wing of the home, we needed to align what we were doing in close communication with the general contractor, his crew and the other trades on site. In fact, if I had to point to a single most important lesson to be learned from this project, it would have to be the value of partnering to work through challenging situations.

In fact, we needed that partnership to work smoothly every step of the way, because later on, after we had accommodated the first big change and had moved into final stages of construction, the customer changed the scope of the project again, this time asking us to add another section of cantilevered concrete deck off the far side of the pool's perimeter.

In the original design, the deck cut off about halfway along the far-side length of the pool and left a gap for what was to become a flight of steps leading to the lower portion of the property. That idea was discarded in favor of extending the deck along the full length of the pool – a massive expansion of deck over a sheer, unstable slope, which meant that it had to be fully integrated into the structures we'd already set up.

Again, it was doable – but the engineering had to be rock solid or we'd face the possibility of having tons of concrete and stone tumble down the slope someday.

Some of these spatial relationships are tough to describe in words, so let's take a pictorial walking tour of the project, start to finish.



## A Site to Behold

For all intents and purposes, the project started with a stretch of lawn and dirt in back of a large, rambling house on multiple levels. There was a lot of old brick and flagstone on the existing deck, an existing fire pit and a huge ash tree at the top of the slope (A) – all of which were to come out.

The original plan called for setting the pool about two feet below the level of the original patio adjacent to the house's upper level and about eight feet above the slope at the far end over the hillside. The hill sloped off at about 2:1, the bedrock was down at least 40 feet, and we knew massive friction piles would have to be sent down to competent soil to support what ultimately would be a *tremendous* amount of weight.

Our soils report confirmed our suspicions: There was water moving horizontally through the bedding planes and, as might be expected, chances of failure with anything less than bulletproof construction were exceedingly high.





## The Big Dig

Once we'd done some excavating, we began setting our forms. The top of the form seen in (B) was set to align with the *original* deck's level – but that old level is something I never trust: Many times, old decks were pitched to channel rainwater to one side or the other rather than to central drains. In this case, the decks were pitched downslope and everything was crooked, so we brought in a transit and shot new elevations.

We set our basic forms using the high standards I always apply, including two-by-four forming lumber and two-by-four kickers every 24 inches rather than the usual bender-board and one-by-three kickers. It costs a few hundred dollars extra to do it my way, but I see it as a cheap means of making certain everything stays square and at the proper elevations.

The soil we found beneath the pool was junk, as the soils report had led us to expect: Piles and grade beams would indeed be an absolute necessity. Once we knew the elevations, we marked the positions for the grade beams and five piles (seen in B) and began drilling (C), in some cases down to a depth of more than 50 feet.

We set the cages for the piles on site (D) – there just wasn't room to do it any other way – and brought in a crane to reach over the house and move them into place when the time came (E). The cages consist of #7 rebar tied with loops of #3 rebar at six inches (note the spacers set like thorns along the structure to keep the cage centered in its hole). The piles would later be tied to the grade beams using #5 and #6 rebar as hooks and sleeves.



**F**

## A Time to Change

While we were digging the piles, the customer decided she wanted something different. We took advantage of a spell of wet weather to meet and run through several rounds of perspective drawings.

Eventually, the revisions called for raising the deck and pool by two feet, creating space both horizontally to allow for an expansion of the deck area and vertically to clear space beneath the spa to accommodate the equipment room and some enhancements of the home remodeling.

Fortunately, we knew about this change in time to build temporary frames and add Sonotube collars to the holes to extend the piles by two feet (F). Big #6 bars were tied into the top of the pile cages to transfer the load of the grade beams.

Once the piles were poured, we brought in a Bobcat to remove the spoils from the deep drilling and set the pool at its new height (G) – now with a much larger portion hanging out in midair. This put some extra pressure on the forming crew to hold to tight tolerances – especially when it came to the cantilevered concrete deck that was to hang eight feet off the side of the pool – 12 inches thick next to the pool, 10 inches thick at the outer edge (H).

Next, we set drains and backfilled the floor of the pool using spoils from the original excavation. In this case, we could've used anything at all because the soil isn't structural. In fact, all it does is act as a bottom form for the shell.

**G****H**





## Nuts, Bolts and a Spa

Reforming the pool to the new specifications took a while, but once we were set, the crews arrived to place the plumbing and hang the steel (I).

My approach to plumbing and hydraulics didn't just occur to me overnight. I've spent years learning what works and what effects can be created when it's done the right way. And I give a lot of credit to my friend and Genesis 3 partner, Skip Phillips, who has taught me more about hydraulics in the past two years than I'd picked up elsewhere in the previous ten.

I also like to use a lot of steel. It may be called overbuilding, but I sleep easy knowing that the structure you see here will survive just about anything Mother Nature throws at it – something that can't be said for many other pools in the area.

With so much steel at so many elevations, we had to install the plumbing in three or four stages. We'd lay some plumbing, stub

out the lines, install more steel and then finish the plumbing. The work was particularly complicated in the 5-by-12-foot spa, which has 16 jets (J).

At this point, we installed an interesting joint detail between the pool and the non-structural deck on the house side of the pool. We used a V-shaped, accordion-style aluminum joint to act as a sort of channel to transmit water away from the pool while it also allowed for differential movement of the structures.

This notion of accommodating differential settlement is truly important: There's a general lack of understanding that different structures with different footings made of different materials at different times and sitting on inconsistent soil will result in things moving independent of each other. When you build large, integrated structures such as this, it's absolutely critical that you plan for this settlement and accommodate the situation with necessary joints in strategic locations.







## What a Cantilever!

With the steel, plumbing and forms in place, we finally shot the pool, removing the rebound as we went: It has no place in my pools. (To save some time in stripping the forms, we'd lined them on the inside with plastic sheeting.) At this point, everything looked neatly on track (K), with the grade beams supporting the cantilevered structural deck telling quite a story on their own (L).

That calm, however, did not last, because the owner had another change in store for us: The pool and deck slabs had both been shot when she asked us to extend the cantilevered decking on the far side of the pool along its full length. We had to do it without the advantage we had in setting up the original cantilever of tying everything directly to the grade beams. Instead, we had to work with the structure I'd set up to support the steps that originally were to sweep down the back of the pool to the lower level.

In this case, and in consultation with my structural engineer, I came up with a plan that used the existing steel I'd installed for use with the steps down to the lower level as the foundation for the new portion of cantilevered deck.

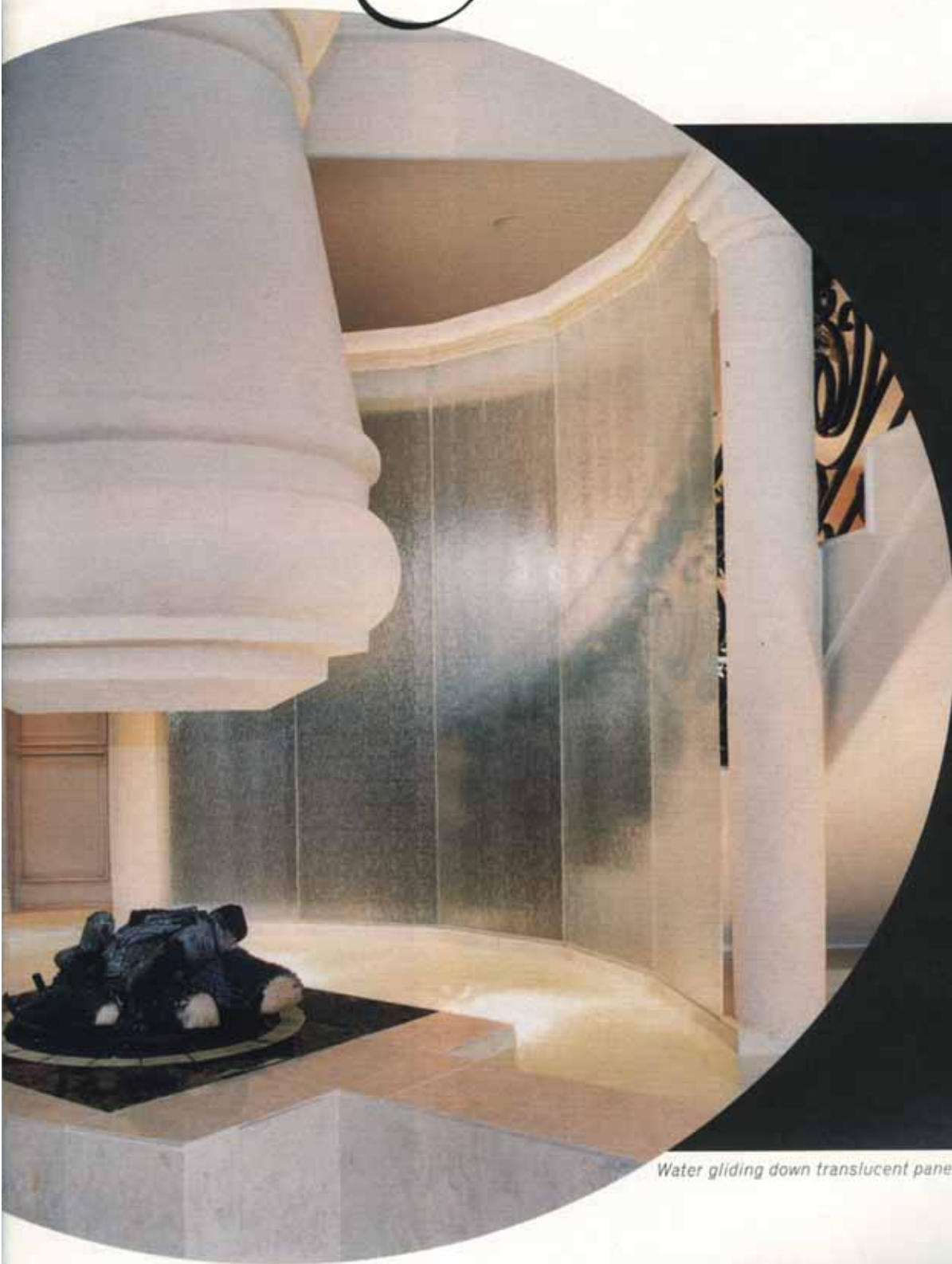
The steel for the steps had been set 24 inches below the beam, so we lapped the #5 bars, added 8-inch grouted blocks and set up a small wall (M). After backfilling the cavity between the pool's wall and this new wall, we formed and poured the slab, setting up expansion joints to isolate the new section from the decking on grade.




