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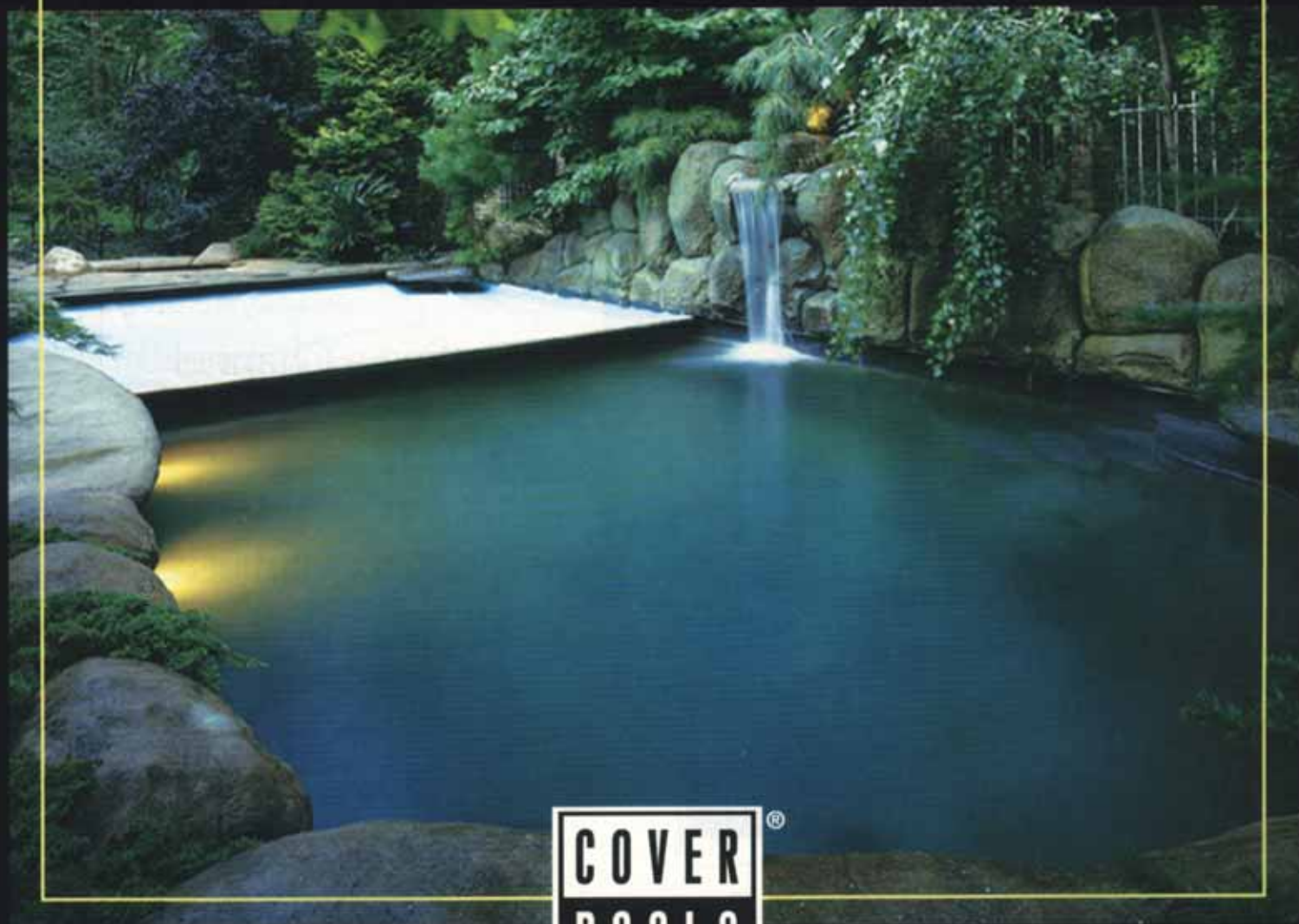


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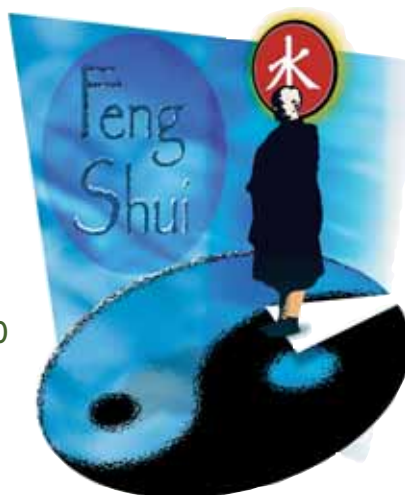
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Photo courtesy Elite Concepts by Michael Nantz, Dallas

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A Path Discovered

Last year at about this time, my wife and I were driving through Big Sur on the California coast when, on impulse, we decided to stop at Pfeiffer State Park and take a long walk through the redwood forest. It was a gorgeous day, and the snows in the nearby Santa Lucia Mountains had mostly melted. Everything was green and the rivers and streams that lace the area were running swift and high.

As we huffed and puffed our way up a steep incline, we began to hear the sound of cascading water echoing through the majestic conifers. As if the beauty of the 300-foot redwoods wasn't enough to draw us deeper into the forest, the sound of the water put a decided spring in our steps. This burst of energy and inspiration was a good thing: As it turned out, although we could hear the water more clearly with each stride, we were still more than a quarter mile downslope from the source.

The steep, winding path ultimately led us to a landing in a small box canyon at the foot of a spectacularly intricate set of falls. Because of the way the trail had twisted and turned, we couldn't actually see the water until we were practically getting wet. I remember hearing Teresa, who's in much better shape than I, sigh with relief and delight as we walked onto a small wooden deck that enabled visitors to all but touch the falling water. (It took several moments of fairly intense panting before I was able to drink it all in.)

It was a beautiful experience – one that reinforced my view that there's nothing quite like the sight and sound of water to transform the mood of those who go near it. In this case, the sound of the water exercised a magnetic pull on our tired legs all the way along the path, and the payoff was worth the effort, tenfold. Teresa and I lingered near that waterfall for nearly an hour.

I recall this story to make the simple (yet profound) point that watershapers have a chance to do what nature does so often by offering this unfolding sense of discovery to clients – and that you don't need an entire redwood forest and a rushing river to make it happen.

In this issue on page 22, landscape designer Bobbie Schwartz takes us on a "walking tour" of several noteworthy gardens she's visited in England and the United States. In her story, called "The Unfolding Garden," she describes a veritable arboretum full of ways that anyone working with water can provide delightful revelations for clients coming upon the water's edge.

The best thing about her presentation is that what she describes falls squarely into the category of things you can do for clients that don't necessarily cost an arm and a leg. Rather, with a bit of space and imagination, it's possible to arrange footpaths and plantings and position a watershape in such a way that a sense of excitement and discovery is a product of design strategy and not of a massive budget.

Although the spaces and plantings pictured in Schwartz's article have had the advantage of generations of growth in some cases, the philosophy of design she defines can be applied in a modest backyard environment almost as well as it can in a space as vast as the great outdoors. Watershapers may not be able to work this magic in quite the same way nature does, but the rewards of trying can make the journey worth every step for you – and especially for your clients.



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IN THIS ISSUE

APRIL'S WRITERS

Bobbie Schwartz is a landscape designer, consultant, lecturer and writer – professions that have made her well traveled in pursuit of excellence in garden and watershape design. She founded her full-service design business, Bobbie's Green Thumb, in 1977, and her residential, institutional and commercial designs have been recognized by awards from the Perennial Plant Association, the Ohio Nursery & Landscape Association, the Ohio Landscapers Association and the Cleveland Botanical Garden/ASLA. Schwartz participates in several trade associations on the national, state and local levels and currently chairs the Certification Committee for the Association of Professional Landscape Designers.

Rick Anderson is owner of Ston Wurks, a landscape-design firm in Columbia, S.C. A designer and artist with 22 years of professional experience, Anderson's work focuses on the use of natural materials, particularly stone, in naturalistic settings. He is the founder of The Whispering Crane Institute, a landscape design "think tank" dedicated to exploring our physical, emotional and spiritual relationships with the land. The institute stages Philosophy of Design Symposia each year. Anderson is a past director of the Association of Professional Landscape Designers and has contributed numerous articles to a variety of trade and consumer magazines.

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Interested in writing for WaterShapes on design, engineering or construction topics? Contact Eric Herman at (714) 685-1854!

Joe Esser is the Midwest regional sales representative for Kiefer Pools & Equipment, a manufacturer based in Zion, Ill. Esser has been involved in the swimming pool industry for 26 years, working for a wide variety of firms in positions ranging from construction and service to project management and distribution for the commercial pool market in the upper Midwest states. In his current capacity, he is often called upon to supervise projects featuring construction of modular stainless steel shells.

Michael Nantz owns and operates Elite Concepts by Michael Nantz, a Dallas-based design/build firm for high-end residential and

commercial swimming pools, spas and water-features. Now often called upon to offer design and consulting services for elaborate water-shape installations around the world, Nantz joined the pool and spa construction industry in 1988 as a project manager for another Texas builder. Previously, he'd spent several years as a project manager for large commercial construction projects including several high-rise buildings that grace the Dallas skyline. Nantz has been a member of the National Spa & Pool Institute's Builders Council since 1994. His work has won numerous design awards in the United States and Mexico; he served as a design-awards judge for NSPI in 1995 and 1996.

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In Search of Balance and Harmony

By Brian Van Bower

The words mean “earth luck,” and over the last 18 months, at least half of my design-work appointments have been with people who have some concern or interest in the ancient philosophy known as *feng shui*. In fact, many of these (mostly upscale) customers already own books on the subject and have the expectation that I will factor *feng shui* principles in as I design their watershapes.

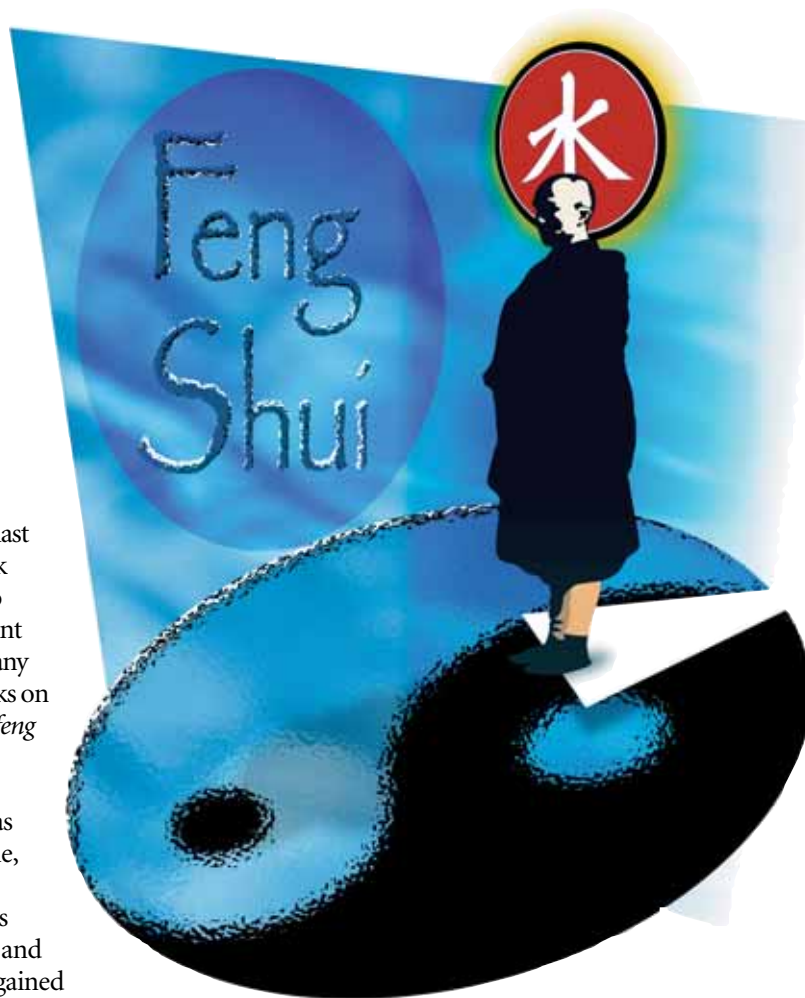
By now, most of us have at least heard of this ancient Chinese philosophy, which is often described as “the art of living in perfect balance.” If you’re like me, it’s been one of those things to which you’ve never paid too much attention in your own life. But as has been the case with other forms of Asian philosophy and spirituality, *feng shui* (pronounced *fung shway*) has gained a strong foothold in this country and among my clients in recent years – and at this point I have a sense that I need to get up to speed, sooner rather than later.