Continued on page 32



# Features that redefine water



*Water gliding down translucent panels from PowerFall drop nozzle*

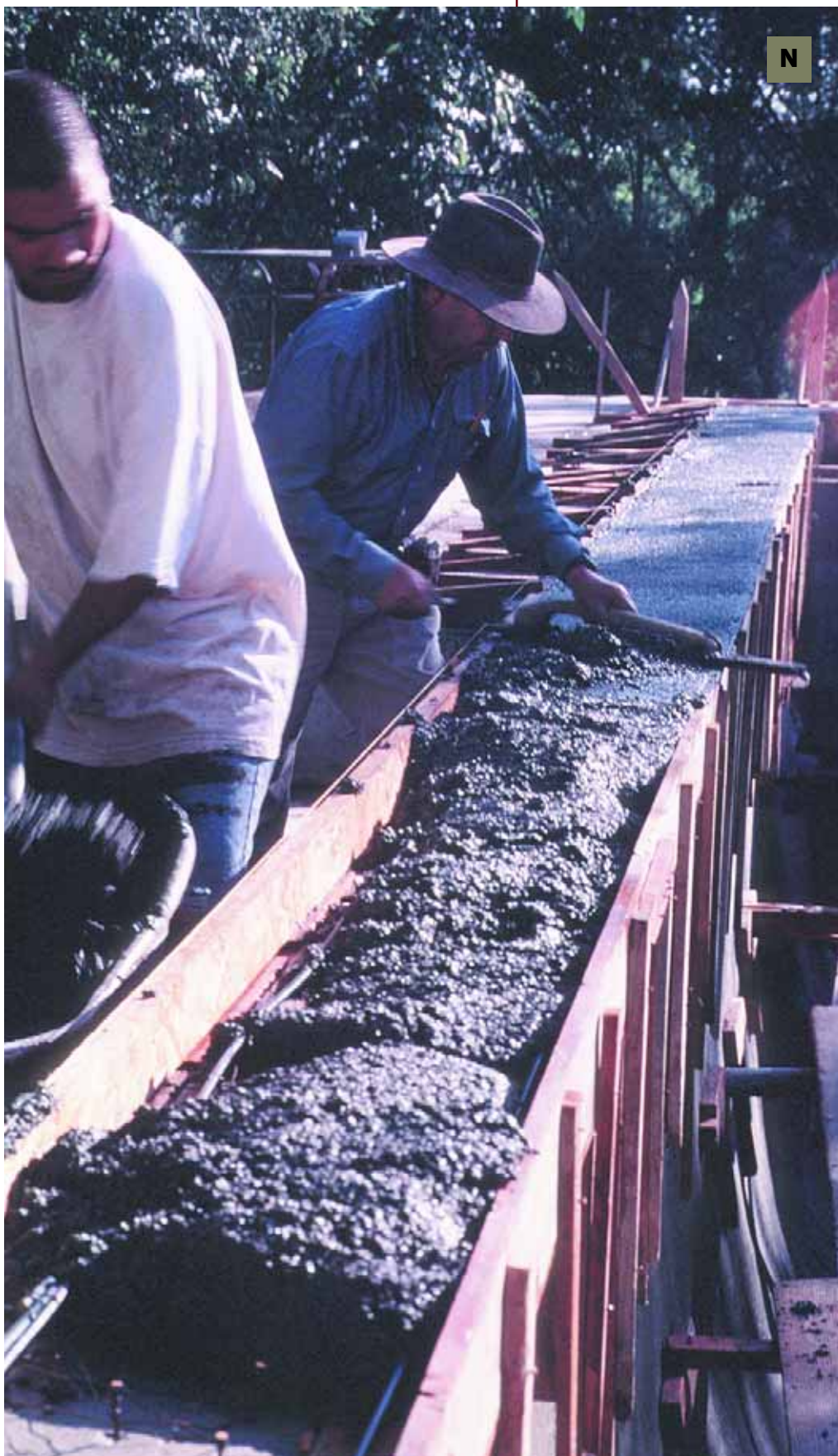
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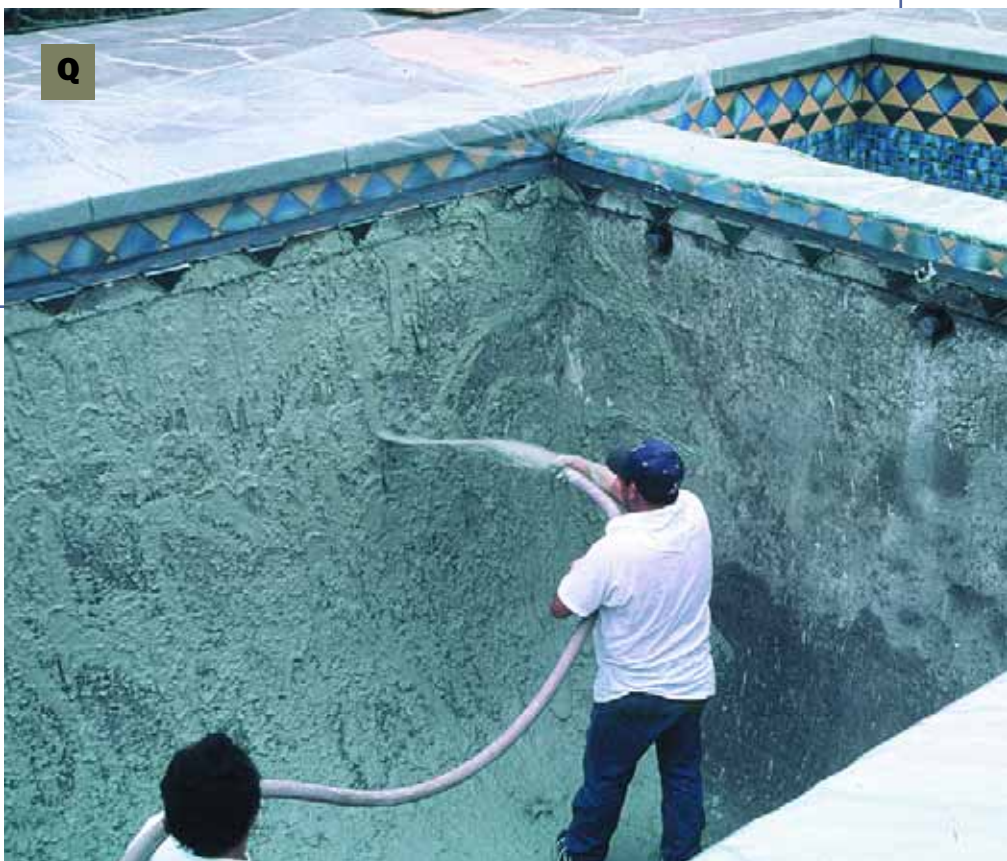
## Material Delights

Atop the cantilevered slabs, we hand-set bluestone shipped in from Vermont. I can't say enough about this material: It comes at a high price, but it's absolutely gorgeous.

To match the bluestone's basic color, we poured the green concrete coping in place (N) and gave it a broomed finish. To prevent cracking, we set steel and concrete nails in the beam and tied them together with a heavy-gauge, wrapped, black-annealed wire. The emphasis as always was on structural strength: Rather than pumping the concrete from the street (which would have meant using more water in the mix), we went to the extra work of wheeling the concrete in and placing it in the forms by hand.

The tile we used for this project is also something special (O) – quite expensive, very elegant. We paved the way with several coats of sealant (tile is wonderfully waterproof, but you always get pinholes in the grout. We used quarter-rounds on every single edge and three-dimensional beaks at all corners. All of this is expensive, but the results are slick and beautiful.

The tile pattern at the waterline is another unusual touch (P). The projection of the triangles below the waterline is a neat visual idea – and when the pool was filled, those points seemed to dance on their own, as if they're separate from the waterline tile. Quite an effect – although it did give the plasterers their share of headaches as they worked around them in applying my favorite green plaster mix (Q).





## Under Cover



One of the client's principle desires was for an automatic cover, but as with so many other decisions about materials, she took her time in settling on a color.

We worked closely with Aquamatic Cover Systems of Gilroy, Calif., in generating a palette of colors for her review. After looking at a seemingly endless run of samples, we settled on a soft kelly green that ties in with the tile and plaster. Integrating the package, the leading edge of the cover and the stainless steel runners were all powder-coated the same green so they would basically disappear, rather than disrupting the aesthetics with a stainless-steel gleam.

Because the vaults for these covers are invisible much of the time, many builders I know don't pay much attention to making them look great. That's not my approach. In fact, the dam wall separating the vault from the pool is finished in tile, just like the rest of the pool, with no disruptions of the pattern at the water line (1).

The edges of the wall between the pool and the pool-cover vault, back and front, are finished in quarter-round tiles, too, just like the dam wall on the spa. Why set up the dam with an edge that might snag the cover? Finally, we used forms to make capstones for the vault using the same batch of concrete we used to pour the coping and applied the same brushed finish (2).

What sets quality builders apart from the rest is how they handle the small things and work with their vendors to iron out all the details, as I did with Aquamatic's Tom Dankel (3, left). The vault we set up for the automatic cover falls into this category – and I wouldn't have it any other way.

–D.T











# Wild For

# Tigers

From building a 21-foot, cantilevered waterfall to mimicking the muddy banks of a jungle stream, this sprawling installation at the Palm Beach Zoo presented a series of unusual challenges for watershaper Steve Lucas – not the least of which was thinking like a tiger. By the time Lucas was finished, however, two of the zoo's most popular residents enjoyed a lush jungle paradise tailored to meet all their environmental and aquatic needs.

By Steve Lucas





## Believe it or not,

I became involved with this project because my nine-year-old daughter, Savannah, plays tackle football. I was watching one of her games when I overheard a teammate's father talking about a renovation at the Palm Beach Zoo.

Joining the conversation, I learned that he owned a general contracting company that builds large commercial projects and that he'd been hired to renovate the zoo's parking lot and utility infrastructure and build an exhibit facility for two Bengal tigers. It was, he told me, the first phase of a long-term plan to upgrade the zoo at Dreher Park, a complex that also includes a planetarium and a museum.

The work at the zoo, he said, was one phase of an effort by the city to create a quality facility that ultimately could serve as a low-cost alternative to Orlando's theme parks. As part of the project, my new friend's firm also was acting as general contractor in the construction of a new tiger pen, the first of a series of new display areas planned for the modest zoo.

When he talked about the watershapes involved, I jumped: The design called for a large waterfall, a winding stream and a bathing pool for the cats. In a heartbeat, I offered my services, eventually won the bid and soon developed a relationship with this gentleman that went well beyond rooting for our kids on the gridiron. Along the way, we learned more about recreating a slice of the Indian jungle than I could ever have imagined.

### IN AT THE START

I became involved while the project was still in the early stages, which meant I was given a set of basic plans that included a rough layout, basic dimensions and some structures – but not much additional detail. The contractor had already received bids from several firms, some from out of state, but when he took a look at our company's background in commercial pool construction, he was anxious to see how our local quote stacked up.

The plans called for a free-form, 15-by-30-foot concrete pool with faux mud-bank edges; a 25-foot meandering stream; and a spectacular faux-rock waterfall, 21 feet tall by 30 feet wide, cantilevered ten feet out from its supports over the tigers' night house at the rear of the half-acre site. We

looked over the plans and gave as tight an estimate as we could, noting carefully that several key aspects of the plans would have to be changed.

We submitted the bid in September 1999, won the job and went to work on site in October 1999. The timeline was tight, with completion targeted for February 2000, including landscaping and the animals in place. This meant that much of the changing and actual designing of the job would have to be done on the go.

One of the biggest changes involved the structure of the waterfall, which was totally inadequate in the original plans. As mentioned above, the waterfall structure fronts a wall of the animals' night house that serves as its primary support. The problem? The building is only 12 feet tall, which left a massive, cantilevered portion of the falls basically suspended in air.



**Believe me, as a builder who usually works with steel and concrete alone, installing this project with a liner on the outside of the shell was a strange exercise. It had us worrying with every step whether we could do the job without poking any holes in the membrane – especially tough when we were setting the steel.**



To accommodate the structural requirements, I designed four vertical support pillars with a horizontal baffle halfway up the structure and a tie beam as part of the water basin across the top.

The other major change involved the aesthetics. The initial sketches were based on recreating Florida capstone and using local plant life – an easygoing, South Florida “interpretation” of India’s jungles that would be completely unlike any landscape in which you’d find Bengal tigers.

Given clearance to strive for a more appropriate look, a local faux-rock artist named Bill McCauley and I dug through back issues of *National Geographic* and any other printed material about tigers and their habitats we could get our hands on and eventually came up with a rockwork design that was much like the tigers’ home turf.

## CONCRETE IN A BAG

I knew we were heading into uncharted territory with this project, and sure enough, we learned something unexpected at just about every step. As a builder specializing in shotcrete and plaster, for instance, I haven’t had much experience with liners. And at the start of this project, I especially had no idea how to work with a liner installed on the *outside* of the concrete shell – but I was soon to learn.

Continued on page 40



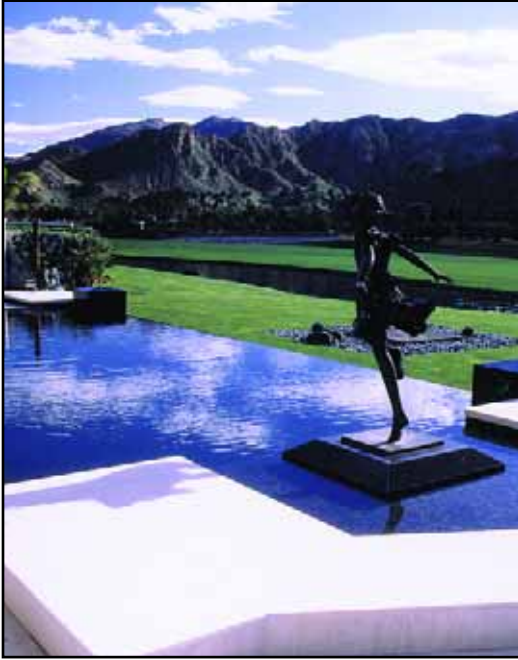
The waterfall’s structure was doweled into the block building that held the tigers’ night cages (A). The building just wasn’t massive enough to support the tower as originally planned, so we pulled the cantilever back a bit. By the time we were finished texturing the rock face (B) and setting up the cascades (C), the effect was nonetheless spectacular.







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That requirement arose from zoo officials' concerns over the water-tightness of the structure, and I'm still not quite sure if they were more worried about water seeping in from the high water table or about water weeping through the porous shotcrete. In either case, the liner didn't seem to me like the right solution.

I offered a more familiar, alternative suggestion of using a dark pebble surface on the interior of the pool, but the designer and the zoo staff were adamant about the external liner – and made it perfectly clear that there couldn't be so much as a single puncture. Acknowledging my own lack of experience in building watershapes for tigers, I gave up the fight. Now I had to figure out how not to rip the thing to shreds as we worked on top of it!

To get things going, we installed a dewatering system (described in detail in the sidebar on this page) and excavated the site. Once we'd balanced the system to keep encroaching water at bay, this phase of the project was pretty straightforward.

That done, we planned to install the plumbing, set the liner, hang the steel and apply the shotcrete. Sounds simple, but everything was complicated by the presence of the liner and the fact that the site was infested with roots. As a consequence, we had to put down a layer of plastic sheeting to protect the liner – and watched just about every step we took thereafter.

Of course, we were lucky enough to be

starting in the middle of our rainy season. Given the loose, sandy soil and a legitimate concern over cave-ins, we extended the protective plastic sheeting out over the edge of the dig and the berms we'd set up on the perimeter to keep rainwater from draining into the hole.

As it turned out, we had two significant storms during the month the site was open but only experienced a small collapse of one wall. It wasn't difficult to repair; overall, we felt like we'd dodged a bullet on that score.

## HANDLE WITH CARE

With the dewatering system doing its work and the liner now in place, we began the work of building the shell, starting with the plumbing. Because the water in a zoological exhibit like this cannot be chemically treated, installations such as these almost always have flow-through circulation systems. In this case, the influent came from a freshwater canal located about 30 feet away and discharged to another canal about 150 feet on the opposite side of the exhibit.

This basic system used a 2-horsepower pump with a flow rate of approximately 150 gallons per minute – no filtration system, no recirculation. Water flows out of the pool through a simple cast-in-place skimmer in the shallow end, where gravity carries it out to the other canal. The influent line is 4-inch PVC and the effluent gravity drain line is 6-inch PVC, pro-

viding a nice lazy flow through the system.

Within the pool's hopper, we placed a single 24-by-24-inch fiberglass sump assembly and set up a 7-1/2-hp pump to feed the waterfall. The sump is equipped with a special foot valve arrangement to prevent backflow. It's also covered with the largest grate size possible to protect the tigers from any risk of suction entrapment.

Using this simple plumbing scheme meant that we would only have to penetrate the liner in a very few places – eight in all. Once the plumbing fixtures were installed, the 8-mil PVC liner was brought in, stretched across the pool and pulled up over the edges. We carefully cut holes in the liner for the plumbing and sealed each aperture with special sleeves and adhesives.

With the pipes and the plastic bag in place, we tied the steel cage for the shell. There was nothing special here, except for the fact that every single step we took was attended by the fear that we would poke through the liner with a steel bar or tie wire or an errant step. This didn't make for the easiest working conditions, but we managed without incident.

Once the rebar was set in place, we blocked with the greatest of care. We also went so far as to point all of the ties inward, away from the liner. With equal care, we completed our framing and prepared to shoot the pool, the streambed and the "mud banks" at the



## Low Ground, High Water

The first challenge we faced on this project had nothing to do with the exotic nature of the project, but with the earth beneath our feet. Ultra-high groundwater, just a slim ten inches below the surface, meant that we would have to dewater the sprawling site mechanically throughout the "open" phase of the project.

We knew we'd need something big – something to keep the sandy soil almost bone dry – and what a brute the rig turned out to be!

The system's pumping force was delivered via a big, trailer-mounted diesel engine driving a 280-hp hydraulic pump. A 200-foot manifold made of 8-inch PVC was laid across the length of the site; 110 swing hoses attached to the manifold were sunk 8 feet below grade.

The system ran 24 hours a day, seven days a week and kept the site dry for the four weeks we needed to install the plumbing, liner, steel and shotcrete.

– S.L.



edges. (For details on the banks, see the sidebar on the right.)

## MOVING UPSTREAM

We shot the pool and the streambed right up to the footer of the waterfall, bringing this phase of the project to completion. Now we pulled out the dewatering system (which was a huge relief), stripped the forms and backfilled areas around the perimeter of the pool and stream – using clean sand to protect the all-important liner.

Then it was time to turn our attention to the waterfall – a particularly delicate part of the project because of the structure’s vertical scale. We set our scaffolds across the front of the support pillars and baffles and began building a steel cage that would do double duty — providing structural support as well as expressing the shape of the rockwork.

We used #3 and #4 rebar on 8-inch centers, carefully contouring the steel as we went. The waterfall’s weir is 29-1/2-feet long; the falls are fed by 4-inch pipe set in a small trough at the top of the structure and perforated with 1/2-inch holes. Ultimately, the top of the waterfall structure projects out about four feet beyond its bottom. (It wasn’t the dramatic, ten-foot overhang originally specified, but it was all the structure would support.)

With the steel in place, we came to our next major challenge: Because of the size of the structure, we couldn’t shoot the waterfall solid against the night-house wall; it would have been too heavy for the support system. So we had to come up with a way of forming *behind* the steel, leaving hollows between the back of the waterfall’s rockwork and the wall of the building.

Our solution? We used a product called Poly Burro, a sort of ultra-strong cheesecloth, as a backing form. We maneuvered the material behind the steel cage and attached it to the rebar using metal “hog rings” at each point of connection and proceeded into an unusually delicate shoot. Moving very slowly and shooting in thin layers, we took a full day to shoot an area that would only have taken a few hours in a normal project. As the applicator moved, McCauley and his crew followed with trowels, carefully carving and sculpting the rockwork.

With the shotcrete in place, we covered the structure with a gray plaster material applied

## Muddy Waters

As with any watershape, the transition between the water and its surroundings is critical to achieving the desired aesthetic effect. In the case of the tiger pen described in the accompanying text, the edges here were to consist of realistic mud banks running the full perimeter of the pool and its stream.

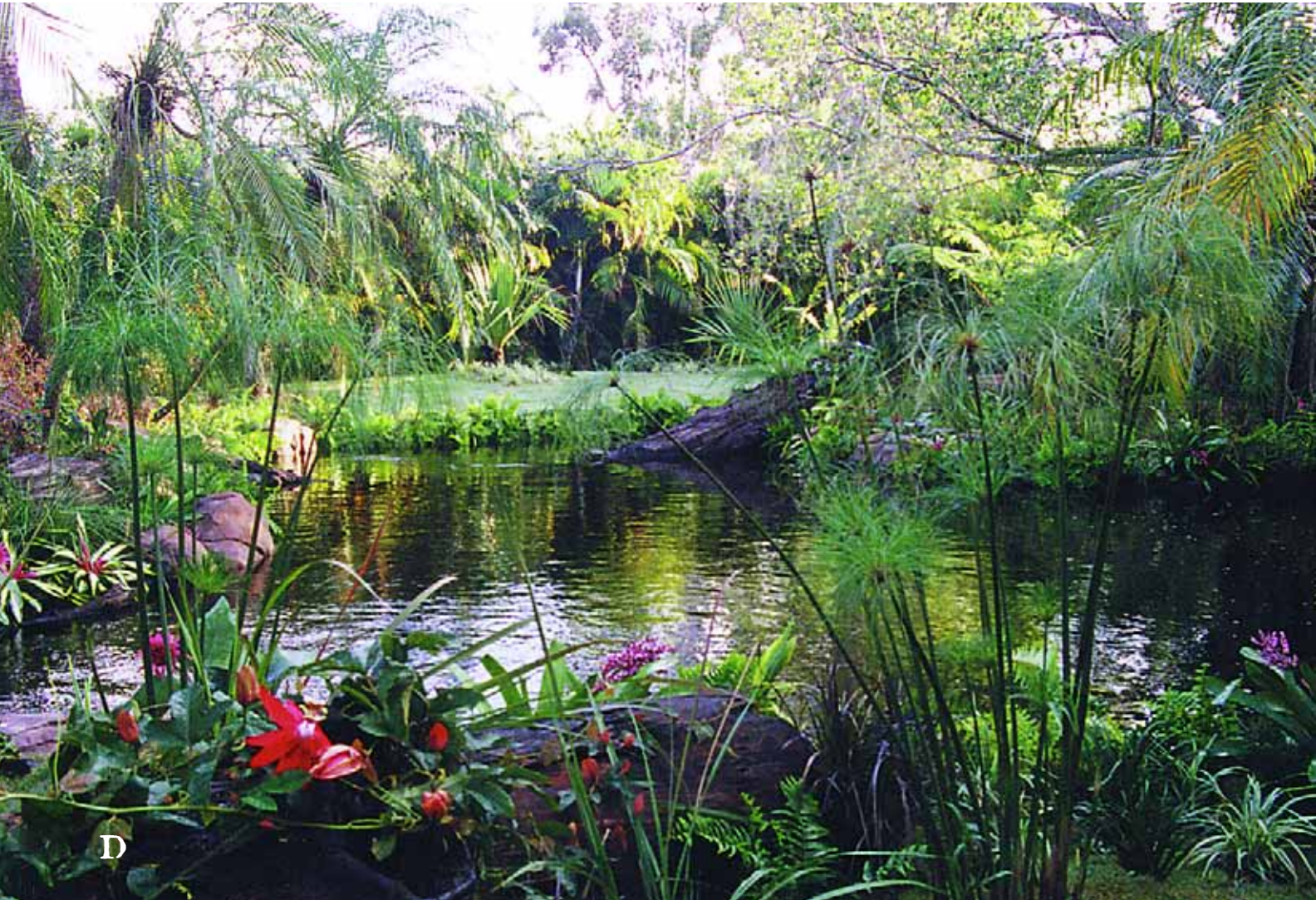
A handpicked “mudbank team” formed the gently sloping banks with chicken wire just above a beveled beam we cut at the top of the shell. Into this substructure, the crew wove a series of tree roots and thick vines to create the appearance of roots growing out of the soil at the edges of the stream and the pool (A).

We then filled these low structures with shotcrete and sculpted the contours (B). Once the concrete was set, we clear-coated the banks in a polyurethane coating to seal in the root material and prevent it from decaying. It was a fairly simple process, but one that yielded remarkably life-like results.

—S.L.







**D** in small sections to allow McCauley and his crew to carve and sculpt minuscule fissures, clefts and outcroppings as we went. On the top of the falls, the weir was sculpted to provide a broken, uneven flow.

Later, when we fired up the whole system, the effect was perfection itself. In fact, McCauley said that in all his time working on large waterfeatures such as this, he had never before seen a waterfall that didn't need some degree of tweaking.

### STALKING THE FINISH

At this point, the structures we'd created didn't look much like a jungle waterfall or watering hole. As we added various finishing touches during the final phase, however, the entire environment really came to life in rapid order.

□ Up on the waterfall, McCauley personally saw to the application of the color finish. Using an airless spray system, he applied thin layers of acid-based stains onto the plaster – a fascinating process that held my attention throughout as he artistically highlighted the outcroppings

and deepened the fissures and indentations. He began with the dark colors, blacks, browns and grays, and moved gradually to light-gray and tan highlights.