In other words, regardless of the reasons behind the trend toward *feng shui*, the reality is that this is something that many of my clients and potential clients here in South Florida really care about. I therefore believe it’s up to me to know more about it, too.

GARDEN PATHS

I recently attended a dinner sponsored by my local food and wine association to celebrate the Chinese New Year. We ate truly wonderful Chinese food and were treated to a presentation by author Grace Young, who, among other things, informed us that we were entering the Year of the Dragon. More helpfully, she also gave us some historical perspective on *feng shui*.

Although it’s been around for centuries, she said, *feng shui* has not been hugely influential in Asian culture. That aligned with what I’d learned in my own reading: Only



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the wealthiest Chinese citizens originally practiced *feng shui*, and its principles are mostly evident in grand ceremonial buildings such as tombs, palaces and temples.

Over time, however, the *feng shui* sensibility filtered down to the masses to a point where it became popular throughout China and began spreading to other parts of Asia and, eventually, the rest of the world. Whatever path it’s taken to

get here, *feng shui* certainly has caught on in my area. We now even have a "Feng Shui Master" listed in our Yellow Pages.

Although I'm certainly no *feng shui* master, I do believe that the current interest in this ancient art is part of an important trend that we in the water-shaping industry should strive to understand and even embrace. Put in a way that steers clear of mystical mumbo jumbo, more people than ever before are actively seeking opportunities for serenity in their busy and often noisy lives and want tranquil places in which to experience these brief respites.

In fact, many of my clients have read books on the subject and are asking me to apply *feng shui* principles in our projects. They want pathways through their gardens and places along the way where they can sit and read a book or practice yoga or simply relax while listening to the sound of some gently flowing water.

I'm finding more often that this

"tranquility portion" of the discussion is dominating my client meetings, far more prominent now than concerns over features of their pools and spas. Taken in the broadest sense, *feng shui* thus offers us a design philosophy and vocabulary that gives us access to people who believe that its principles are important to the creation of these small spaces for peaceful repose.

TRINITY OF LUCK

So what exactly is *feng shui*?

In elementary philosophical terms, it is the third side in what is known as the "trinity of luck." The first is considered "luck from heaven" – that is, your destiny or *karma*. The second is "human luck," the kind you create as you live your life. The third is "earth luck," or *feng shui*.

Earth luck relates to the flow of energy through the universe and achieving harmony and balance within that flow. The ancients used the *luo pan*, the orig-

inal *feng shui* compass, to interpret this energy flow and arrange interior spaces, exteriors and entire complexes according to what they observed.

Today, figures known as *pakua*, which look like small octagonal compasses, are used as guides to find balance and harmony in the way that objects are arranged in exterior or interior spaces.

Figuring all of this stuff out can be a bit intimidating at first. *Feng shui* encompasses several ancient Chinese ideas and techniques, and many of the references are both unfamiliar and a bit bizarre. For example, one of the keys is the concept of *chi* (a counterpart of the *ki* I mentioned in a previous column), which is also known as the "dragon's cosmic breath" – a common Asian metaphor that refers to the flow of energy in the universe. Harmony with this flow is achieved by balancing the *yin* and the *yang* – a pair of common Asian philosophical terms that most people recognize even if they don't

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quite know what they mean.

Yin and *yang* are very important in *feng shui* because they are believed to encompass the basic opposing forces of nature. *Yin* is considered female and represents things such as the moon, water, winter, valleys, streams and darkness. *Yang* is male and represents fire, light, heat, summer and life itself.

According to *feng shui* philosophy, *yin* and *yang* together "constitute the eternal union of heaven and earth, which becomes the universe whose breath is *chi*."

In *feng shui* philosophy, all things contain both *yin* and *yang*, and it is how they are balanced that matters. The practice seeks to eliminate or offset what are known as "poison arrows," which might loosely be interpreted as sources of negative energy and are things that are sharp, straight and rigid.

In that context, a straight path leading to your front door from the street is considered a poison arrow, as are any sources of excessive noise. There are some less obvious examples, too: A mailbox pointed at your front door, for example, is considered a poison arrow.

INSTANT KARMA

Much of what I know about *feng shui* I learned from the book, *Feng Shui for the Garden* by Lillian Too. It's widely available along with many, many others and can be found at bookstores everywhere.

As I've delved into it, I've found many useful ideas and many others that seem far less practical. What is particularly interesting and certainly has been of most use to me in working with my design clients are the ways that the art of *feng shui* can be used to manipulate exterior spaces. The books discuss several famous examples of buildings and spaces that are said to have either good or bad *feng shui*.

Buckingham Palace, for example, has very bad *feng shui* with all that ungainly stone and sharp masonry features - lots of poison arrows with little or no balance. It's all rigid, sharp and devoid of life or water. On the other end of the spectrum, the Summer Palace of Peter the Great on the outskirts of St. Petersburg is surrounded by gardens with lots of beautiful winding paths and is said to exist

in an excellent state of balance.

As I began looking around and trying to interpret these concepts on my own, I noticed that my own backyard includes several (unconscious) attempts to balance *yin* and *yang*.

Most dramatic have been my attempts to deaden the noise I pick up from a nearby thoroughfare. In my attempts to drown out the racket, I built a fence that was the maximum allowable height and backfilled soil to create an elevated slope up against it. This let me elevate my landscaping near the roadway and do a better job of knocking down the sound of the cars speeding by.

Little did I know, but in *feng shui* terms I was seeking to balance out the negative *yang* energy of the noisy traffic. What I'd done simply made sense as a Miami guy trying to make his backyard a more pleasant and usable extension of his interior space. What all the local buzz about *feng shui* has done is bring issues like this into focus

I'm no mystic, but I observe design details with new awareness and seriously consider things such as the balancing of light and dark areas with shade structures.

and given me and my clients a vocabulary we both understand and can use to speak clearly about key design issues.

At the risk of sounding cynical, I'm happy to apply my problem-solving skills in these situations no matter what terms are used to describe what I'm doing. If those terms happen to float my clients' boats, they work for me, too.

WET AND DRY

Of particular interest to us water-shapers is that *feng shui* describes water as being highly beneficial when used in

a balanced way. In fact, water brings good fortune when the balance between wet and dry is optimized. Doubling back to the notion of creating tranquil spaces, a small stream that meanders by a stone bench represents a nice form of balance.

With a bit of practice and application, I'm now working full speed ahead with *feng shui* in mind. For instance, I'm currently installing a spa that is fed in part by a massage waterfall. To add balance and soften the design, the waterfall's flume will be made of wood,

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probably some type of oak that will stand up to the treated water without adding tannins to the spa. It works in *feng shui* terms; it's also a flat-out neat design – and I must admit that I've been helped here by a sharper awareness of balance and other issues I've encountered in studying *feng shui*.

In another job, I've created an elevated wooden path that angles over a small meandering stream bed. The detail here is pretty interesting: Instead of building the path with horizontal planks, as on a pier, I'm laying these long planks lengthwise with the wood grain flowing in the direction of the person walking down the path. The path leads to a wooden gazebo where my client, an extremely busy professional, plans on practicing her yoga.

These are just two modest examples of small details that are extremely important to some of my clients. When approached with an open heart, I believe that *feng shui* keys the creative mind to an array of compelling ideas. I'm no mystic, but I observe design details with new awareness and seriously consider things such as the balancing of light and dark areas with shade structures, or schemes for juxtaposing hardscape elements with plantings. And I'm more aware now of how gently cascading water, flowing in the correct direction, can mask the sound of our noisy world.

I look at it this way: If I sell a small waterfeature or incorporate some material like bamboo or include some other traditional Asian design touch because the customer wants it based on their belief in *feng shui*, then to my mind, it is only to everyone's benefit.

After all, being in the business of providing "earth luck" sounds pretty good to me.

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



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Coping Skills

By Stephanie Rose

Your clients are thrilled with your pool design – with one exception. It may be set up to withstand a 9.0 earthquake, but with all that decking and concrete, it resembles a bomb shelter. Apparently while you were working with the client's desire for seismic durability in mind, you lost sight of their additional desire for soft, rolling meadows.

I exaggerate here to make a point: Too many watershapers are reluctant to minimize coping or design pools without broad expanses of decking that can make backyards look like parking structures.

You may do it because you've been told that chlorine will kill any plants near the pool, or you're afraid that the plants will get trampled by hordes of teenagers using the yard. Whatever the reasoning, the result is that too many pools seem to be designed with too much hardscape surrounding them. This usually turns what could be visually spectacular into a concrete jungle.

If you're a watershaper who constructs mainly ultra-contemporary designs with lots of structure and minimal plantings, you can exclude yourself from this discussion and read on just for the fun of it. The rest of you – listen up!

CONSIDERING OPTIONS

So what are you supposed to do if your clients tell you they want as little hardscape as possible? There are many ways to approach this request. Here are



Breaking up the hardscape visually with spots of plants near and surrounding the pool can go a long way toward softening up a harsh look.

some of your choices:

- **Minimal coping with lawn up to the coping.** Most contractors I've worked with like to see a minimum of 15 inches of coping and decking. I recommend going no more than 24 inches if you want the coping and any decking to be inconspicuous. Then you can plant lawn right up to the hardscape.

- **Stone set in the soil next to the coping.** As an alternative to grass, try setting stone in the soil surrounding the coping to add what seems like more coping or decking. This option works well for clients who are on the fence about having plants or lawn that close

to their pools. You also can fill spaces between the stones with ground cover or sod for a varied, softer look.

- **More decking with cutouts.** If the clients are the ones insisting on maximum hardscape, do them a favor and suggest cutouts in the hardscape for planting. Breaking up the hardscape visually with spots of plants near and surrounding the pool can go a long way toward softening up a harsh look.

No matter which route you decide to go, I don't recommend putting gravel or decomposed granite near the pool. The potential for tracking them into the pool is too great.

Decomposed granite (which has the

consistency of sand when not compacted) would likely clog a pool filter and doesn't feel great on the bottom of the pool. The point here is to avoid any materials that may be easily transported by feet into the pool.

There are other reasons you might want to talk your clients into minimal coping and hardscape. Here are the best ones:

- **Heat reduction.** Many of your pool-buying clients live in areas where the temperatures get quite high during the summer. Some pool owners in these areas are even reluctant to use their pools during the daytime hours in the summer because they burn their feet on the deck and just can't stand the heat. Some resort to hosing down the deck to cool it, but that doesn't always work.

Concrete and stone absorb the heat. By eliminating much of the hardscape, you reduce much of the heat, because there is nothing absorbing it. This makes it more inviting to walk around the pool and be out in the yard. I've heard some people say their yards were 20 degrees cooler after they reduced the size of their decks and planted sod right up to the coping.

- **A softer look.** Plants always soften the look of concrete, stone, or even wood. Although many people like the look of a lot of hardscape, for those who don't, allowing as much planting space in the yard as possible will most likely achieve the softer look they want.

- **Versatile design.** Once you've installed hardscape, you limit your options for planting. If clients aren't sure what they want, keep the coping and hardscape minimal and plant the rest of the yard. You can always add decks and other hardscape later, but removing it, as we all know, can be quite expensive. Saving your clients money in this way, especially when they aren't sure about the final look they want, will boost their confidence in you.

- **Easier treading.** Who wouldn't rather walk on soft grass than hard stone? If your clients have kids running around their pool, playing games, they'd probably rather have them fall on a lawn than on concrete. In that

vein, having a lawn next to the pool may even reduce your clients' liability.

CLEARING THE WATER

OK, I can tell that some of you are still not completely convinced this hardscape-reduction plan is a good idea. So let me dispel a couple of common myths about this approach by way

of convincing you of its wisdom:

Myth:
Chlorine will kill the lawn.

Reality: It will not kill the lawn.

The amount of pool water that will



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get on a poolside lawn, even if it's right up next to the pool, is not enough to harm it. If it's warm enough to splash around in the pool, it's probably also warm enough that the lawn will be watered every day. So any chlorinated water that gets splashed on the lawn will get diluted and washed away soon enough to prevent any damage.