I know there are lots of ways to make artificial rocks these days, but when McCauley was finished doing it *his* way, I was completely sold on the effect. Even up close, these rocks look *real*!

□ At the foot of the falls, we created several small stones placed to look as though they had tumbled down and been scattered over time. These ranged in size from about six inches to about four feet in diameter. Starting out as #3 steel bars and chicken wire, they were covered in shotcrete and then artistically finished in minute detail with plaster and the acid stains.

□ Outside the pen, work progressed on an "earthen" walkway that would lead visitors through a thicket of plants into the prime viewing area. Here we sculpted the plaster finish coat to mimic mud and rock. To make it look as though the visitors were walking on mud by the banks of a rainforest river, the zoo

arranged to bring in kangaroos and peacocks to walk over the wet plaster, leaving tracks in the "mud" that looked like fossil footprints.

We also took some plaster moldings of children's footprints and created stamps that we mounted on the end of some doweling. While the plaster was still wet, we "walked" the stamps along the pathway to show that this imaginary jungle also had been inhabited by a herd of small bipedal hominids.

□ Finally, the landscaping was installed. This particular jungle included an array of large palms, hyacinths, bougainvillea and birds of paradise. We didn't need to worry about landscape lighting: The zoo is closed at night and the animals are kept inside.

When it was all in place, the facility looked amazing – just like a place you'd expect to run into a tiger!

### THE STRIPES HAVE IT

The tigers were introduced to their new home during the last week of February.



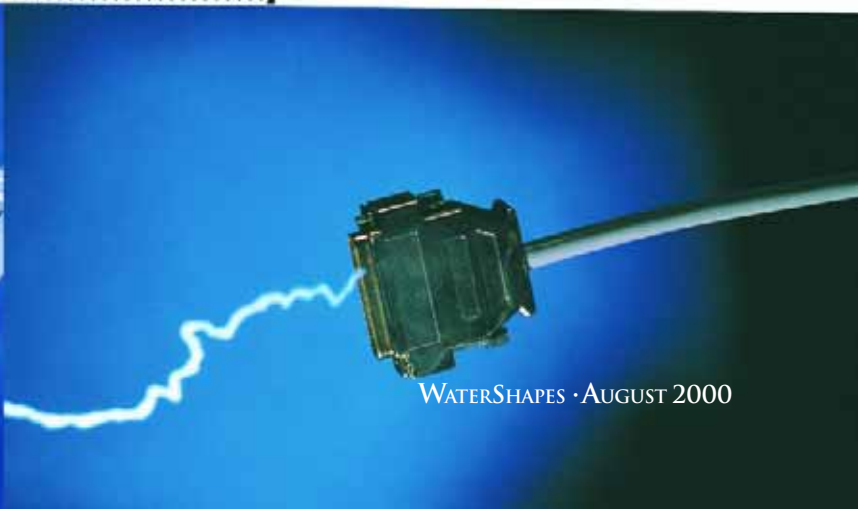
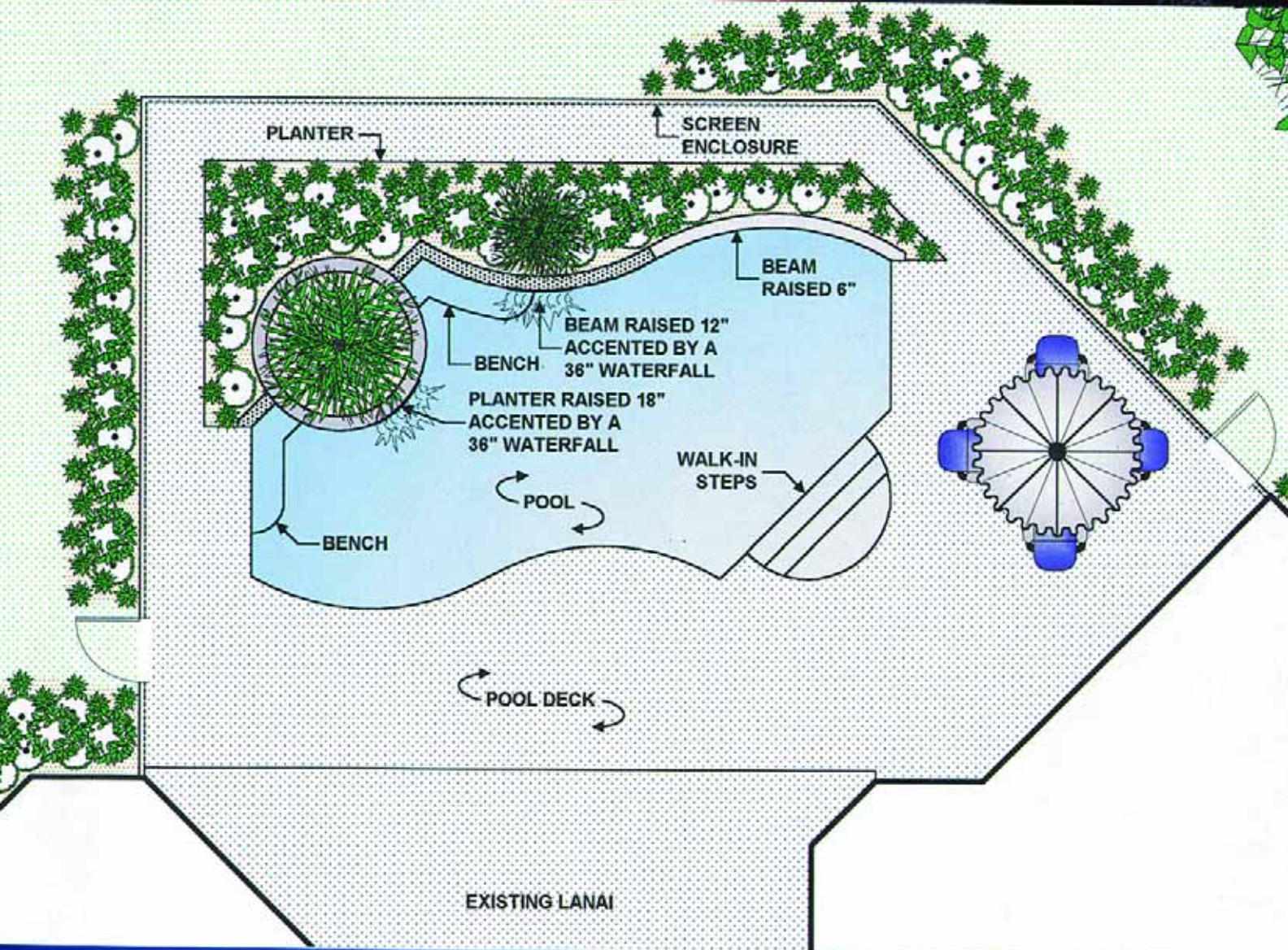
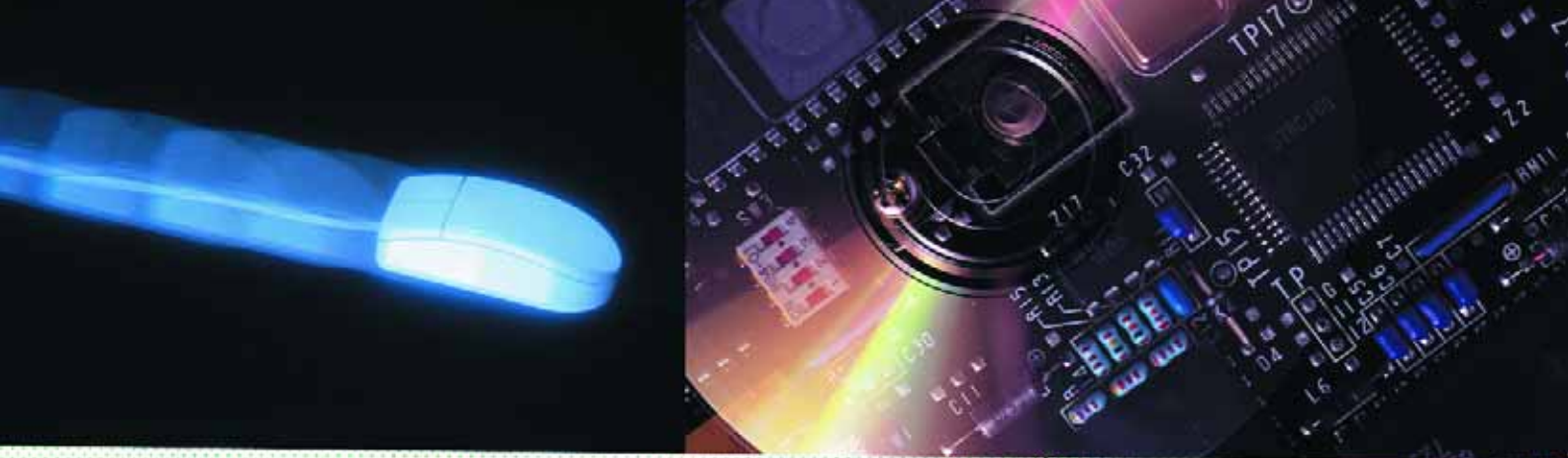
During the opening weekend, the zoo drew more than 2,000 people each day – well above its former average attendance of 500. I’ve been told that the numbers are holding months later – and that the tiger exhibit is a particular draw.

As I look back on this job, I find myself filled with a tremendous sense of satisfaction, having done something truly unique that will be a part of the Palm Beach community for decades to come. And, of course, it was a kick watching my own kids enjoy the exhibit. According to Savannah, it wasn’t quite as much fun as playing football, but I could tell she was pretty proud of her old man.

**Of all the points of pride we’ve found in this project, the way we were able to help turn it from a South Florida landscape to something much more closely resembling the Indian jungle is among the most significant to us. From the pond (D) to the Waterfall (E), we established an environment that has helped make the tigers and their enclosure the zoo’s all-star attraction (F).**









The watershaping trades haven't quite caught up with the rest of the architectural/design world in terms of plan-generation and project-management technology, says Chris Walton. But that situation is changing, adds this Florida designer, who has tracked the spread in usage of computers as a means of ensuring quality, consistency and accuracy in watershape design.

# 21st-Century Drafting

By Chris Walton

**A**s watershapers, we can look at the rest of the architectural world and see that every other genre is benefiting more than we are from computers. Bridge builders and skyscraper architects use computers to do everything from the simulated testing of three-dimensional structural models to the generation of detailed blueprints to be used on site. Even the designers of modest housing developments are now using computers to conduct 3-D virtual tours for prospective homebuyers and in specifying floor plans and structural details.

All of these marvels are being generated by computer-aided design (CAD) programs at a time when many in the watershaping business are still working with pens and pencils.

In skilled hands, drawings done with a compass and a T-square can be fantastic. For the rest of us, helpfully, CAD represents a way to generate quality plans that can be effective, evocative and communicative. And even those who can draw by hand may find that they can benefit from CAD's flexibility and fast response time when it comes to customer requests.

## FROM PAGE TO PRACTICE

Despite the growth CAD technology has seen in other architectural fields, it has yet to break through convincingly with watershapers. Without a doubt, some of the blame can be set at the feet of software vendors who haven't adequately addressed the needs of watershape designers or demonstrated how existing technology can be effectively applied to watershape designs.

It's also true that many potential CAD users have not even reached the stage where the applications questions are relevant, and are still struggling with fundamental questions about the available technology such as: What specifically should I buy? How long does it take to learn? How long before it pays off?

Despite the growth CAD technology has seen in other architectural fields, it has yet to break through convincingly with watershapers. Without a doubt, some of the blame can be set at the feet of software vendors who haven't adequately addressed the needs of watershape designers or demonstrated how existing technology can be effectively applied to watershape designs.





Those are all valid questions, and what I've found as I've worked to answer them for myself, my employers and my clients is that CAD systems afford the water-shaper the freedom to define the extent of detail and uniformity required by the project. In other words, CAD is a highly flexible tool that enables you to determine how far you want to go in using its advantages.

Given that, I've had a tough time understanding why more companies haven't gotten more involved in the technology. We at Florida Bonded Pools in Jacksonville use CAD and have come to a simple realization: Understanding specifically what you want to do with a CAD system is the key to reaping the technology's rewards.