Even if the watering comes only every other day, it still isn't a problem. In reality, a dog poses a greater threat to a lawn than the pool water does!

Myth: Wide coping is essential.

Reality: You can do what you want.

Some watershapers insist you must have at least three feet of coping and decking. Although I'm not familiar with all the building codes throughout

the country, my experience tells me that, aside from structural limitations, there is no reason you can't reduce the coping to a minimum.

GREEN POSSIBILITIES

Once you have convinced your client that minimal coping is a good idea, you need to decide what to plant.

In Southern California, Marathon 2 sod works quite well next to pools. It's hardy and stays green year 'round. You can experiment with other types of sod or ground cover, but I recommend experimenting with small patches of anything other than a sturdy sod to begin with. Different plants react differently to high traffic. And who would want to install a whole expanse of Scotch Moss all around a pool, only to find out that it gets destroyed by a single drop of chlorine-tinted water?

In past columns, I've discussed

some of my "dos" and "don'ts" when it comes to roses and tropical plants near swimming pools. Speaking for myself, I'll try anything once, but I recommend for those of you trying things for the first time that you consult the *Sunset Guide* for your area. As I've mentioned before, it has an excellent section on plants that work well near swimming pools.

If you need some more help deciding what to do, you can e-mail me for advice.

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.

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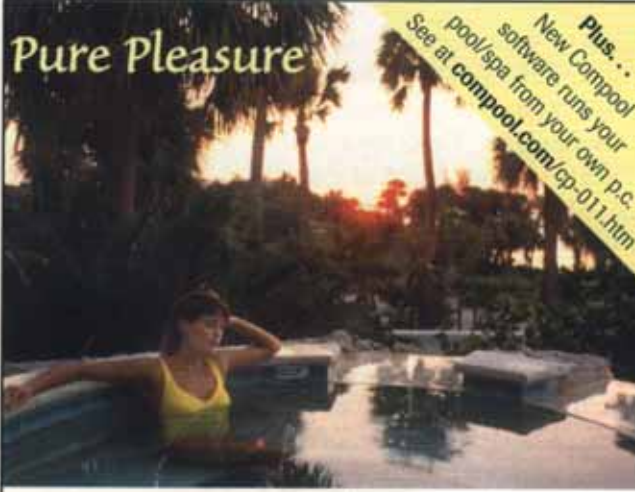
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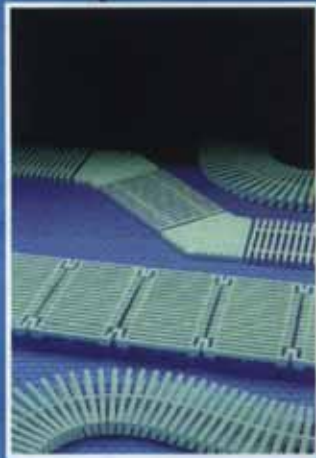
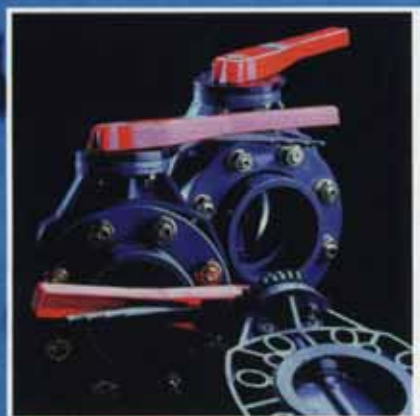
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KONA COAST

The Unfolding Garden

It's why art museums are arranged in spatial sequences and why so many people love reading mystery novels: That excitement of discovery is a powerful tool used to create drama and interest for the observer or reader. So, too, says landscape designer Bobbie Schwartz, watershapers can lend welcome elements of surprise and wonder to their work, creating spatial experiences that unfold as clients approach or wander near the water's **edge**.

As adults, we too often forget one of the great joys of childhood – the sense of wonder and discovery we experienced when we first saw the ocean or flew in an airplane and the world opened and unfolded before our very eyes.

As designers, I believe we similarly forget about the excitement that comes with discovery. Too often, we lay out beautiful lines and incorporate interesting and unusual plant and hardscape material for everyone to see *all at once*. The work may be beautiful, but it leaves little or nothing to the imagination and offers no surprises.

I can't help thinking how much more our landscapes, public and private, would be savored if they were to be explored and discovered *bit by bit*. This is especially true for spaces containing watershapes, which by themselves lend interest and drama to almost any space: The magic of water can (and I believe *should*) be exploited by concealing it at first and then revealing it in a way that gives the viewer a brief moment of visual revelation.

To see what I mean with respect to watershapes and waterscapes, let's explore an approach that makes seeing everything immediately an impossibility. Instead, this approach offers glimpses that tantalize and intrigue – and can be seen in the work of thoughtful garden designers who've manipulated sights and sounds around the water's edge to lend these spaces a transcendent sense of discovery.







AURAL INVITATIONS

Consider the experience of being drawn to a watershape not because you can see it, but because you *can't*. Ever heard a sound that so entranced you that you felt compelled to discover its source? When you work with moving water, you have the opportunity to set up that experience for clients.

Here's a striking example: Near the education building at Strybing Arboretum in San Francisco is a relatively narrow tropical garden that backs up to a wall and has a very narrow path through it. As you walk along the path, you hear a faint bubbling sound. Not until you come to the end of the path do you discover a tiny pool with a bubbler in the middle.

Even though you have been listening to this subtle sound, however, you might easily miss the pool because it is almost completely surrounded with rocks and verdant plantings (Figure 1 on page 23).

Or sometimes the sound itself is the surprise at the end of a quiet path. At Cranbrook Gardens in Bloomfield Hills, Mich., an old estate has been converted into a public garden with many wonderful elements. One of them, the Greek Theatre, is approached by way of a long woodland path. The attractive force here is not sound; rather, it is the tall Greek columns that surround a be-

calmed, rectangular pool.

Once the visitor comes to the end of the path and stands in this area of the columns and the pool, he or she picks up the sound of water but has no immediate idea as to its source. Moreover, that sound will vary, depending upon the amount of rainfall at the time, from faint drips to a rushing cascade.

With further exploration, the observer finds, on a wooded slope behind the theatre, a series of perhaps 30 wide steps over which rainwater descends until it reaches two small pools, one below the other (Figure 2). This cascade was built before the era of re-circulating pumps, but if the idea were to be copied by a contemporary designer, the sound could remain a constant (and equally variable) invitation to further exploration of the garden space.

In my view, we designers don't make sufficient use of this element of surprise. Frequently, our clients will tell us they want to see the ornamental pool or pond from the house. But must it be seen immediately from the paths that visitors take from the front entrance around the house to the back where the pool is?

Why can't we lead these visitors on a journey through interesting plant material on the way? And then, as they near the pool or pond, why can't we screen it in some way so that the watershape comes



as an unexpected marvel? Why do we feel that we have to have visual accessibility from every angle?

PATHS TO BEAUTY

The development of a sense of discovery begins to take flight when you think about questions like the ones I just posed and begin to understand the value of things like screening.

An excellent example of screening is a garden in Baltimore – a collaboration between the client and the firm of Oehme & Van Sweden. Here, a small ornamental pool, contiguous with a patio just off the back of the house (Figure 3), may be approached in one of two ways, neither of them direct: You can walk around the house past a hedge of tall conifers to a path that cuts through two of them and then discover the pool. Or you can come from the opposite direction on a path that meanders beside a Lagerstroemia (Crape Myrtle) and be enticed to look through its foliage and exfoliating limbs as through a veil. This is an *adventure* rather than a mere sighting.

Back at Strybing Arboretum, there is a rather large pond mostly surrounded by conifers and a wide walking path. At one end of the pond, however, you can duck under and through branches of two enormous conifers onto a path of sand and stone steps and almost imagine yourself on

Continued on page 26

Swimmin' Holes

The designing and placement of swimming pools in landscapes can be problematic. First of all, they tend to be big. Second, some municipal codes require that they be fenced for safety reasons. But neither of those factors means that one of them has to be seen the instant you look out of the back of the house – at least not from the first floor, anyway.

When swimming pools are fenced, there is normally one gated entrance. If you think about it, even the entrance does not have to be apparent as long as the path leading to it is obvious. So consider surrounding the pool with a garden full of tall plants including trees, large shrubs, grasses and perennials.

World famous designer Wolfgang Oehme has a swimming pool in his own backyard that is totally hidden from the patio by his “jungle.” It seems to me that, not only do we contribute to the thrill of discovery by designing this way, we also enhance the swimming experience by adding a sense of immersing ourselves in nature. After all, the very first swimming pool was a natural body of water surrounded by trees, shrubs and grasses as well as birds and butterflies. Who says the main thing you have to see when floating in the water is the back of the house?

In Rotterdam, I visited a private city garden that is essentially a long, relatively narrow rectangle (A). About halfway toward the back of the property, you catch sight of the rest of the garden through a frame of two large trees sited at the edges. What you see to the rear and center right is a horizontal row of four-foot-high evergreens that intersect a shrub border on the far right. Parallel to the shrub border (but at a 90-degree angle to the evergreens) are some blue spruce.

In the neighboring space is a chair, which implies that you might find a patio in the space bordered by the Spruce and the evergreens. What a surprise, then, to find not a patio, but a full-size swimming pool! In addition, the right side of the pool is bordered not by paving, but by a planting bed full of conifers and deciduous shrubs that comes right up to the edge of the pool (B).

Swimming pools can be hidden by grading as well as plants. A client of mine has a pool that cannot be seen from the street because it sits below a four-foot wall that has landscaped beds on top of it and then a sloping lawn above those beds up to the street. The pool cannot be seen from the drive down to the garage either, because that area has a trellis wall covered with vines. The pool can only be glimpsed from the kitchen window through the canopies of trees that mostly screen it from plain view.

Another way to make a pool or pond become a revelation is through manipulation of the land. If the client has a property with hills and valleys, all to the good. If not, however, the land can be graded to create a depression or a streambed. Then, with careful selection of plant



material, you can create a short or long expedition leading to the hidden watershape.

I don't know if the University of California's Asian Garden in Berkeley was created on natural terrain or constructed terrain, but the end result is a great joy, with a pool at the bottom of several slopes that can be viewed from several vantage points. When you see it from the top of the highest path, you're drawn closer and closer until you reach the pool itself. But to get there, you must travel along a path and through a plethora of incredible rhododendrons while catching brief glimpses of the pond along the way.

To be sure, we're generally not given that much space to work with, but principles of screening and grading can certainly be applied on a smaller scale to bring a sense of discovery to just about any swimming pool in almost any client's backyard.

– B.S.



a small beach (Figure 4). If you were to approach the water from that end first, the pond would come as a complete and delightful surprise.

In both of these cases, it's about the designers thinking through and controlling access to the watershape at the end of the path. Yes, a direct approach might have worked well in either case, but the profound impression and experience that comes with the unfolding of the scene would be entirely lost.

English designers have been attuned to the importance of this principle of surprise for many years. At Hidcote, now a National Trust Garden, owner Lawrence Johnston converted a piece of farmland into a series of garden "rooms" early in the 1900s. As one treads a brick path and enters the fuchsia garden, part of a pool and a statue in it can be perceived just beyond in another space that is mostly screened by sheared conifers (Figure 5A).

This glimpse tantalizes the observer, who then proceeds down the path to the Bathing Pool. Even then, as one enters this room, the view of the pool is partially obscured by the ring of *Cimicifuga racemosa* (Black Snakeroot) on the outer edge of the path around the pool (Figure 5B).

Continued on page 28



Traveling for Inspiration

It takes an investment of time and money, but from my perspective, there's no better way to learn about styles and principles of design than by breaking away from your usual environment and seeing a bit of the world. For my part, the inspiration to create a sense of discovery has come in large measure from visiting and studying English and Continental gardens.

These journeys have had a profound impact on my designs: Without the stimulation of seeing other designers' solutions and creativity, it's all too easy to forget that the obvious approach may not be the best.

In my travels, I have learned to use the concept of the large plant by the curving path to hide some of the garden in many of my designs. I have also designed some diagonal gardens on barren rectangular properties, using large plants on the points to disguise part of the landscape. I use the concept of the see-through plant to gradually reveal a vista or vignette as well.

The best of it is that none of these ideas are expensive: It's all about how you perceive and use the space and add value to a design without bankrupting the client!

—B.S.



5A



5B

6A

Continued from page 26

Another English designer, Rosemary Verey, is a firm believer in vistas and has used that concept very cleverly at Barnsley House to tempt the visitor to discover the pool in front of the Greek temple that she and her husband rescued from demolition. Standing at the end of a grass path, flanked on both sides by long mixed borders, you see the temple with tall iron gates on either side and tall tropical looking plants just within (Figure 6A).

At that point, it's not clear whether there is a small pool in front of the temple or whether you're looking at a bed of groundcover. Only as you approach the vessel can you distinguish the water and the water lilies therein (Figure 6B).

SUNKEN TREASURE

Naturally, there's more than one way to build surprises into landscapes.

At Great Dixter, England, home of the

Continued on page 30

6B

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7A

Continued from page 28

noted plantsman and garden designer Christopher Lloyd, the “bones” of the garden were designed by Edwin Luytens and Christopher’s father, Nathaniel. A tall evergreen hedge serves as one of the walls of the Sunken Garden; an arch, carved into the hedge as a doorway, provides a partial view of this “room” (Figure 7A).

Simply passing through the arch does not allow you to see the pool within: It merely allows you to see that there is a lawn surrounded by mixed borders and that within the lawn are three levels. Not until you are fully inside this garden room can the sunken pool be seen in all its beauty, because it is edged on the entrance level with a three- to four-foot-tall mixed planting of perennials and ornamental grasses.

As you come closer to the pool and then descend to the lower levels, you’re better able to appreciate the design of the pool itself, the planting of the stone paving around it, and the planting of the stone wall surrounding the paving (Figure 7B). The complexity of this design can provide

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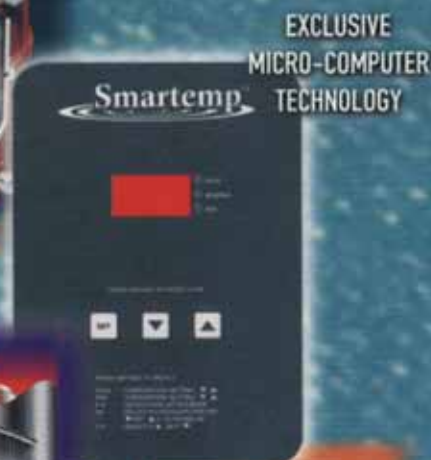
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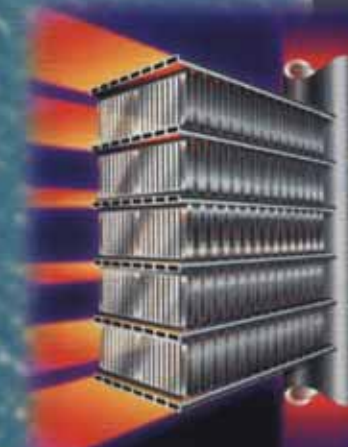
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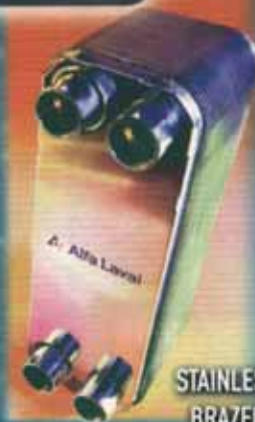
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8A**8B**

Continued from page 30

multiple levels of inspiration for a watershape so long as the designer remembers that sunken gardens should not be fully appreciated until seen at close hand.

England, of course, has the luxury of old estates and relatively mild temperatures. In many parts of this country, designers need to be a bit more innovative to make the elements of surprise work year 'round – and sooner rather than later. If our clients cannot afford to buy mature evergreens for hedges or build walls of stone or brick, we can use ornamental grasses or shrub roses or prolific vines on trellises as walls.

At The Land of Nod, a small private estate near Kiftsgate, England, the present owner's father established an English version of a Japanese garden. Here, one en-

ters through a torii arch covered with vines and follows a curving path composed of stepping stones set into the grass (Figure 8A). This path leads to an open expanse of lawn into which is set a pond surrounded by Japanese Maples and several other kinds of vegetation that mostly obscure the edges of the pond and also hide it from the other side (Figure 8B).

Again, full appreciation comes only when you are up close to the watershape. The beauty of the design has many levels, not the least of which is the way the designer has controlled the observer's pathway to that closer view with screens and plantings.

DISCOVERY ON GRADE

We can also work with the land itself

by creating terraces and paths that take the viewer from one level to the next – and by placing watershapes on one or more of the terraces. With judicious selection of plant material, the watershapes themselves would not be apparent until the viewer was quite near.

There's a private garden in the Boston area that employs this strategy. The house sits on the lowest level of the terraced property. Outside the back of the house is a simple formal garden; at the far end, you are drawn forward by lawn and steps.

These steps ascend between a woodland garden on the outer edge of the property and a meandering stream on the inner side. This stream, which can only be glimpsed from time to time through closely planted, water-loving perennials and shrubs, also flows under the steps to the other side and then seemingly drains into the woodland garden.

As the viewer nears the top of the steps, a new world is seen through a delicate iron arch. This new world features an undulating swimming pool with planting pockets that come right up to the water's edge – with more beds just on the other side of the unevenly spaced width of the surrounding paving (Figure 9). As you wander around the pool, in other words, you are also strolling through a garden.

This strategy of terraces and steps to pull the gardener or the visitor through a sloping landscape has also been used in Atlanta at Hosta Hill. Here, a hosta lover and collector built a zigzag series of brick steps with landings interspersed. Beside one of the landings is a small pool that can be seen neither from the bottom nor top of the steps but only from a close observation point (Figure 10). The element of surprise increases our appreciation of this unexpected watershape.

Of course, how you achieve a sense of discovery depends on many, many factors including size of the space, the desires and tastes of the client, the nature of the watershape and the plantings you are using. The key is to be ever on the lookout for opportunities to conceal and reveal the beauty you're so painstakingly working to create.

When you do, you may be surprised by the profound effect it has on the work and all of those who enjoy it for years to come.



9

10



Designed for Drama



Observation of the world through which we travel, near and far, stimulates our minds and helps us think creatively. Once, for example, while riding on a cog railway in Switzerland from Interlaken up to the Schynige Platte, an alpine botanical garden, I occasionally caught glimpses of one of the lakes below.

The view was frequently hidden by tall conifers and other shrubs and trees as well as by perennials and grasses that grew along the tracks. When the view was unimpeded, the sight of the lake was a gift. Such should be our intent when designing watershapes into landscapes: Let them be gifts rather than givens.

Frequently, ornamental pools are either set into an obvious patch of lawn or made part of a patio. Why not border these pools on one, two or three sides with perennials and ornamental grasses that are at least as tall as eye level (or even a *seated* eye level) so that the pools cannot be seen immediately? Instead, let the viewer be pleased initially by the beauty of the plants, later to enhance that pleasure by the discovery of the pool!

—B.S.



Cutting A Channel

By Rick Anderson

From start to finish, observes Rick Anderson, the process of stream building isn't that complex or exotic. But in addition to good planning, he says, these projects require thoughtful spontaneity and a subtlety in the work itself that defines success or failure in creating streams that look 'natural.' Here, in the first of a series on stream construction, Anderson starts at the beginning – with the land and the layout and excavation phases.



Here's the site before any work on the stream had taken place. The foreground will eventually become a pond; from this angle, we're looking across the pond site and straight up what will eventually be the path of the stream.

Building a stream that looks as though it was actually completed by Mother Nature is no small challenge. To make the illusion work, the watershaper quite literally “shapes” the basic elements of the stream – its path, width, depth, outcroppings, falls, transitions and plantings – all with an eye toward mimicking natural designs.

To a large degree, the process is different from that of designing and building a pond, pool or fountain. In those cases, the watershape generally goes in the ground almost exactly where and how it's been drawn. With streams, however, the differences between drawn plans and what you actually do on site can be (and usually are) quite pronounced.

The truth about streams is that they need a little more leeway. More often than not, the key creative decisions you make will occur during construction rather than in the planning stage. The contours of the channel, the placement of rocks, the points where the flow speeds up or slows down – all these things, I've found, are just too difficult to define on a flat piece of paper.

For me, this backyard improvisation runs from beginning to end of the process. Let me demonstrate what I mean by taking you through the steps I follow – steps that enable me to keep my creative juices flowing as I build streams that look like the real thing.

TERMS OF SCALE

Most of what I'll describe here applies both to large and small streams. In fact, the biggest differences you'll run into for streams of different sizes are in the logistics of the job: The stream depicted on these pages, for example, is almost 90 feet long and flows into a 25-by-30-foot pond. That's fairly large by residential standards and required trucking in nearly 90 tons of stone.

With 90-foot streams and 90 tons of stone, you need to think about practicalities with more focus than is the case with a 20-foot stream with, say, 15 tons of stone. Issues like delivering the stone, laying the liner and planting the landscaping are definitely more complicated with a large-scale project. That said, the basic challenge of stream building remains



We began our work by tearing out the lawn. Within that wide patch of newly bared topsoil, we began to gouge out a streambed approximately 8 feet wide.



A

the same, large or small: You have to be able to make on-site adjustments as you go, based on what you know about the way nature moves water.

For most of my jobs, I like to set up an 8-foot-wide swath and let the finished stream work somewhere inside that corridor. I went through some trial and error before settling on this parameter, but I've found this works best because it allows me to use 10-foot-wide liners. With an 8-foot maximum width for the overall watercourse, I have enough extra material to fold up and secure the sides for the stream banks.

This gives me plenty of that leeway I mentioned above, because my streams rarely run to 8 feet wide and I very often work with channels no more than a foot wide in cases where elevations change dramatically. In these cases, I use the excess liner to fold around larger stones and reach up into the embankments. A wide liner also gives me opportunities to cre-

As we continued to gouge out the streambed (A), we began to form the transitional falls (B). Even though these contours may eventually be torn out, these early attempts let us study the space and get a feel for how the layout is working. At this stage, we also make adjustments based on what we find below the surface, working our way around large roots or native stone, for example.



B

ate deeper areas of streambed and more dramatic outcroppings.

Of course, this creates a lot of waste material, but I put the trimmings to good use under large boulders or to double up against any sharp outside boulders that are close to the streambed. (Quite apart from the stream, you can use the extra liner in bog gardens.)

I call so much attention to the liner because knowing the range of widths and depths you have at hand influences how you'll lay out the shape of the stream itself.

CLEARING THE WAY

I begin the layout process with some spray paint and a few flags, just getting a sense of how the stream will work. Even here, changes from the drawings start to occur: What I'm looking for are contours in the existing topography that will work to my advantage – any twists, turns or drops that bring drama to the watershape.

These existing earthen contours constitute the “underlying structure” I've written about in previous articles in *WaterShapes*. This underlying structure drives the stream's dynamics, and I believe it's critical to pay close attention to these features and use them to best advantage.

In many cases, however, the job site will be a blank slate with no pronounced underlying structure – no twists, no turns, no inherent drama. This is where your study of nature comes into play. Understanding the way real streams work will help immensely in creating a com-

The progress on site is gradual as the stream takes shape. Here, we've begun working on one of the lower embankments on the backside of the stream. Our study of the site from various angles guides us here, but the work takes patience.



plete underlying structure that brings life, dynamism and natural touches to the watershape you are about to create.

Either way – whether working with a clear underlying structure or creating it with your own grading – from the very beginning you have to know where to place the bends, the turns, twists, drops, falls and outcroppings, plus any other outside influences that will have an effect on the course of the stream.

Once all of this is clearly in mind, it's

time to start some preliminary digging.

One of the nice things about streams compared to other watershapes like pools or ponds is that you're not really moving a tremendous amount of dirt. My tool of choice here is a skid-steer loader: It provides a fast way to get rid of the existing turf or lawn and has good digging and material-handling capability, all in the same tool.

First, I'll strip the lawn, moving it off to the side or to an area where I'll be doing



Now we're working on the upper embankment. In the background at left, you can see where the headwaters will rise.

some mounding. Next, I'll cut in from two directions on the areas where the main falls will be. This gives me a good idea of how the most important factors of the layout are going to relate to each other.