In my case, I had the advantage of working with a variety of companies and setting up their CAD operations. I've seen how these programs work for everyone from high-end, custom builders to low-

end, volume builders. The one thing they had in common was that they knew what they wanted to do with the technology.

For volume builders, I found that crystal-clear CAD renderings gave the sales staff a way to stand apart from their competitors while offering a much wider array of pool shapes and features – so much so that they no longer had a template-tracing feel.

Other builders find that CAD helps them bridge the distinction between volume and custom work and reap benefits in two ways: More pools can be designed and bid more effectively, plus the quality of the design work picks up as well. The key here was and is the system's ability to provide ample details quickly, which affords both the sales staff and the design and engineering departments the ability to respond rapidly to customer requests.

One of the companies I worked for, for example, was in transition to becoming

a high-volume, custom builder. Our use of CAD technology was essential in maintaining the quality of our work while increasing the volume of production. In this case, providing ample detail for their construction department was vital, especially when translating conceptual drawings into finished products.

This flexibility is the heart and soul of CAD's edge: It lets the designer work in layers of detail and with a variety of dimensional scales, line densities, textures and specific visual elements. It also lets the designer archive details as clip-art for everything from fire pits and trees to footpaths, rock fountains and shade structures.

Later, on the construction side, you can take this store of information and turn it into detailed structural plans for use by excavators, plumbers and steel contractors. You also can establish precise elevation details and set locations for electrical outlets, plumbing and irrigation runs.

Continued on page 49

## Explorers and Conquerers

In the early 1990s, industry-specific computer-aided design (CAD) systems presented themselves to the watershaping industry and met with some early excitement. But the aura of newness and fascination quickly gave way to concerns about costs involved with buying the software and the computer hardware needed to support a full CAD operation.

The builders who had the inclination and the capital to support the purchase of CAD system did so and quickly sorted themselves into two distinct categories: those who *explored* the technology and those who *conquered* it.

The first of these groups, the explorers, bought CAD systems and asked, "What can this technology do for me?" In many cases, companies with this approach spent considerable time sifting through the program features without a specific focus, often shifting uses from sales to project management and never really settling on a "purpose" in using the technology. This led to frustration – and many explorers turned away from computers in favor of tried-and-true, hand-drafted plans. In other cases, companies continued to use their CAD, but the technology had lost much of its early luster and the resulting work did not capitalize on the technology's true capabilities.

The second group, the conquerors, had a more specific vision: Whether the application was presentation for sales or accuracy in construction drawings, or both, the companies that successfully implemented CAD did

so with a vision of the technology's usefulness more firmly in mind. Their focus and direction eased their pathway to CAD efficiency.

Both types of users usually became involved at some point in ongoing debates over whether the cost of CAD systems makes them worthwhile.

Others have questioned and argued whether CAD enhances creativity and the designer's ability to customize a project – or significantly limits it.

The turning point of these debates lie not with the CAD system, but rather with individual designers and how they use what is, after all, only a tool. For the high-volume designer, there's no doubt that CAD can become part of the assembly-line approach used by template tracers. By contrast, for the designer or firm looking to expand capabilities in custom work, the truth of the matter is that a CAD system can be used to generate watershapes with an infinite range of looks, styles, configurations, materials, elevations and details.

What CAD enables you to do in truly custom designs is to change out elements very rapidly. You can, in effect, present a menu of ideas on "finished" or at least "well-polished" sets of plans for the client's review and acceptance – and do so reasonably quickly.

In other words, as a design tool, CAD is no more limiting nor any more liberating than a ruler or a T-square: It simply facilitates and enhances the objectives of those who explore its use – or conquer it.

– C.W.





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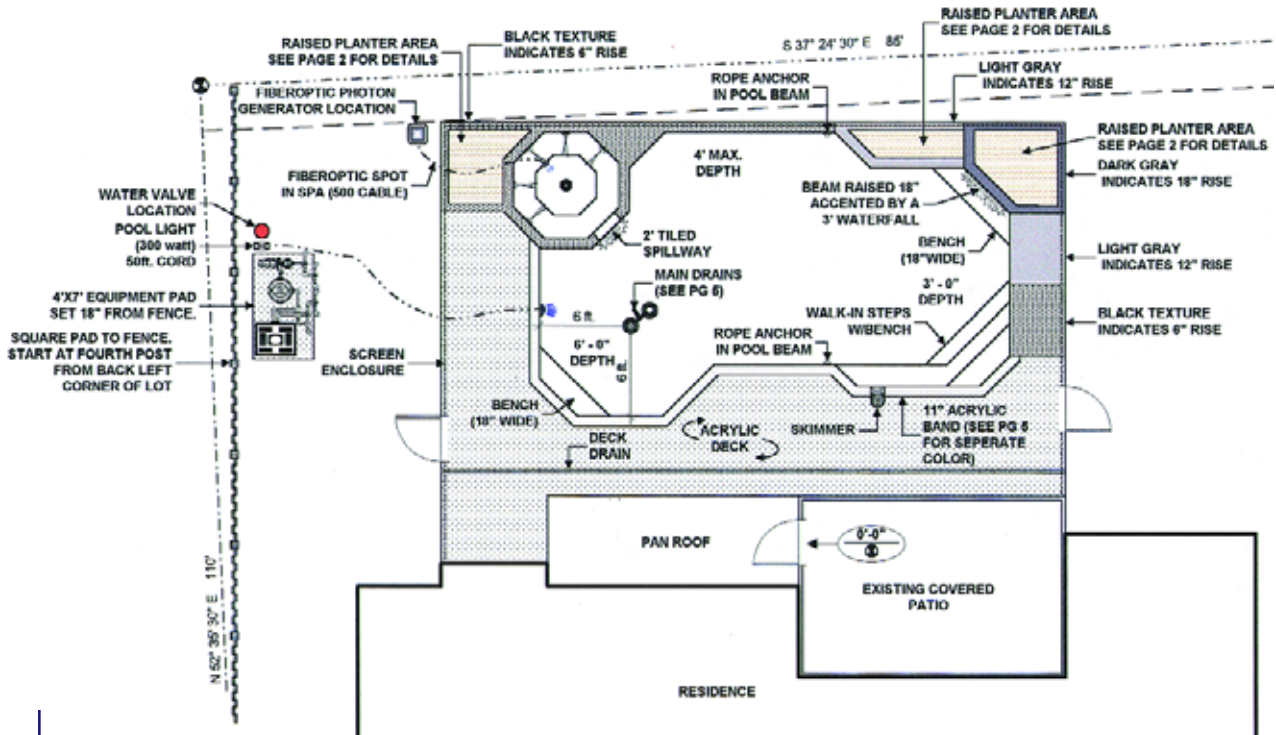
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S&S TO KNOTCH POOL BEAM AT  
WATERLINE FOR ROPE ANCHORS  
(SEE THIS PAGE FOR LOCATIONS)

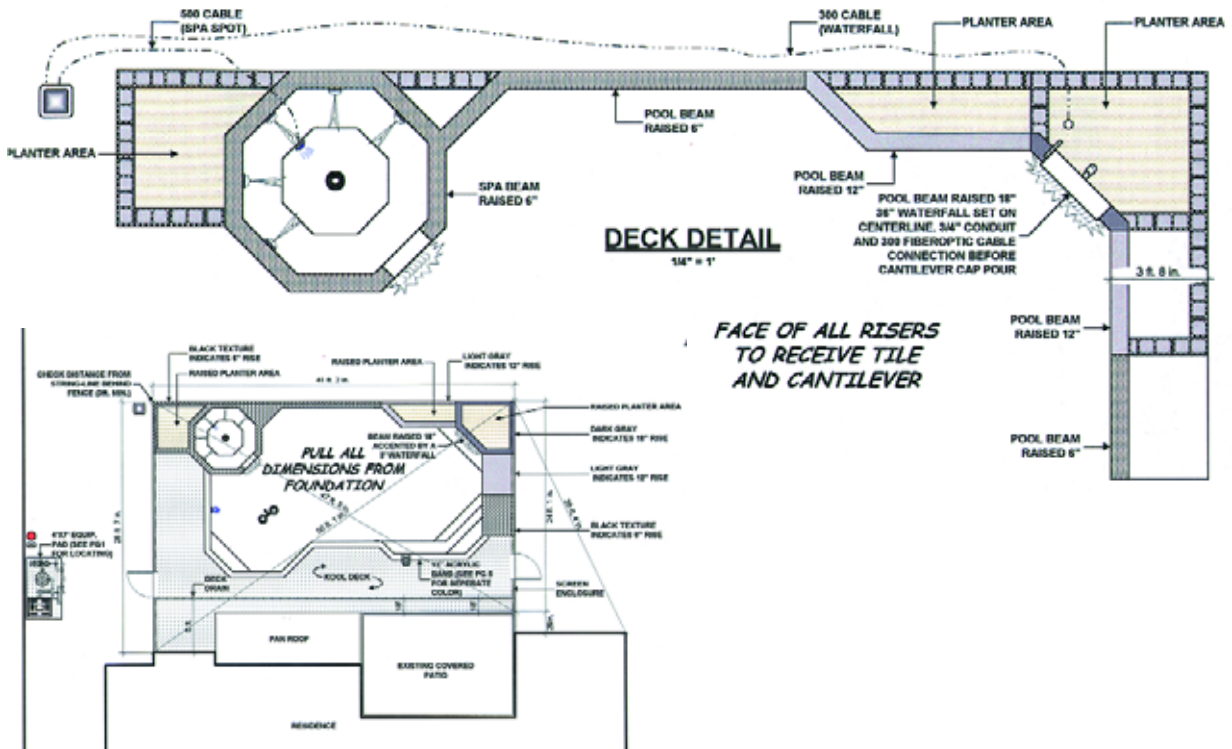
A

S&S TO KNOTCH 18" RAISED  
BEAM FOR 36" WATERFALL



-- POOL DECK AND CANTILEVER CAP SECTIONS TO RECEIVE ACRYLIC DECK TEXTURE --  
-- BLOCK SUPPORT WALLS TO MEET ELEVATION OF CORRESPONDING POOL BEAM SECTIONS --

B





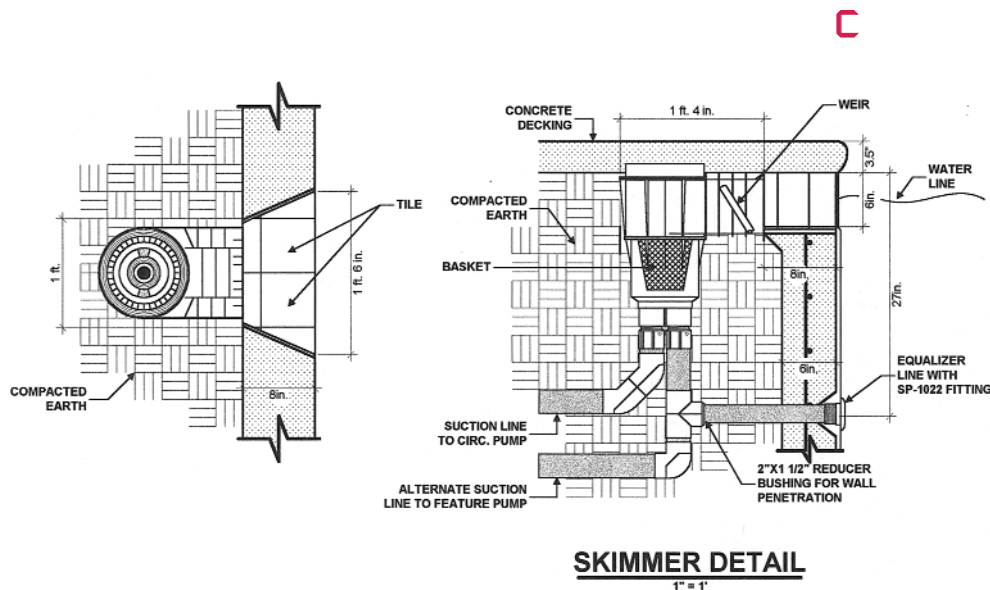
## Digital Case Studies

Seen here and on the next two pages are a pair of projects that illustrate some of the potential that CAD systems have in the realm of pool design.