With just that much done, I get off the loader and ask myself a few key questions: Are the drops taking advantage of the existing underlying structure? Is their spacing good relative to the type of aesthetic I want to create; whether it's tumbling, jumbled, mountain-like, rushing, or lazy? Most important, what is the relationship of what I've done to the primary view or views? Does the composition look good from the points at which most people will see the stream?

REACHING FOR CLARITY

If you're dissatisfied with what you see at this point, back up and take time to rethink the positioning of the major elements. It's important to rework whatever is necessary at this formative stage before you go on to create the contours of the stream's channel.

If you're positive you're on the right track, it's time to continue roughing out the stream by carving out the streambed, creating the deeper areas at the bottom of waterfalls, and digging back into the banks to allow for the placement of stones and boulders. Along the way, I repeatedly step back, assess the site and make necessary adjustments. Seldom is this process either simple or clear from beginning to end!



The next step is crucial in the development of your watershape: the placement of boulders. I've seen a lot of projects where boulders were placed as an afterthought rather than as part of the main watershape. The results are streams that look distinctly unnatural.

I take the opposite approach, setting the waterfall anchor stones first because these highlight the most dynamic feature in a stream. Once these are set, I step back again and look at how the support stones meld into the composition. In this particular job, I ended up adding a couple of embankments on the backside. This was done in conjunction with the waterfall anchors to create a more harmonious setting.

Depth, dimensions, aesthetics, realism, mood and underlying structure should all be running through your mind as you place these stones – and the larger the stones, the more important it is to focus, because you don't want to move the big ones over and over again as you go.

Placing these big stones before you finish the grade work has another advantage: Between the cutting out for these stones and the potential for damage by equipment and tools, it just doesn't make sense to spend time on handwork with smaller stones before you place the big boulders.


Once the waterfall boulders are placed, I position stones in between them to tie things together. I backfill as I go, being careful to look at the placement first and always making sure I like the look of the stone formations. The great depth of the embankments on this job gave the stream an even more dynamic appearance.

Outcroppings can be put in at this time as well, along with any large plant material that will not interfere with the work of

Continued on page 40

At this point, much of the grading has been completed. You can see clearly how we've sloped the streambed up toward the banks, making the liner's base as smooth as possible (A).

This was a crucial "big picture" step: With work advancing on the pond, we checked all lines of sight to make certain the relationships of the stone embankments and the pond were working (B).



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Continued from page 38

actually building the stream. I say this because you need to have good access to move materials in to construct the actual stream. By this point, however, we've done enough work on site to have a good feel for the overall project and its aesthetics.

THE BIG PICTURE

At this point, I step back and take a really long look at the area surrounding the streambed. What I'm looking for is opportunities to place boulders and embankments and other features outside the swath I've cut as a way to add depth and dimension to the composition and turn the overall setting into a really great watershape.

Beyond the aesthetic advantages, there's also a practical bonus here: By putting as much dramatic detail as possible outside the stream, you reduce the risk of damaging the liner. Although a 45-mil EPDM liner is tough stuff, you want to keep foot traffic to a minimum and all sharp stones off the stream's liner – and no way do you want to run a loader over it!

We sometimes set outcropping stones that have lots of jagged edges. These jagged edges cannot come in contact with the liner, so we'll add another piece of liner or underlayment between the stone and the liner. By setting these jagged stones first and then placing the liner, there's less chance of damaging the liner. It just makes a lot of sense to work this way rather than sliding boulders up to a liner.

The key thing to remember in this phase is that you want the construction process to be driven by the placement of these all-important outcroppings and not the other way around: Let the larger boulders dictate the final layout instead of letting the layout dictate boulder placement.

Once these key outcroppings and embankments are placed, it's time to step back again and take another good, long look at what you've installed to this point.

Does the work look interesting? Could the embankments and outcroppings stand alone as separate features? Do the anchor stones appear solid and stable? Is

everything in place to install the liner? Do we have good access to the stream area to bring in materials? And again: *Does the work look interesting?*

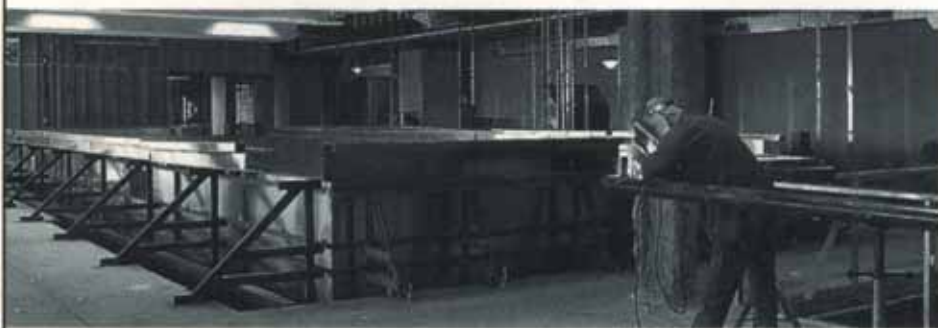
As I look at the overall composition, I also focus on the details. Consider the rock outcroppings, for example. Could they become stand-alone fixtures without a stream running across their fronts? Do their shapes and contours have an interesting look? Does all this material visually flow down into the channel you've excavated for the streambed?

SETTING THE STAGE

Let me emphasize again what we've been trying to accomplish to this point in the project: In large streams like this one, you need to use boulders, outcroppings and terrain changes to bring life to the watershape. I believe that the best way to accomplish this is to install as many of these elements as possible *before* laying down the liner – and I'd hold the same to be true for smaller-scale projects, too, but

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I'm not advocating that *all* work outside the streambed be done first, mainly because we still need access points to bring in material to complete the stream itself and do not want to compromise the integrity of the liner. (Stream leaks are difficult to find, so you don't want to push your luck!)

Of even greater importance, what you're doing to this point is working with or defining the underlying structure and the impact it will have on the stream and the construction process. If you were to build the stream first and then try and create the outside structures, you'd be putting the cart before the horse – something I wouldn't advise trying no matter the task.

When all this preliminary work is complete, it's time to move on to the next phase of our stream project, including the placement of the headwaters, consideration of the way the stream transitions into a pond, lake or hidden container and, finally, a look at setting up the plumbing runs to make the system work.



By now, we were satisfied that the system of embankments was working from all key viewing angles. We were then ready to move on to the next project phase, as we'll see next time.

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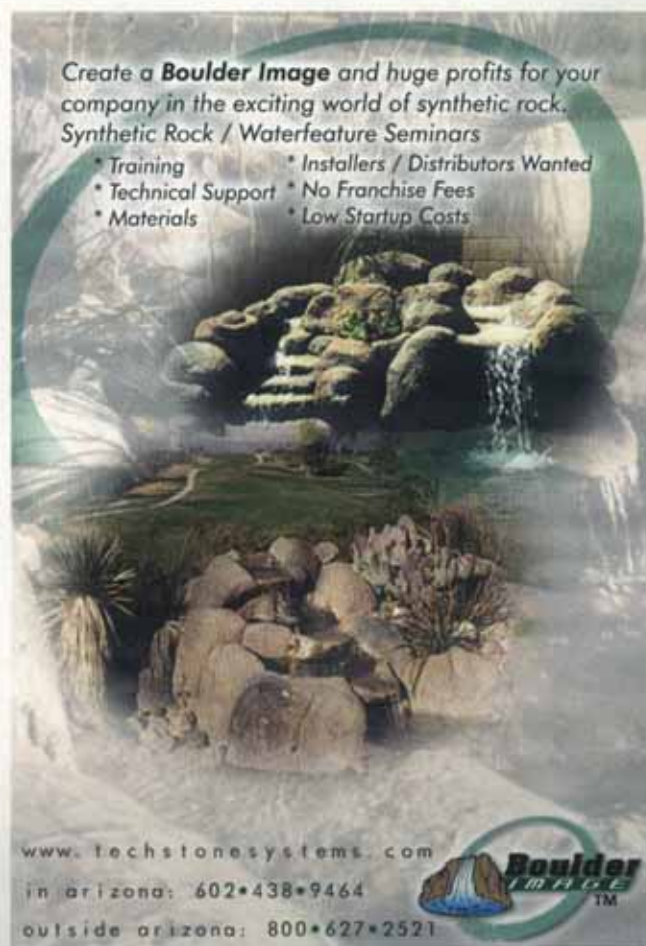
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Modular Marvels

By Joe Esser

Steel

structures may never entirely replace gunite shells for competition pools, says Joe Esser of Kiefer Pool & Equipment Co., but the ease of construction and durability of stainless vessels make it an interesting race to watch – particularly because steel opens competition-pool projects to a much wider range of builders. To demonstrate the whys and hows, he leads you through the construction process step by step, showing just what it takes to assemble these modular marvels.



All photos courtesy Kiefer Pool & Equipment Co., Zion Ill.

It used to be that competition pools were the sole province of big engineering/construction companies with their substantial assets, impressive inventories of equipment, huge labor forces and established skills in working with low-tolerance plans and specifications.

The arrival on the scene of modular stainless steel pool systems has changed all that – and it's a good thing, because so many competition and training pools are being built today that there are not enough qualified construction companies of the traditional sort to get around to installing them all.

This boom is a product of both the popularity of aquatic sports and the hot economy. If a university or city can live with higher prices and construction delays, they'll wait for traditional concrete construction, massive shells and formed gutter systems. As an alternative, they can move on to investigate systems such as the one seen in this article – fully modular systems that can be installed by just about any competent contractor.

Even better, they can get a stainless steel construction pool when they want it and generally at significantly lower cost – 10% to 20% less, in fact – than would be the case for a concrete vessel.

NO MORE WELDS

Stainless steel pools are nothing new, nor are stainless steel gutters. In fact, companies like ours have been installing stainless steel pools and gutter systems with concrete floors for commercial customers for more than 25 years.

Back then, the process required a staff of competent welders to assemble the steel panels, a circumstance that made the jobs just as challenging as installing a traditional gunite structure, if not more so.

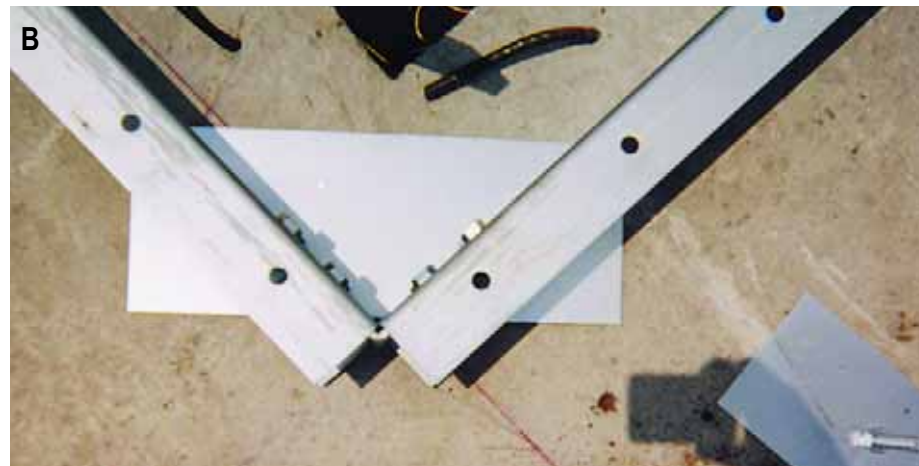
Obviously, this took the work out of the hands of pool builders whose primary medium was reinforced concrete. Despite the small number of firms installing these pools, however, a significant number of commercial pools of the welded-steel type were installed nationwide and gained credibility from the fact that the aquatic centers at universities including Ohio State and Bowling Green featured them.

Later, as an alternative to welded construction, companies such as Clayton & Lambert made concrete-bottomed, stainless steel pools that relied on gaskets, not welds, to prevent the pools from leaking. The systems worked, but the skimmer-type vessels were limited to about 3,500 square feet in size, making them too small to serve as competition pools, which traditionally have gutters.

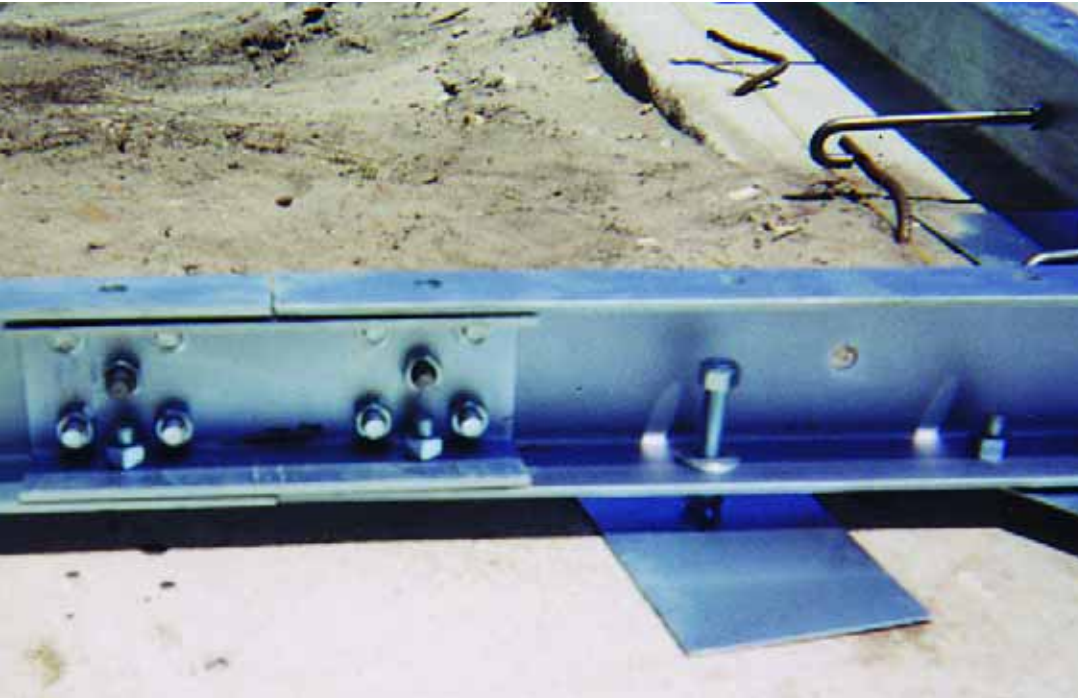
More recently, advances in modular engineering by our firm and others have resulted in easy-to-assemble structures that can easily be made of sufficient size for swimming, water polo or synchronized swimming competitions. As you'll see in the accompanying how-to photographs, these modern structures feature modular wall and gutter pieces; a heavy base frame that serves as a foundation for the 3-foot wide wall sections; adjustable wall braces that attach to each panel joint; and a PVC-reinforced membrane that seals the floor of the pool.

Construction begins when a heavy concrete footing is formed (A) and poured under the perimeter of the pool (B). For large pools, this slab is typically 4 to 8 feet wide and 8 inches thick and uses reinforced, 3,500-psi concrete. For the smaller pool depicted here, the slab isn't so wide.





Once the concrete cures, a heavy-duty steel base channel is assembled on top of the footing (A). To simplify the process, the base-channel sections have alignment holes used in forming either 90- or 45-degree corners (B). Once they're squared within an eighth of an inch, leveling pads are shot-an-anchored into the cement to hold the channel in place and keep it square (C).



The next step involves leveling the channel to within a sixteenth of an inch with a laser level. This is best done at night, when you can see the laser level “spin” around the perimeter. Now the base channel is lowered or raised using its adjustment lugs. Once leveled, locking nuts are set and twisted together to lock the base channel at the desired height.

With the foundations in place, it's time to install plumbing for the floor inlets and main drains (A). Next, a cement floor is poured between the perimeter-base channels to lock the entire assembly together (B). Once the concrete has cured, a reinforced PVC membrane in 12-foot-wide rolls is installed across the floor of the pool to act as a gasket on top of the base frame.



Continued on page 48

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Now the walls are assembled on top of the base channel. The wall panels are 3 feet wide and up to 9 feet tall. At each panel joint, we use a heavy-duty brace to hold the wall perfectly vertical (A). If a gutter is used, as it is in this case, the sections fit into a supporting brace assembly seen at the top of the photograph. The massive braces supporting the 9-foot panels shown here (on a competition pool in Ft. Lauderdale, Fla.) weigh in at 185 pounds each. The braces are attached to the footings with heavy "thunderstuds" (also known as concrete expansion anchors) that have been hammer-drilled into the cement (B). At this point, the walls are perfectly square and straight. The vertical level may need adjusting at this point; if necessary, this is accomplished by turning the leveling nuts.

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Once the reinforced PVC floor is installed (A), all panel and floor seams are sealed with a PVC/solvent mixture (B). (Note: All inside faces of the gutters and walls are coated with a hard PVC lamination that's applied during the manufacturing process. This is similar to the super-tough laminate material you see on the insides of microwave ovens or on the exteriors of vending machines – but here it's seven times thicker.)



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The racing lanes, targets, shallow-line breakers and step edges are marked with black PVC membrane material that is permanently laminated on the walls or floor. Next, suction and return plumbing is connected to the floor-mounted return fixtures and gutters, respectively. (Note: This type of construction enables the installer to meet all Health Department requirements for circulation, filtration and chemical treatment.)



Olympian Portability

The type of steel-vessel construction described in the accompanying article has been used in a variety of high-profile competition facilities – most notably the Olympic water polo pool installed at Georgia Tech for the 1996 Summer Olympics in Atlanta.

This pool was assembled just a few weeks before the games in a site adjacent to the main competition pool and stadium. After

the games, the water polo pool was dismantled and removed.

That's a key point: While these stainless structures can be as permanent as concrete pools, they can be assembled in a fraction of the time and can easily be disassembled and moved as need arises.

– J.E.

The pool is basically finished. In this case, the pool was filled with water before backfilling was completed to make certain there were no leaks. After that, all that remained was detail work, including installation of gutter grates and racing-lane floats – and, of course, the decking and enclosure.



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The style of the home, with its extra-wide soffits and low-pitched rooflines, is in keeping with design ideas expressed by Frank Lloyd Wright – and gave me the inspiration I needed to design its watershape.



M Mid-range Mastery

By Michael Nantz

Taking inspiration from Frank Lloyd Wright and features of the client's home, pool designer and builder Michael Nantz worked a bit of backyard magic. By carefully shaping lines, contours, textures and elevations, he crafted a swimming pool and reflection pond that balance water with wood, hardscape and landscape – and accomplished a high-flying design with a decidedly down-to-earth price tag.

It's a basic and important idea: Quality and beauty can and should be provided across a wide range of pricing levels.

In my work, I design and build many residential and commercial watershapes with budgets well into six figures; I also tackle many projects firmly planted in the five-figure range. No matter the budget, I believe strongly that I owe it to my clients to deliver a watershape of lasting beauty each and every time.

Fact is, quality and artistry often can be achieved with a distinctly uncomplicated program. By bringing a watershape's design into harmony with the architecture of the home and/or other adjoining structures, it's often possible to enhance aesthetics and value without dramatically increasing the price tag.

Take the project seen here as an example: Through careful placement and shaping of the vessel, artistic edge treatments and minor elevation changes – none of which added appreciably to the cost – I left my clients with a wa-

tershape they love at a price they could afford.

EASY LISTENING

I first spoke with the clients while the house was still in the planning stages. That's sometimes a disadvantage, because the backyard all too often is far from the top of anyone's punch list at that time.

In this case, however, the homeowners were keenly concerned about the relationship between the house and its exterior design. In fact, I soon learned that understanding these relationships was essential to getting the job: None of the watershape designs they'd seen to that point had been acceptable, I was told, because none of the builders had picked up on architectural elements the owners considered as being especially unique to their half-million-dollar home.

That was fine with me because, with all of my projects, I always suggest that when one has the opportunity, it is wise to consider the architectural relationship between a home and its watershape. It's a great way to build a rapport – and to get myself in on the ground floor of the project, creatively speaking.

Our first face-to-face appointment was also my first visit to the site. The house was still being framed at that point. I spotted the 36-inch soffits and the low-pitched roof and recognized them as elements borrowed from the late great architect, Frank Lloyd Wright. Just after we made our introductions, I shared my observation. The client's eyes lit up and he said, "Exactly!"

I went on to describe my appreciation for Wright and mentioned the fact that I'd studied his work and had traveled around the country to see Fallingwater, Taliesin, the Guggenheim Museum and the Polk House, to name a

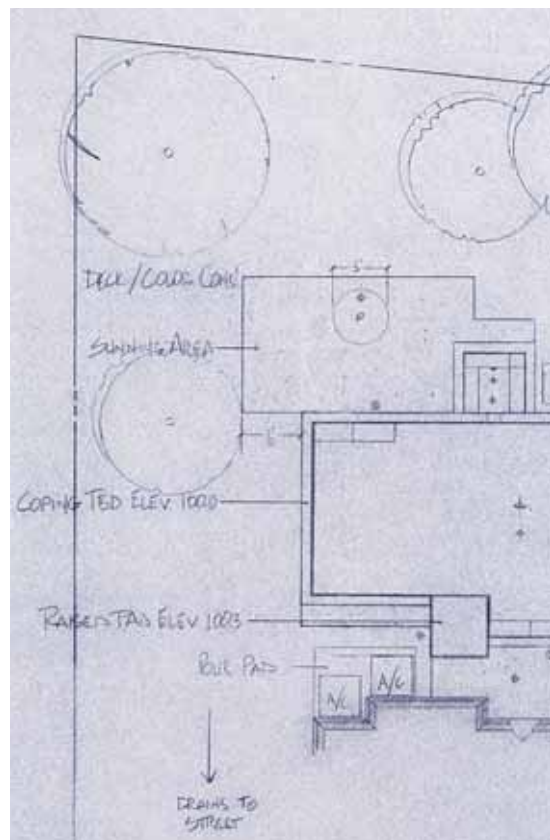
few. As renowned as Wright was and is to this day, however, he was not well known for his waterfeatures, which meant the client had no preconceived notions when it came to watershape designs. I knew the door was wide open for my input.

The client gave me the budget and the go-ahead to develop a design. At \$50,000, the budget wasn't large – and I didn't have

the sense there'd be much leeway to expand it. Fortunately, however, the yard had its advantages: The soil conditions were just about ideal and the site would be an easy one to work, so I knew I'd be able to focus the dollars on aesthetics.

MODEST PROPORTIONS

In approaching the design, I knew



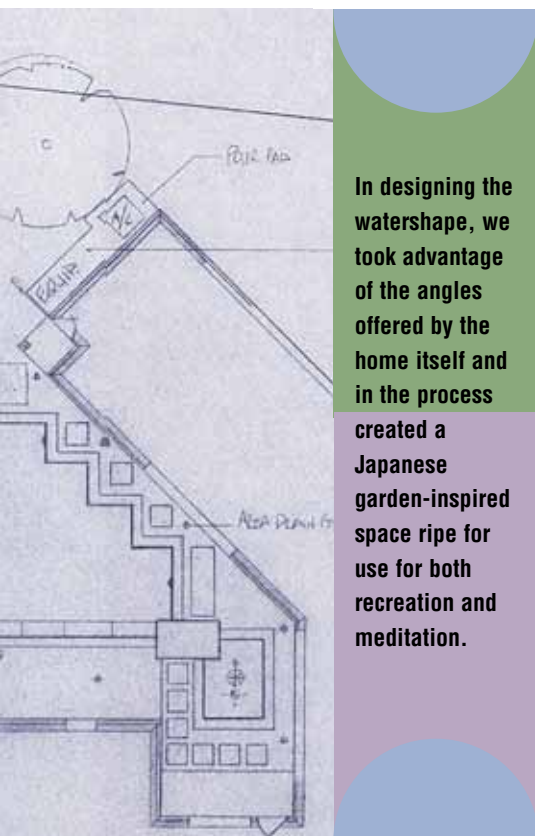
that keeping Wright in mind and paying attention to the simple, elegant lines and subdued, dark and neutral colors of the house would head me in the right direction.

First, and with Japanese garden design somewhere in mind, I tucked a small reflection pond into a slight, otherwise unusable area just outside the back door. This alcove can be seen through windows from the living room, the formal dining room and the main entry – a perfect opportunity to bring a meditative watershape “indoors.”

I placed a small bubbler fountain (consisting of a single return line from the filter pump) in the center of the reflection pond for movement. I also carefully positioned a 100-watt underwater lighting fixture in the pond to avoid any glare. Coupled with the bubbler, the



The angular treatment of the edge along an angled wall of the home keys the impressions made by the watershape – without adding dramatically to the



In designing the watershape, we took advantage of the angles offered by the home itself and in the process created a Japanese garden-inspired space ripe for use for both recreation and meditation.

lighting creates an elegant, shimmering effect that reaches many interior surfaces at night.