The first is a multifaceted, geometric pool with an attached spa and a raised planter detail. The basic plan is simple (A) and could arguably have been done up by hand just as easily, but here's the computerized edge: Once the basic plan is complete, the CAD program is ready to turn out details – even in multiple scales

for clarity – that helps the client “see” things more clearly.

In turn, the drawings that helped the client visualize things like deck details (B) also help on-site crews nail down dimensions and plumbing placements as the project moves through various construction phases (C). Add in good materials and skilled crews and the initial drawings turn into a source of pride and pleasure for the homeowner and the builder alike (D).



Continued from page 46

## SOUNDS GOOD

This probably sounds like a sales pitch for CAD systems, but that's true only in a limited sense. I've *seen* the effect these systems can have on site, in sales departments and with customers, and there's a lot to be said for what their use can do by way of elevating a client's perception of your professionalism as well as his or her expectations for the project.

A skilled operator truly can do amazing things with the technology, but CAD is like any other tool: When used by an unskilled operator or by one whose only aim is to generate designs very quickly, CAD drawings will lack detail and creativity. In this sense, CAD systems do not replace the need for thoughtful integration of design elements or attention to creative details. Rather, the systems simply enable you to create with a computer what a draftsman does by hand – but with greater flexibility and, ultimately, greater speed and efficiency.

If you're open to the potential these systems have for your business, now's the time to go back and look at the key questions suggested above:

❑ **What should I buy?** Like any tool, there are different CAD programs designed to suit different needs. If your design work includes integration with a wide variety of exterior elements and are not “just pools and spas,” you may want to look at systems intended for landscape designers, which offer a great deal of depth and detail for things like plantings and hardscape. If you focus on commercial fountains, a CAD program designed for architects may be the smart choice. And if you're a mainstream pool builder, it's likely that one of the industry-specific programs available to the trade will suit your needs.

One thing that almost all CAD programs have in common is that they are increasingly flexible. The ever-growing speed of computers and improvements in printer technology mean that newer programs can do more with less bother while allowing themselves to be tailored to specific needs.

❑ **What kind of learning curve is required?** Make no mistake, if you're from the hand-drawing school or do not have

Continued on page 51

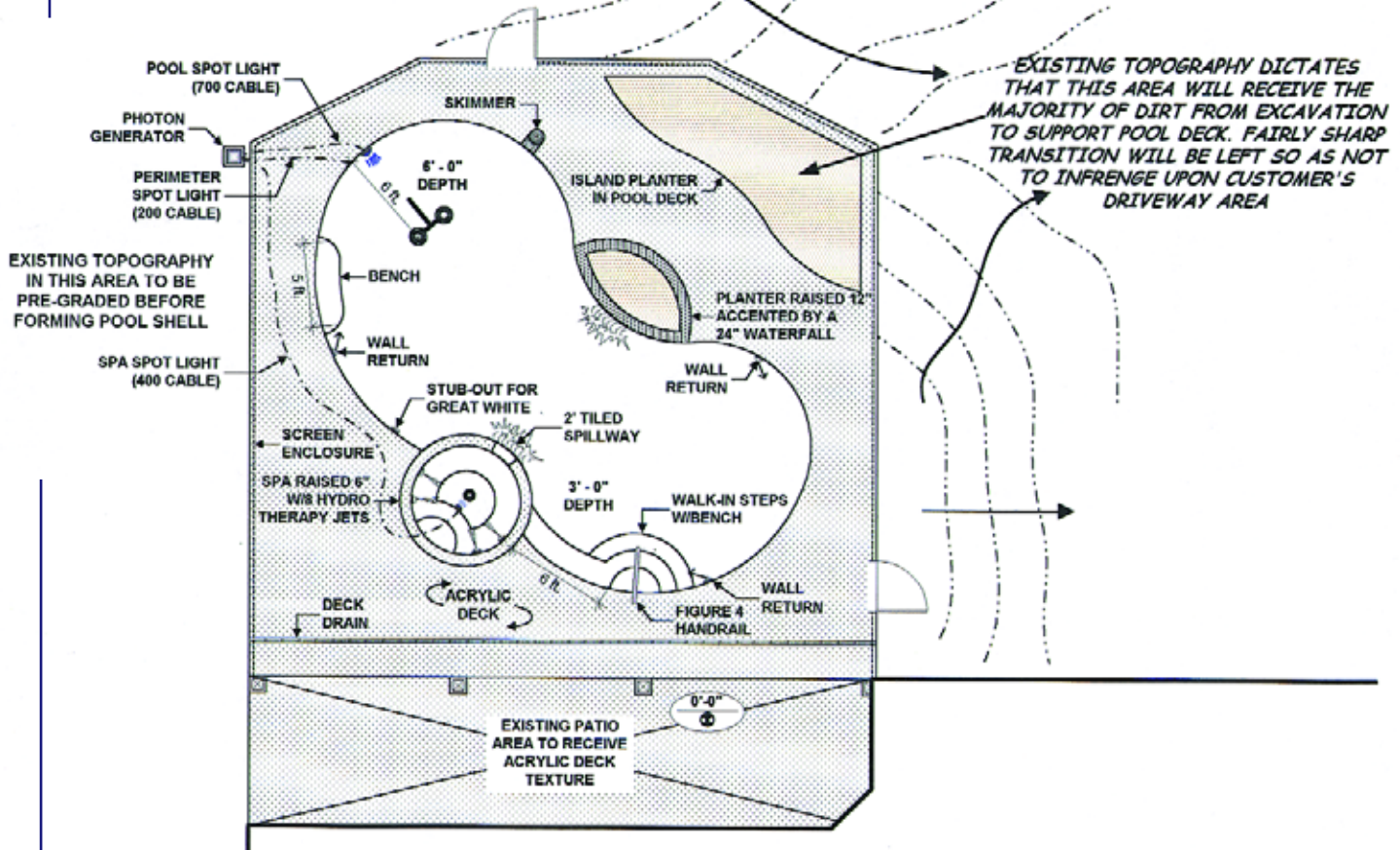


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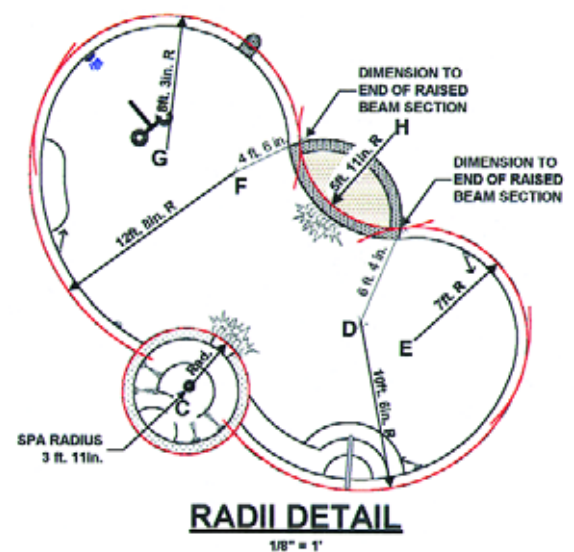
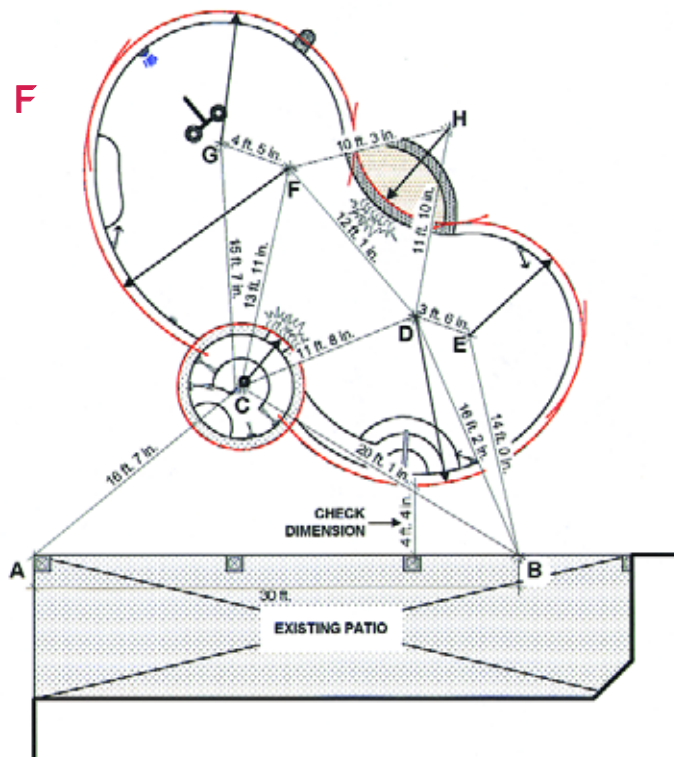
POOL EQUIPMENT LOCATED ON  
BACKSIDE OF CONCRETE SLAB IN  
THIS VICINITY ADJACENT TO  
WELL EQUIPMENT. (SEE  
EQUIPMENT PAGE FOR DETAILS)

EXCESS DIRT FROM EXCAVATION  
TO BE DUMPED IN VOID OF RETENTION  
WALL AT THIS LOCATION


EXISTING TOPOGRAPHY DICTATES  
THAT THIS AREA WILL RECEIVE THE  
MAJORITY OF DIRT FROM EXCAVATION  
TO SUPPORT POOL DECK. FAIRLY SHARP  
TRANSITION WILL BE LEFT SO AS NOT  
TO INFRENGE UPON CUSTOMER'S  
DRIVEWAY AREA



F







The second project takes an entirely different form – one with lots of radiuses to be set (E). In this case, the CAD system tackles the bulk of the geometry and gives construction crews a direct shot at on-site accuracy and efficiency (F). The outcome is another CAD-generated project sold, specified and installed using the latest in design technology – an impressive process with impressive results (G).

– C.W.

Continued from page 49

a great deal of experience using computers, adopting CAD will mean rethinking and relearning the way you do things. No matter your entry-level skill, however, most systems have on-board tutorial programs, and there are numerous CAD classes available from a variety of sources including program manufacturers and vendors, vocational schools and junior colleges.

In setting up a CAD-based design or sales office, you will need to invest both in the technology itself and in personnel who know how to use it. This doesn't mean hiring directly from the computer science department of your local college or university. In fact, anyone with some drafting or design background can be up and running using CAD with just a week of training and practice. (True proficiency and skill, of course, take longer.)

❑ **How will it pay for itself?** This is, of course, a critical question – and has two primary answers. First, CAD can help increase sales and thus pay for itself by improving the quality of your presentations and the flexibility of design options you offer to customers. Second, it can reduce

construction costs through high levels of precision and detail in working drawings.

That second point is particularly significant: In a marketplace where errors can deal designers or builders costly, time-consuming body blows, a properly programmed CAD system can be of benefit in generating bullet-proof specifications. This increases the on-site accountability of crews and subcontractors and stands to lift the reputations of contractors working at all levels of the trade.

### THE NEXT GENERATION

Technology is at the head of our societal vanguard these days, and watershapers have a good bit of catching up to do to reach the level of others in the architectural community.

And it's not just a matter of being left in the dust within our own trade: In the year 2000, more Americans will turn 40 than ever before as the Baby Boom crests. Personal computers have been around for half the lifetime of these people: They represent the bulk of our pool of potential employees. They also represent the bulk of our potential clients.





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# **Pursuits**

**By Paul Ryan & E.C. Medley**



As is true of all architectural forms, the design of watershapes calls for thinking in three dimensions. In fact, say Texas pool builders Paul Ryan and E.C. Medley, the integration of a vertical dimension is crucial to success, both as a way to contrast to the sublime flatness of the water's calm surface and to echo surrounding architectural styles and motifs.

Given the way bodies of water interact with gravity, a great deal of the personality of any swimming pool is set by the flat surface of the water and its reflective qualities. In our work, we've found a variety of ways to capitalize on that flatness by creating focal points that are distinctly *vertical* in nature.