Concrete stepping pads – done in the same color as the deck – border but do not touch the coping around the reflection pond, nor do they touch each other. This allowed for placement of a tight landscape groundcover between each pad and the coping (and other pads), softening the look and contributing to impressions of both texture and color.

The same stepping-pad idea is picked up again along the angled house wall, neatly filling the gaps at the right angles of the pool and adding to an overall sense of symmetry in the horizontal lines of the design. I chose this series of right angles to accommodate a wing of the house that was set off from the rest of the structure at a 30-degree angle – much

more interesting than running a straight line parallel to the structure.

These right angles gave me an opportunity for another detail – that is, aligning all of the inside angle points parallel to the house, the reflection pond, the pool and the spa. The best thing is that this sort of design detail looks like a million bucks but is simple and inexpensive to

do. All it involves is borrowing contours found on site, and it can be done with virtually any kind of installation.

The final detail I chose was, again, simple and inexpensive. I decided to pop up a few sections of deck – not as the standard 6- or 12-inch raised beam, but a raised slab only 4 inches high. All it took was a simple 2-by-4 form placed direct-



expense of the project. The stone coping lends texture and contrast, while the raised pads give dimension and add interest to the treatment.



ly on top of the finished coping elevation to add a slight change in elevation – one that creates strong visual interest while still conforming to the basically horizontal design pattern.

TIED TOGETHER

Given the close proximity of the watershape to the house, we paid particular attention to colors and materials and did all we could to create links between our work and the house exterior.

The back of the house is stucco, but the front features a beautiful stacked stone with a recessed mortar detail – a common feature of Wright's work. Thinking through the traffic pattern, which draws any guest quickly from the stone façade out front to the rear of the house and offers quick access to views of the pool and pond, we decided to pick up stone details to tie everything together.

Of course, a tight budget makes it tough to use a lot of stone. As a result, we were limited to stone coping and were happy that my supplier, Custom Stone of Dallas, had recently added Ozark blue-stone to its inventory. Despite the name, the stone is predominately black with minor brown tones – a perfect complement to the house. Along with a black

By leaving a space between the coping stones and the decking, we left ourselves room to plant groundcover. All at once, the planting breaks the edge, creates visual interest and completes the meditative impression made by the space.



The special touches we added to the project, including the raised pads, added little to the expense of the project but helped seal the impressions it makes. For the most part, in fact, the work was standard stuff – but always with an eye on quality and on harmonizing the watershape with the house that surrounds it.



Pebble Tec pool finish and black slate at the waterline, the stone details complete a perfect package.

All of this thinking and insight went into the plan we offered the homeowners before any work was done. When they learned that this thing of beauty was also within budget, "prospect" quickly became

"client" and we got to work.

The results seen in these photographs, I believe, speak for themselves. The yard evokes the mood of a Japanese garden as well as the design drives of Frank Lloyd Wright (who was himself a student of Japanese design). Even more important, the watershape is perfectly

integrated with the style of the house that surrounds it – testimony to the fact that you can stick to your guns in terms of quality and design while operating within a budget.

It's a beautiful job, one that I am proud to show any of my high-end clients as an example of my finest work.

PROFESSIONAL POND PRODUCTS

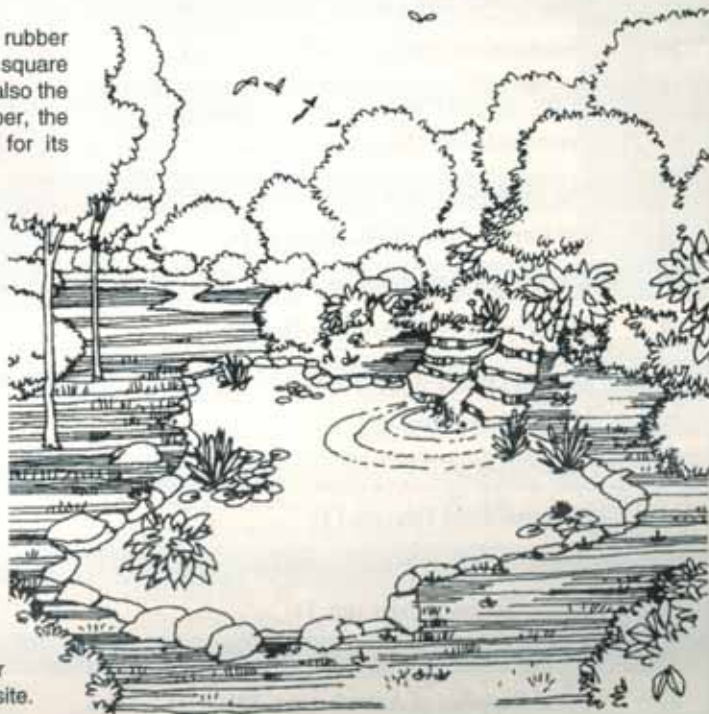
RUBBER POND LINERS: We offer pond-grade EPDM rubber liners in a wide range of standard sizes from 25 to 10,000 square feet at remarkably low prices (20-year warranty). We are also the only North-American fabricators of pond-grade Butyl rubber, the liner preferred by water-gardening experts worldwide for its unsurpassed flexibility and longevity (30-year warranty).

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ENERGY-EFFICIENT PUMPS: Our pumps are more reliable and cost substantially less to operate than traditional pond pumps (up to 3-year warranty).

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Other products include fountain equipment, heavy-duty black corrugated tubing and black flexible pipe, valves and plumbing fittings, ultraviolet sterilizers, underwater lighting, and bronze statuary. For more information, call for our free catalog *Pond Builder's Handbook* or visit our website.



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PRODUCT INFORMATION CARD

For more information on advertisers and/or products featured in this issue's Of Interest section, circle the corresponding Product Information Number on the postage-free card opposite this page.

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IN-FLOOR CLEANING VALVES

Circle 100 on Reader Service Card



PARAMOUNT POOL & SPA PRODUCTS introduces two new valves – a 2-in., 6-port valve and a 2-in., 2-port valve – designed for use with the company's in-floor pool cleaning systems. Based on the company's proven 1-1/2-in. valves, the new valves offer a 64.8% performance improvement over prior models, bottom-access fittings and a capacity to allow cleaning systems and fountains to run with from 2 to 12 ports. **Paramount Pool & Spa Products**, Tempe, AZ.

BROCHURE ON POOL PUMPS

Circle 102 on Reader Service Card



PACFAB has published an eight-page brochure on Purex Triton's line of pumps for use in pools, spas and waterfeatures. Highlighted are the WhisperFlo, Challenger, Ultra-Flow, Pinnacle, Dynamo, Hydropump, Waterfall and C-Series pumps, with brief explanations of their capabilities and applications. Also featured is a table comparing pump performance across a range of features, including basic specifications. **PacFab**, Sanford, NC.

POND TEST-STRIP SYSTEM HIGHLIGHTS

Circle 104 on Reader Service Card

ENVIRONMENTAL TEST SYSTEMS, the maker of test strips for pools and spas, introduces AquaChek Pond Test Strips for the water-gardening market. By dipping a strip in a water sample and comparing results with a chart on the container, the pond-keeper checks levels of total ammonia, pH, buffering capacity, nitrates and nitrites – key factors in maintaining sound water chemistry and in keeping imbalances from harming either fish or plants. **Environmental Test Systems**, Elkhart, IN.



LANDSCAPE-DESIGN SOFTWARE

Circle 106 on Reader Service Card



EAGLE POINT has published LandCADD 2000, a software series for use in landscaping and design of irrigation systems. The updated system offers features often requested by designers, including improved plant-labeling routines, a general topography tool and greater power. The system covers the base plan, construction details, landscape design, plant database, site planning and more. Works on its own or with AutoCAD, IntelliCAD or Microstation. **Eagle Point**, Dubuque, IA.

LITERATURE ON FOUNTAIN SYSTEMS

Circle 101 on Reader Service Card

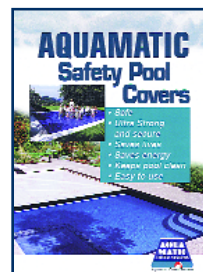
AQUAMASTER FOUNTAINS & AERATORS has prepared literature on its aquatic management systems. The eight-page, full-color brochure features photographs of the company's fountain systems in action, from small aerators to geysers, as well as information on lighting and air-injection systems. Also included are feature lists and system specifications. **AquaMaster Fountains & Aerators**, Kiel, WI.



BROCHURE ON POOL SAFETY COVERS

Circle 103 on Reader Service Card

AQUAMATIC COVER SYSTEMS has published a six-page brochure on its line of pool safety covers. The literature highlights features of the Hydramatic automatic system and its unique fluid-drive system as well as EZ Cover, an easy-to-use manual system. The brochure includes strips indicating available fabric colors, suggests applications for both rectangular and non-rectangular pools and details the range of available track systems. **Aquatic Cover Systems**, Gilroy, CA.



LITERATURE ON POOL CLEANING SYSTEM

Circle 105 on Reader Service Card

KREEPY KRAULY has released a new brochure on its automatic pool cleaning system. The brochure is designed to assist in sales presentations and highlights the power, cleaning performance and reliability of the cleaners. Also highlighted is a new 20-year warranty on the flapper – the cleaner's only moving part. **Kreepy Krauly**, Sanford, NC.



POND-MAINTENANCE SYSTEMS

Circle 107 on Reader Service Card

ADVANCED AQUACULTURE SYSTEMS offers the Aquacube, a complete, maintenance-free aeration, degassing, biological filtration, circulation and foam fractionation system for any size pond. The system needs no pump, submerged wiring, chemicals or replacement parts. All units are backed by the company's free systems-design services and technical-support staff, with the emphasis on delivering turnkey systems to contractors. **Advanced Aquaculture Systems**, Brandon, FL.



IN-LINE CHLORINATION SYSTEM

Circle 108 on Reader Service Card



PURE & CLEAR offers AutoClear, a new in-line chlorination system that sanitizes pools safely, conveniently and naturally. Using an electrolytic cell to convert ordinary salt into pure chlorine, the unit works with pools of up to 40,000-gal. capacity and minimizes complaints about eye irritation, chlorine fumes, dry skin, hair discoloration and faded bathing suits. The cell is installed in the plumbing on the return side of the filtration system, with the control unit mounted nearby. **Pure & Clear**, Sunrise, FL.

ROCK GALLERY HIGHLIGHTED

Circle 109 on Reader Service Card

WESTERN ROCK & BOULDER has released a flyer featuring its line of granite in a range of colors and a variety of patterns, from highly stratified to simple polychrome appearances. The all-natural rocks come from areas in the West famous for their abundance of minerals – minerals that give the rocks the extraordinary colors and textures needed to enhance any landscaping or watershaping project. **Western Rock & Boulder**, Fallon, NV.



NUTRITIOUS FISH TREATS

Circle 110 on Reader Service Card



AQUARIUM PHARMACEUTICALS has introduced Koi Kookies as an addition to its pond-care line. Designed to meet the special needs of koi and goldfish, the floating treats contain stabilized vitamin C along with other vitamins, minerals and carbohydrates that promote the health and vigor of pond fish. Easily digestible, they reduce ammonia production. Also, they do not sink to pollute the pond's water. **Aquarium Pharmaceuticals**, Chalfont, PA.

MULTI-PURPOSE DECK COATING

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ENVIRONMENTAL COATING SYSTEMS offers the All Deck Coating System, an all-in-one waterproofing and traffic coating for use over just about any surface, from newly poured asphalt or wood to new or old concrete – and even other coatings. The material is particularly suited to deck graphics with sharp, fine lines or curves and unusual colors and protects any walking or driving surface from heavy use and extreme temperature changes. **Environmental Coating Systems**, Santa Ana, CA.



Continued on page 62

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The Genesis Global Design Awards: Celebrating the Art of the Waterscape



For the first time ever, designers and builders who work with water can participate in a truly global design competition.

Any waterscape of any form – pool, pond, fountain or water-feature – built anywhere in the world in the 20th Century is eligible for consideration.

An international panel will judge all entries on the basis of design continuity, aesthetics, integration with the environment, structural soundness and hydraulic excellence.

The Grand Prize Winner will receive prizes totaling more than \$12,000 in value, including \$5,000 in cash; tuition to the next Genesis Design School (during which the project will be featured); a front-cover feature in *Swimming Pool/Spa Age*; and airfare and accommodations in Lyon, France, where the award will be presented during the International Pool Show to be held in November 2000.

For complete information on entry requirements and submission guidelines, contact the Genesis 3 Office at (800) 513-5877 (ph) or (800) 279-1729 (fax).

Program co-sponsored with Genesis 3 by Horner Discus International and *Swimming Pool/Spa Age*.



SEMINARS ON DESIGNING WITH ROCK

Circle 112 on Reader Service Card



ROCK & WATER CREATIONS has organized two-day, hands-on seminars designed to introduce participants to the art of creating boulder pools, ponds and watershapes. Includes tips on preparing and selling bids, installation and waterproofing, creation of faux stones, basic hydraulics and adding light and sound. As a highlight, the seminar offers techniques for applying lifelike, natural handwork and coloration to faux stones. **Rock & Water Creations**, Fillmore, CA.

PIGMENTS FOR COLORING CONCRETE

Circle 113 on Reader Service Card

BAYER has published literature on the Bayferrox line of iron oxide pigments used to color concrete and concrete products. The range of available colors – covered in sample strips – makes the pigments suitable for a wide range of applications, from architectural precast products or stamped concrete to colored mortars and ready-mix concrete. All colors (except green) can be made with four primary pigments. **Bayer**, Pittsburgh, PA.



HIGH-VOLUME PLASTER EQUIPMENT

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PUTZMEISTER offers Tommy Gun A3, the latest in a line of products introduced more than 40 years ago that has evolved to meet current market needs for application of plaster, decking, exposed aggregates, grouting and more. Rugged, reliable and versatile, the units are designed for tag or mobile use; are driven by gas, diesel or electricity; come with or without a mixer; and offer a full range of options. Available literature covers specifications. **Putzmeister**, Anaheim, CA.

STONE SERVICES HIGHLIGHTED

Circle 115 on Reader Service Card

KRC ROCK has published literature on its landscape and building stone as well as its boulder-placement services. The company offers a full line of boulders along with a wide selection of flag, building and dimensional stone and aggregates, gravel and more. In addition, it developed the KR 2500 boulder-placement crane for precise, efficient on-site work with large boulders. **KRC Rock**, San Marcos, CA.



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PRODUCT LIABILITY ASSISTANCE

Circle 116 on Reader Service Card



S.R. SMITH, a leading manufacturer of diving boards, slides and rails, has published a brochure on a program that backs builders who install its products with up to \$1,000,000 in product-liability insurance at no charge when those projects comply with applicable NSPI and manufacturer standards. S.R. Smith, Canby, OR.

POND-QUALITY REFERENCE MANUAL

Circle 117 on Reader Service Card



AEROMIX has published "Pond Water Quality Manual," a guide to water management for ponds and lakes. The booklet describes various quality-management techniques; offers a full glossary of common water-quality terms; provides details on

limnology, algae control and water improvement; and includes guidelines for aeration-system sizing and more. In one source, it offers advice on selecting the best maintenance practices for any pond or lake. Aeromix, Minneapolis, MN.

ADMIXTURE FOR ALKALI-SILICA REACTIVITY

Circle 118 on Reader Service Card



FMC/LITHIUM DIVISION offers a flyer on Lifetime G Admixture, specially formulated to control alkali-silica reactivity (ASR) in concrete. The material, either used by itself or in combination with suitable pozzolonic materials

such as certain fly ashes or silica fume, can control the expansions caused by ASR. The flyer includes guidance on usage, storage and shipping as well as basic toxicity and safety information. FMC/Lithium Division, Gastonia, NC.

POOL AND SPA PUMP MOTORS

Circle 119 on Reader Service Card



GE INDUSTRIAL SYSTEMS offers a six-page brochure on its full line of pump motors for pools and spas. Coverage includes discussions of features designed to give the motors a long service life as well as those making them easy to

maintain and service. All flange configurations are depicted, and a comprehensive selection guide is provided. GE Industrial Systems, Fort Wayne, IN.

AQUASCOPE® patented Telescoping Fountains transform pools and spas into beautiful fountains during non-swimming hours. These easily installed fountains automatically retract flush into the pool bottom and do not protrude when not in use. The fountains are powered by the standard pool filter pump. NO ADDITIONAL PUMPS ARE NECESSARY. A one inch line fitted with a gate valve is all that is needed in addition to the fountain.

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crease the voltage on each phase conductor from 16,500 volts to 230,000 volts.

This high transmission voltage allows a tremendous amount of electrical energy to be transmitted over relatively small conductors. This is important when you consider that the aluminum/steel conductors weigh about two pounds per foot and that the span between the transmission towers is from eight hundred feet to one thousand feet. All that weight adds up quickly.

A HIGH-WIRE ACT

You can see these towers in many places while driving between Los Angeles and Las Vegas. The three conductors hang from more than 200,000 large porcelain insulator sections. There is also a single, lightning-rod conductor running along the very peak of the towers.

If we could follow these towers far enough, we would eventually come to a utility company's transmission substation in the Los Angeles suburbs. The very large towers used to carry the conductors across the countryside cannot continue

into the built-up areas of a city — the cost of the real estate on which to build them would simply be too high. So the three conductors can be seen leaving the last tower and entering the substation.

Now the substation uses step-down transformers to reduce the 230,000 volts down to more manageable values for local use. Various voltages are used at this point. The 230,000 volt, three-phase supply coming in from the dam may, for example, be transformed down to several three-phase circuits of 4,600, 12,000, 33,000, or, maybe, 69,000 volts. There might even be a feeder circuit heading off to another substation at 138,000 volts.

(Please note: I have never seen the specific transmission substation I am referring to here. Some are now totally underground, in which case the following paragraphs don't apply, but everything I say from here on *does* apply to the thousands of aboveground substations still out there. Onward to the backyard!)

If you were sitting in your car across the street, you could see these various

circuits leaving the substation. Because everything at this point is still three-phase, each circuit will still consist of three conductors. Look for those groups of three conductors. You can get a pretty good feel for the voltage of each departing circuit: The taller the pole or tower, the higher the voltage.

Now pick a group of three conductors to follow. The group you want is probably on wooden poles 30 or 40 feet off the ground. The individual conductors won't be spaced too far apart — maybe two feet. In all likelihood, this will be a 13,200-volt, three-phase circuit.

Several interesting things can happen to these three conductors as they travel from pole to pole. All three can branch off in a new direction (but you want to try to follow the original group), or all three conductors can branch off and connect to a transformer mounted on the pole. (The transformer looks like a slender metal trash can.) The transformer will reduce the voltage to some value such as 480 or 2,300 or 4,600 volts

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to provide power to an office building, a group of stores or maybe a group of small factories. But don't stop there: Keep following the original group of three conductors.

Sometimes the three conductors might dive into a metal pipe running down the pole. They may have gone underground, never to be seen again. In this case, your chase is over – unless you want to backtrack, pick up another leg of this group and head off in another direction. Or the three conductors may have simply crossed the street, underground. Look around: You may find another pole with a pipe on it on the other side of a wide intersection.

DOWN TO ONE

Eventually the chase will end in a residential neighborhood. We do not distribute three-phase electric power in residential neighborhoods in this country, so there is no longer any need to keep the three individual conductors of our group together. Now each single-phase leg can take off on its own to provide 120/240 single-phase power to a large number of homes.

You'll see it happen, usually at an intersection: One of the three conductors will take off to the right, another will go to the left, and the third will go straight ahead. From this point, these individual single-phase conductors travel along the very top of the poles.

At every tenth or twelfth house, you'll see a step-down transformer mounted on the pole, and a group of conductors will connect the output of the transformer to the service entrance panel of each house. Through those conductors, each house will then have an almost endless supply of 120/240 volt, 60 hz, single-phase electric power ready to do the owner's bidding.

When you're standing in the backyard of the house, you can look (don't touch) at the wires with new respect – you know that at the other end, maybe hundreds of miles away, an enormous dam is connected to those wires – and you'll have a pretty good idea of how those conductors reached you.

Although I have been known to follow electrical lines on more than one occasion, I don't honestly expect any of you to do so. I've done it because everyone

needs new hobbies – and believe me, finding areas where everything is still on poles is becoming more difficult every day. And in taking this practice to extremes, you may find that setting off alarms, making dogs bark and bite and setting up the occasional ardenaline-pumping confrontation with a homeowner is hardly worth the effort.

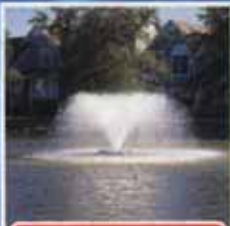
But I do recommend that you look

upward now and then and appreciate those wires whenever you spot them. Those towers and poles may not be beautiful, but they carry conductors and power that make so much of what we value in our daily lives possible.

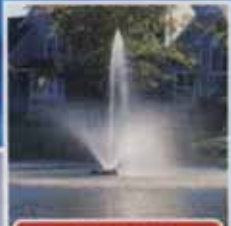
Jim McNicol is a technical consultant to the swimming pool, jetted bath and spa industries. He works from a base in Orange, Calif.

Font'N-Aire


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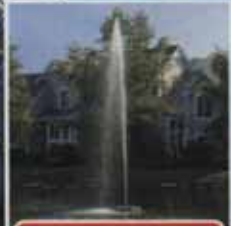
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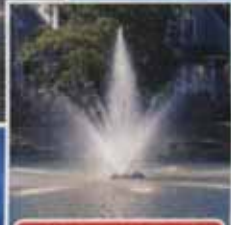
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Circle 3 on Postage Free Card

Giving a Dam Its Due

By Jim McNicol



Each year, the National Spa & Pool Institute offers special programs in conjunction with its International Expo. Most years, these programs include tours of local places of interest, such as notable museums, historical sites, outstanding examples of local architecture and the like. With the Expo in Las Vegas last December, NSPI took advantage of the location and included a tour of Hoover Dam and Lake Mead, a scant 30 miles from the glitz and glitter of The Strip.

More than 100 Expo attendees took the tour and learned a great deal about flood control and irrigation, Hoover Dam's primary reasons for being. The tour guides also reported that the dam structure alone required 3.25 million cubic yards of concrete – and that there are no workers buried in the pour, despite lots of old and persistent rumors.

Of greater interest to readers of this column, attendees learned as well about the generation of hydroelectric energy, a lucrative by-product of this massive land-reclamation project. In fact, the total electricity output of Hoover Dam serves more than 1.3 million people in the Southwest, with current contracts sending 19% of the output to Arizona, 56% to California and 25% to Nevada.

STANDING AT THE SOURCE

It's a great tour all in all, but for those of us with an interest in things electric it is simply a great *starting point*.

As we're standing in the powerhouse looking at those huge generators, we recognize them as the origination point of all of the electrical energy that we require every day to maintain our lifestyles. How do we direct all this energy into the malls, factories, schools and office buildings? How do we guide this essential ingredient to the backyard of a home where a newly constructed watershape is awaiting its electrical connection?

To answer those questions, let's take a closer look at this amazing feat of 20th-century engineering and the transmission of electricity from source to backyard. We'll use some actual numbers from the Hoover Dam/Southern California link, working our way from the generators at the dam to a typical backyard in a Los Angeles suburb.

All of the generators at Hoover Dam produce three-phase power, as is true with virtually every generator in the United States. This means that there are three output conductors leaving each unit. (Only later, at the user end of the circuit, will we see how the single-phase power is derived.) These generators operate at 16,500 volts, so each of these output conductors is operating at a transmission voltage of 16,500 volts.

Does that sound high? Not when you remember Ohm's Law, which shows us that as volts increase in a circuit, amps will decrease in direct proportion for a given amount of power to flow. This higher voltage allows smaller conductors to be used and improves the operating efficiency of the system.

These three conductors from each generator don't go very far. In fact, they terminate at a switchyard/transformer center a few miles away in Boulder City, Nev. There, the outputs from various generators can be connected together in various combinations to suit the customer's requirements. One of the outputs from the switchgear will be the group of three conductors heading for Southern California.

Each conductor is connected to the primary of a step-up transformer, the one final step required before the precious power heads out across the mountains on its 270-mile trip to Los Angeles. These transformers in-

Continued on page 64

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