In fact, we've found that working on the "y axis" and focusing on upright structures as diverse as arches, walls, columns and waterfalls can yield a variety of stunning visual effects: Exterior spaces and vistas can be connected or distinguished, architectural shapes can be contrasted or echoed, shadows or reflections can be cast, and privacy or openness can be enhanced.

The fact that these effects cut both ways makes them appealing to a custom builder who strives to give clients something unique and lets the characteristics of the individual setting drive the design process. It makes the work more challenging, yes, but it also makes it more fun and rewarding.

In many cases, the vertical elements we use can be subtle and retiring—a slightly raised bond beam, for example, or a small waterfall. More often than not, however, we gravitate toward the bold and declarative by integrating water into architectural forms and creating dramatic and unusual waterfeatures. Whichever way you choose to use vertical elements in your own designs, one point is clear: Exploiting the vertical dimension adds depth and character to the work—and affords both client and designer a broad set of aesthetic options.

### STANDING TALL IN TEXAS

Working with vertical elements has always come naturally for us at Texas Pools. We work almost entirely with a high-end clientele, mostly residential, and these people want something truly special in their watershapes.

We've found our answer to that challenge in architectural continuity: By borrowing vertical elements from their homes and working with the intrinsic drama of tall structures, we really excite some of these upscale buyers away. And make no mistake, there is something distinctly Texan about this approach to design. The Lone Star state has a reputation for bigness in all directions: big spaces, big cities, big money.

You see this proud Texas attitude in the style of homes as well, with many of them boasting neoclassical facades designed to impress with their pillars, arches, columns and colonnades. Even in homes that are relatively modest in socio-economic terms, we still see many of these same elements—if only to a lesser degree.

Many of our clients have traveled extensively in Europe and Asia and have been influenced by what they've seen. As a result, we're often asked to provide Greek, Roman or Moorish details in the designs we do, sometimes on a

grand scale. It's part of the regional fabric, too: Our public buildings often feature classical Greek-inspired columns, Roman-design arches, Moorish-style quatrefoils and Renaissance-type domes.

As watershapers, this means that our clients come through our doors with elevated expectations—both literally and figuratively. And we exploit those expectations in the way we've set up and lit our offices and showroom to feature many of the projects you'll find in the photographs seen in this article. With very few exceptions, these projects contain impressive vertical elements.

### WORKING IN SPACE

As mentioned above, what's so interesting about vertical structures is that they have an ability to connect and divide at the same time. Arches, for example, suggest a threshold at the same time as they offer a passage. Through that barrier, we're able to see what's on the other side—and things on one side are effectively linked to things found on the other.

Particularly when used to mimic the architecture of a home, columns and arches near a watershape connect interiors and exteriors—a link made even clearer by the fact that large expanses of glass are usually all that stands between a home's interior and its yard. When seen through these glass walls, the vertical structures outdoors draw the eye the instant anyone walks into the room.

Better yet, these vertical accents can be used to house a variety of water effects—everything from simple sheeting waterfalls to exotic rain-makers. Vertical structures also offer you opportunities to explore and exploit dramatic lighting effects or create and play with shade. They also let you frame views of spaces beyond, break the horizon, add visual interest to flat spaces, complement plantings and trees—the list of possibilities is endless.

To demonstrate some of this vast potential, we've selected the handful of projects seen here. Classic or modern, small or large, we offer them to support the notion that the vertical dimension is a critical one—one that should be considered and exploited by designers who are after something truly special.

And rest assured: You won't have to move to Texas to find clients who'll want you to put these ideas to work.





A



B



## Walls and Falls

Walls adjacent to water – whether they're part of an adjoining structure or constructed as part of the watershape – can lend a sense of privacy and enclosure to a setting. They also provide the designer with an opportunity to create a variety of waterfall effects – and a great way to generate continuity between the vertical hardscape and the water's horizontal surface.

A warm, old-world mood, for instance, is created by this simple fountain (A). Mounted on a concave, seven-foot tiled wall tucked between low walls at the end of the pool, the scupper and urn occupy a space with a bath-like sense of privacy amid a stand of towering pines. Quite a different effect is achieved by opening the water and wall to the surrounding space – as in this case (B), where a curtain of water "laminates" the center section of a tile-and-stucco outer wall that runs the length of a formal, rectangular swimming pool.

Less subtle in effect is this 10-foot waterfall (C), which accentuates the vertical geometry of the exterior windows and walls of a modern-style home. Space for the spa was created during a remodel of the owner's master bathroom. Sliding-glass windows now open into a small atrium designed both to expand the bathroom suite and create an interesting transition to the space beyond – all while maintaining a sense of privacy. Viewed from the deck above, the falling water creates a wonderful, tuneful effect as it falls into the pentagonal spa below (D).





**E**

## Water and Columns

Found in many of the world's grandest structures, columns make *statements*. From the Parthenon in Athens to the Lincoln Memorial in Washington, designers have long used these vertical elements to impress all comers.

We worked with a dramatic variation on this towering theme in a waterfront estate where we set up a series of 15-foot-high columns to serve two specific visual purposes: When viewed from the home (E), they frame the scenic river flowing next to the property's grassy banks; from the water (F), the columns harmonize with and enhance the grand architecture of this multi-million-dollar Texas estate.

On a somewhat smaller scale, columns are used as a backdrop for three lion fountains that stand watch on the upper sunning area of a classic, Grecian-style pool (G). The four columns carry the classic look into the vertical dimension and lead the viewer's eye to the lush landscaping of an adjacent golf course.

Continued on page 58

**F****G**



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## Water and Shade

In our work, we make extensive use of shade structures as a way to echo the architecture of homes and adjoining features, contrast the flat hardscape and water with vertical lines and give bathers a break from the often-searing Texas sun.

In one case, we set up a Spanish Colonial-style gazebo to tower above the flat rocks of a naturalistic waterfall that feeds a small man-made lake (H). Located at a community center in an upscale housing development, the struc-

ture provides a peaceful retreat for one and all.

Shaded areas can also be incorporated into swimming pool designs to give bathers a cooling break. In one case, an arched trellis provides a visual balance with the square spa on the opposite side of the pool (I) while also framing the lush backdrop of landscaping. But these shade structures don't need to have solid roofs to do the trick. Here, for example, an open arbor casts moving shadows behind and around a simple, eight-foot fountain (J).

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## Water and Rain

Commonly known as "rainmakers," these vertical features combine arches with falling sheets of water – and represent the most unique and interactive of all the vertical components we've used so far. These structures can be employed to tie the watershape directly to the architectural features of the home – and to frame and gently distort the view of nearby landscaping. Even more, they look great and are lots of fun for bathers and viewers alike.

Special perforated nozzles mounted in the structure create this water effect. Achieving an even flow from one side of the feature to the other is essential, so you need to pay special attention to hydraulics. And if you really get into it, multiple rows of rainmaker nozzles can be used to add depth and complexity to the falling sheets.

The bold yet simple geometry of one of our rainmakers mimics the exact size and design of the fireplace inside the home, creating a "fire and water" motif (K). Three rows of rainmaker jets have been installed in the free-standing 7-by-14 foot cast-stone-and-tile structure.

By contrast, just a single row of rainmaker jets is housed in another stucco structure (L) designed to mirror the architecture of the house. Here, water falls from the rainmaker into the spa and then into the pool via the tile-covered beveled edge (M). Again, the structure frames the view of the landscaping beyond.



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**FEENEY WIRE ROPE** introduces CableRail, a system for fences and trellises that offers an ideal solution for homes with a view. The 1/8-in.-diameter, high-strength stainless steel cable installs quickly and easily and readily follows contours and bends on tricky hillside slopes. May be installed on new or existing frames of wood or steel and comes with complete, step-by-step instructions. **Feeney Wire Rope**, Oakland, CA.

## POOL/SPA HEATER WITH A CONTEMPORARY LOOK

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**LAARS and JANDY POOL PRODUCTS** has introduced its Laars Lite2 pool and spa heater. Designed for reliability and high performance, the heater has a contemporary look that lets it blend more easily into backyard environments. In addition, its "sterling gray" exterior matches the Jandy pump and filter, providing the homeowner with products designed and engineered to work together. **Laars and Jandy Pool Products**, Novato, CA.

## UNDERWATER LIGHTING FOR SMALL WATERSHAPES

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**Fii FOCUS** has introduced its model SL-11-AB, a brass, 12-V, PAR 36 underwater light designed for small pools, ponds and waterfeatures. Used for surface area illumination or projection out of water on small fountains or waterfalls, the lights are available in several wattages and beam spreads and come with four color filters. Power-cord lengths range from 15 to 50 ft. **Fii Focus**, Lake Forest, CA.

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## DIRECTIONAL FLOODLIGHTS FOR WATERSCAPES

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**RUUD LIGHTING** manufactures the Directional Flood (DF) Series of wet-listed landscape lights for accent or general-area lighting. Designed with a 125-degree aiming range and heads that rotate 360 degrees, the series comes in both line- and low-voltage formats for tailored lighting effects. Available in three colors with a 7-year finish warranty and various controls and accessories. **Ruud Lighting**, Racine, WI.

## PUMPS FOR POOLS, FOUNTAINS, WATER GARDENS

### Circle 105 on Reader Service Card

**LITTLE GIANT PUMP CO.** has published a brochure with capsule descriptions of its main lines of pumps and accessories, including submersible models for use in pools and fountains and units designed specifically for use in water gardens and ponds. The literature also describes the company's history stretching back to 1941 and outlines its customer-service philosophy. **Little Giant Pump Co.**, Oklahoma City, OK.



## SOIL-REINFORCING GRID FOR RETAINING WALLS

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**VERSA-LOK RETAINING WALL SYSTEMS** has introduced the Versa-Grid soil reinforcement system for segmental retaining walls. The grid provides additional soil reinforcement when the weight of the retaining wall units alone is not enough to retain soil loads placed on walls. Available in three strengths, the product lays flat after being unrolled and can be used in building walls to heights exceeding 40 ft. **Versa-Lok Retaining Wall Systems**, Oakdale, MN.

## COLORFUL, EASY-INSTALLING TILE MOSAICS

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**INLAYS** has released a brochure on its new line of mosaics. Called the "Oceanic Series," the line includes colorful fish, dolphins, turtles, a scuba diver and much more. Many of the mosaics come as one piece for easy installation, and all are skid-resistant, frost-proof and available for same-day shipment. **Inlays**, Green Bay, WI.



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## WATER CURTAINS FOR INTERACTIVE FUN

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### Splash'n'Play



CRYSTAL FOUNTAINS offers a data sheet on its PWP-Series Water Curtain Pole, part of the company's Splash 'n' Play line of interactive waterplay components for children. The all-stainless-steel structure incorporates a flush-mounted activation button to supply water to jets along the structure's horizontal spar. Vandal-resistant, the system is anchored using concealed bolts. **Crystal Fountains**, Concord, Ontario, Canada.

## GRATING SYSTEMS FOR NEW POOLS AND REMODELS

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RENOSYS CORP. offers DuraTech, a PVC grating designed for new-pool construction and renovations. The 1-in.-tall extruded grating can accommodate any pool gutter or trench width, is slip resistant in accordance with ASTM standards and works for bulkheads or anywhere else a durable grating is needed. It is also UV and color stabilized. **RenoSys Corp.**, Indianapolis, IN.

## CONCRETE COPING, WALL CAPS AND PAVERS

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AQUASTONE offers a line of concrete coping, wall caps and pavers at affordable prices. Available in three colors – travertine white for a classic look, pewter gray and terracotta tan to blend with popular materials including Bouquet Canyon and Arizona flagstone – the product features a unique stone-like texture. The bullnose coping and caps are 11-7/8 by 7-5/8 in. The pavers are 12-in. squares. **Aquastone**, Laguna Hills, CA.



## CATALOG FEATURES ITALIAN GLASS TILE

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BISAZZA has published a 52-page catalog, "Panorama Piscine," that seeks to transform watershape interiors into underwater art through use of Italian glass-mosaic tiles. Lavishly illustrated, the catalog highlights both residential and commercial projects to show the jewel-like radiance of the tiles as well as the kaleidoscope of available colors, patterns and textures. Installation specifications also are included. **Bisazza**, Miami, FL.



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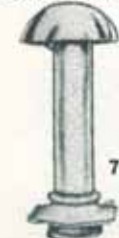


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## LANDSCAPE LIGHTING COVERED IN CATALOG

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**HADCO** has published a 92-page catalog – "Nightlife" – on its landscape-lighting products. An introductory text offers guidance in system selection, lighting techniques and installation. The main section of the catalog then covers the company's garden-art collection, accent lighting, step and deck lighting, inground lighting and path lighting. Details on power systems and accessories also are included. **Hadco**, Littlestown, PA.

## TRAINING SOFTWARE FOR LANDSCAPE CAD SYSTEM

Circle 114 on Reader Service Card



**EAGLE POINT SOFTWARE** has released its new Landscape Design Computer Based Training, complete with 25 step-by-step lessons that demonstrate the use of commands in the company's LANDCADD 2000 landscape design program. Coverage includes creating vegetation lines and edge stipple, creating and displaying new plants and plant information, modifying plant attributes, creating shadows, generating reports and more. **Eagle Point Software**, Dubuque, IA.

## NEW MODELS FOR OUTDOOR ENCLOSURES

Circle 113 on Reader Service Card



**APPLIED GEODESICS** introduces Radiance, the latest addition to the Clarity Domes line of outdoor-living enclosures. The new model combines a clear geodesic canopy with a durable aluminum frame to create an affordable, all-seasons patio cover. Strong, stable and easy to maintain, the model comes in three sizes (9 by 9 ft., 9 by 11 ft. and 11 by 11 ft.) and each can be fitted with insect screens or privacy curtains. **Applied Geodesics**, Vancouver, WA.

## LANDSCAPE TIES FOR VARIOUS APPLICATIONS

Circle 115 on Reader Service Card



**PACIFIC WOOD COMPANIES** supply landscape ties for use in retaining walls, planter boxes and wooden step systems. Made with new wood and pressure treated (Wolmanized), these long-lasting ties are lighter and easier to handle than standard railroad ties, will not soil clothing, can be painted or stained and are easy on cutting tools for easier fabrication. **Pacific Wood Companies**, Bakersfield, CA.



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## CALIBRATION KIT FOR ORP ELECTRODES

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**SENSOREX** offers an ORP Calibration Kit for easy verification of the operational status of ORP electrodes. Each kit includes materials for making solutions used in performing up to 30 two-point calibrations. The solutions generate 90mV and 260 mV; a properly operating electrode will reproduce these values within 10%. If the readings do not match the reference values, the electrode requires maintenance or replacement. **Sensorex**, Garden Grove, CA.

## CONCRETE COVER-UP IN VARIOUS PATTERNS, COLORS

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**INCRETE SYSTEMS** has published an 8-page, full-color brochure on Texture-Crete, a durable, skid-resistant cover-up that transforms plain gray concrete into fully textured surfaces. Three times stronger than concrete, the product is ideal for high-traffic commercial applications and can be used on either horizontal or vertical surfaces. Available in custom patterns and colors as well as an array of standard patterns and colors. **Increte Systems**, Tampa, FL.



## DEHUMIDIFIERS FOR INDOOR WATERSHAPES

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**DECTRON** offers its model DS-030 Dry-O-Tron, an energy-recycling dehumidifier that automatically maintains a relative humidity of 50% in an indoor pool room, recovers energy to heat the pool water and also conditions the air in the space. When used as part of an integrated plan

of ducting and insulation, windows and skylights stay free of condensation – even when the water is maintained at relatively warm temperatures. **Dectron**, Roswell, GA.

## STAIN REMOVAL AND PREVENTION PRODUCTS

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**JACK'S MAGIC** has released literature describing a full line of stain removal and prevention products designed for use with all common sanitizing systems. The four-page brochure covers sequestering agents, stain preventers, enzyme solutions, clarifiers, filter aids, stain removers, non-chlorine shock and professional test kits. **Jack's Magic**, Clearwater, FL.



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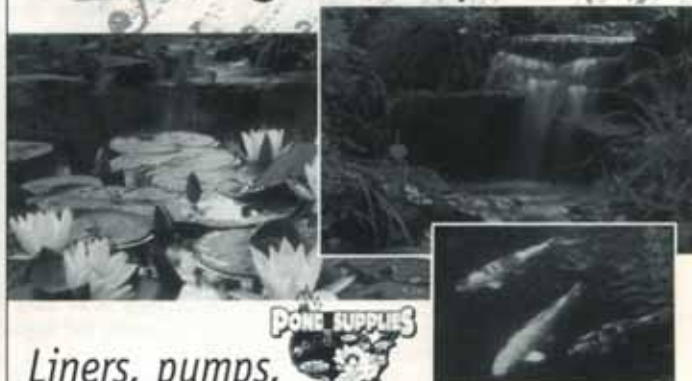
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## RETAINING WALLS FOR POOLSIDE APPLICATIONS

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**KEYSTONE RETAINING WALL SYSTEMS** has released a flyer on poolside applications for its retaining wall products. Designed for ease of installation, the system can be installed by pool contractors with existing crews and equipment—and allows for construction on sites that might not otherwise be suited to pools. An attractive array of design options complement almost any landscaping plan. **Keystone Retaining Wall Systems**, Minneapolis, MN.

## PLASTIC COMPONENTS FOR WATERSHAPES

Circle 121 on Reader Service Card

**SPLASH POOL PLASTICS** offers a range of plastic parts for use in watershape construction. Featured are color-match drain covers, designed to blend in with aggregate finishes; anti-vortex drain covers, designed to eliminate pool-cleaner hang-ups; and aim-flow return fittings, available in eight popular colors. Also available are rope anchors, recessed wall steps and plaster cleats. **Splash Pool Plastics**, Anaheim, CA.

## MULTI-FUNCTION CONTROL SYSTEMS FOR SPAS

Circle 122 on Reader Service Card



**BALBOA INSTRUMENTS** has published a catalog on its spa-control systems, including information on systems designed for use with inground custom spas. The Serial Deluxe Digital model comes in a water-resistant case for outdoor mounting in an unshielded area and can operate a gas or electric heater, a two-speed pump, a single-speed secondary pump, a blower, an ozone generator and a dimmable spa light. Remote controls available. **Balboa Instruments**, Costa Mesa, CA.

## BROCHURE HIGHLIGHTS COPING STONES

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**FEDERAL STONE INDUSTRIES** offers a four-page, full-color brochure on its line of coping stones for use in residential and commercial applications. Reflecting the company's 30 years of experience, the stones are designed to enhance the beauty of watershapes in either safety-edge or flat profiles and come in a variety of colors, textures and sizes to suit any need. **Federal Stone Industries**, Thurmont, MD.



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walk in front of your house. Connect one 1,000-foot-long, No. 18 AWG wire to the positive terminal of the battery and another to the negative terminal.

Now pace off about 100 feet along the wires and connect a 12-volt lightbulb to the two wires. The bulb will glow brightly. Measure the voltage across the bulb and it will be somewhere in the vicinity of 12 volts. Pace off another 100 feet and connect another bulb. It won't glow quite as brightly as the first one, and the voltage across the bulb will be less than the first reading as well. It might be 11.5 volts or thereabouts.

Continue this pacing and connecting until you get to the end of the wires. My guess is that the last bulb might not light at all and that the voltage you measure at the end of the wires will be down in the 5- or 6-volt range.

If you were attempting to sell electric lighting to people along your street, those toward the end of the circuit would be far from impressed with your service. The problem is that long length of small-gauge wire: It has a relatively high resistance to the flow of current moving through the circuit and is causing a significant *voltage drop* in each segment of the circuit.

## Conquering Distance

In a DC system, there are two ways of solving this problem: increase the voltage of the battery, or increase the size of the wire.

Neither, however, is a perfect solution. If the battery voltage is increased to a point where the folks at the far end of the circuit have a usable voltage available to them, then the people in the beginning of the circuit – closest to the battery – will be connected to a very high voltage that would result in drastically shortened bulb lives.

(A whimsical thought – manufacturers could market different lightbulbs, motors, appliances and such for people living different distances from the battery. You would find 100-yard, 60-watt bulbs; 300-yard, 60-watt bulbs; 2,000-yard, 60-watt bulbs, and so on. A retailer's nightmare!)

Increasing the size of the wire is a practical remedy – up to a point. To service people a mile or two from the battery would require a wire about the size of your wrist. The cost of this massive chunk of copper would be absolutely prohibitive to the profitable distribution of DC electricity.

The scenario is radically different with AC. The current in an AC system flows first in one direction and then reverses and flows in the opposite direction. It does this 60 times per second in the distribution systems used throughout North America.

This alternating allows the voltage to be *stepped-up* or *stepped-down* by a transformer and makes practical the distribution of power to customers at relatively long distances – several miles – from the AC generating plant. Also, the distribution wires can be operated at high voltage (10,000 volts and above) and low current for maximum efficiency and smallest wire size.

For each customer or group of customers, a step-down transformer is installed to reduce the voltage to a usable level, such as 115 or 120 volts. Each of the transformers installed along the distribution wire can be adjusted to provide each group of customers with the same voltage, regardless of any voltage drop that may occur in the distribution wires.

In other words, everyone in town has the same 115- or 120-volt electricity coming into their home. And the happy retailer doesn't have to stock dozens of different products after all.

We can conclude that both forms of electric energy have their place: All those batteries work just fine when they are inside the product they are powering and the distribution distance is thereby kept to an absolute minimum. But they are no match for the AC system that provides us with huge quantities of consistent power, hundreds of miles away from the generating plant.

*Next time: how a rivalry between Nikola Tesla and Thomas Edison changed the world.*

*Jim McNicol is a technical consultant to the swimming pool, jetted bath and spa industries. He works from a base in Orange, Calif.*



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## WATER SHAPES



# Alternating and Direct

By Jim McNicol



**W**e're all advised to change the batteries in our smoke detectors once each year. This is truly good and affordable advice, and most of us are happy to comply.

If you were to decide on a whim to replace *all* of the batteries in *all* of your battery-powered appliances or other devices that incorporate battery backup in their design on that mandated day, however, you might find the number of replacements surprising, the day a long one and the financial impact to be staggering.

In addition to those smoke alarms, you now find batteries in clocks and watches, flashlights, calculators, TV remote controls, timers, telephones, radios, garage-door openers, tape and CD players, virtually all of the toys your children cherish, cam-

eras, heating/air conditioning thermostats, desktop and portable computers, test equipment, countless power tools and – the granddaddy of them all – your automobile.

If an alien from a far-off galaxy were to read the above, he/she/it might assume we live on a battery-powered planet – a *direct current* (DC) planet. Far from it: It is the *alternating current* (AC) electricity distributed throughout the world that provides the huge amount of electrical energy required to power our homes and factories.

## Two Current Types

There was a time not so long ago when DC reigned supreme and very nearly became the standard. It is not an exaggeration to state that the inventive brilliance of one man, Croatian inventor Nikola Tesla, prevented that from happening. That's a fascinating short story I'll get into in next month's column; first, let's look at some of the major differences between AC and DC.

The distinction between AC and DC didn't arise at all until the late 1880s. Before then everything was DC and was called, simply, "electricity."

A great deal of basic research into all things electric took place in the second half of the 19th Century. During this period, for example, the telegraph, telephone and stock ticker were perfected, and several versions of the arc lamp were being operated around the world. Electric motors began to show up in the early 1870s.


Initially, some form of chemical battery provided the electric current to operate all of these devices; later, rotating, mechanical generators called *dynamos* would provide the needed DC current.

The telegraph, telephone and similar low-power devices worked quite well with the electric current supplied by batteries. It was lights and motors that the world wanted most of all, however, and battery power or the DC provided by dynamos is not well suited to these applications.

The problem is *distribution* – getting the electric current to users in the required quantities. To illustrate the point, start with a fully charged automobile battery removed from the car and sitting on the side-

Continued on page 69





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