



REVIEWING VANISHING-EDGE DESIGN PROTOCOL

By Skip Phillips, Master CBP

FEW POOL DESIGNS EVOKE the feeling of having a personal resort in your own backyard more than the vanishing edge. The undisrupted sightlines and soothing sounds can immediately transport you to a restful oasis, without actually having to leave your home.

For pool builders and designers, however, creating the proper vanishing-edge design can be a real challenge. In order to create the pool of your clients' dreams, it is important

to understand the fundamentals of vanishing-edge design, construction and engineering.

GENESIS, a company of the Pool & Hot Tub Alliance (PHTA), has been teaching courses internationally about vanishing-edge construction and design for more than 25 years. This article will walk you through three of the more important topics and protocols to follow if you want your projects to end with a successful design and execution.

SURGE TANKS

Surge tank capacity is one of the most common problems with vanishing-edge designs. There is a fallacy that one can properly calculate the necessary size of a surge tank simply by using individual weight



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All photos courtesy Skip Phillips

displacement as the criteria. But when was the last time you saw people using a water-in-transit vessel who were slowly lowered in by crane without splashing? Probably never. How often do you know in advance how many bathers will be in the pool at any given time? Probably not very often.

There are anticipated losses in vanishing-edge pools, such as evaporation and splash-out described previously, as well as unanticipated losses, such as leaks. It is just as important to design for unanticipated



Skip Phillips, former owner of Questar Pools and the firm's current principal designer, is one of the world's most renowned designers and builders of custom swimming pools, spas and other forms of aquatic architecture. In 1993, the Robb Report declared Phillips "the world's most influential swimming pool designer" and since then, he has received extensive coverage in trade magazines and on television, including multiple HGTV appearances, newspapers and prestigious national publications including Better Homes & Gardens, The New York Times and The Wall Street Journal. He is co-founder of GENESIS and is widely credited for transforming and uplifting the pool and spa industry. Phillips' body of work includes some of the most beautiful and technically advanced watershapes of the modern era.

losses. When discussing how to prevent leaks, some pool construction courses recommend waterproofing both sides of the vanishing-edge wall — but this would only prevent leaks where the leaks would be found. What about the rest of the vessel?

Compensating for a known problematic concern only in the areas that are visible is not a valid criteria in any vessel. GENESIS courses explain where and how to waterproof all parts of a vanishing-edge vessel.

While using body displacement values as the sole reference for surge tank displacement may be appropriate for spas, it is obviously flawed when considering the equation for pools. It is important to consider all of the variables, including atmospheric conditions that can heavily influence the surge tank and water-in-transit details. For example, wind can commonly shift 2 inches of water into the surge system.

A preferable “rule of thumb” is using a displacement value based on square footage — 2 inches of the vessel’s surface area, as an example.

Even after correctly sizing the “net” capacity of the surge tank, there can still be issues. It is important to look at the full picture. The minimum operating level, the autofill sensor location, and the feed not returning to the appropriate point are all problematic. Remember, having filtered discharge on dedicated water-in-transit systems with redundant backflow protection (such as a vacuum breaker or check valves) are paramount.

FLOW RATES

When defining flow rates, there are three factors to consider first: tolerance, soil conditions and deflection, as a minimum.

You cannot have a reasonable conversation about flow rates without first establishing the anticipated edge tolerance. While it is true some materials can be refined in place to improve the level of the vessel, and Variable Frequency Drive (VFD) systems make adjustments to the operational design variables a possibility, you still have to know your tolerance. As an example, GENESIS often suggests plus or minus 1/16 inch.



This water feature was modified to ensure minimal water was necessary to create the desired effect. Designer/Builder: Skip Phillips



The pool seen here was new but unfinished, with a 5-foot wall on the beam to support the waterfall conclusion. Simply using a short drop vanishing edge into the landscape solved the problem. Designer: Skip Phillips

Some vanishing-edge pools also employ a slot overflow. If the vessel is elevated, target flow rates typically parallel vanishing-edge flow rates. Otherwise, use lower flows (1 gallon per minute per foot, as an example) and set slot elevation 1/8 inch higher than vanishing-edge elevation. Also, if an elevated pool is flowing into a slot, remember to pitch the deck back to the slot a minimum of 5 feet, to help

recover surge.

Although GENESIS always recommends a soils report prior to beginning construction, it is especially important when building a pool with a vanishing edge. You will want to ensure that site conditions do not preempt the ability to meet and maintain edge tolerance, as aforementioned. A soils report could indicate that a water-in-transit design



This was the first new Lautner edge pool ever built. It had a significant deflection issue, as well as the challenge of the site being on the San Andreas Fault. Designers: Helena Arahuete, Lautner & Associates / Skip Phillips; Builder: Skip Phillips

is potentially predetermined to fail.

The quality of the concrete, its application, and the scope of the site-specific engineering are also key. Some of the greatest adverse variables we have found were due to deflection. GENESIS recommends that the shotcrete meet or exceed the ACI/ASA minimum compressive criteria of 4,000 psi. While deflection is always a

challenge, it is especially problematic for a vanishing-edge design because the smallest shift in the structure can impact where and how the water flows over the edge, either creating gaps and dry spots or causing more water to flow in one area. Improper foundation design can also eventually lead to the collapse of the entire structure.

DESIGN CONSIDERATIONS

Two of the most important design considerations for a pool with a vanishing edge — and, indeed, any water vessel — are visual and audible.

The primary cosmetic responsibility of a water vessel is its ability to reflect. With a vanishing-edge pool, enhancing the reflective quality is paramount. This feature can be defeated in a



This vanishing-edge pool was completely rethought during a renovation, both mechanically and cosmetically. Designer: Skip Phillips; Builder: Mike Fuller, Poolworks

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This pool, with a 160-foot edge, has no turbulence. The spa was used to diffuse the potential turbulence. Designer: Bruce Rudd, Island Architects / Skip Phillips; Builder: Skip Phillips

multitude of ways, including poor hydraulics or water feature designs, but turbulence is a key factor.

The hydraulics decisions can create turbulence that could have easily been mitigated. GENESIS recommends separate primary and vanishing-edge systems. You cannot properly protect from equalization with a common vanishing edge and primary system. There may be different flow rates for the primary system, the vanishing-edge system, and the slot overflow. Both the primary and vanishing-edge systems should have the line sized at 4 1/2 feet per second suction and 6 1/2 feet per second discharge at maximum velocities.

In addition to having a pool that is visually appealing, your clients will also want a pool that sounds nice. If the water flowing over the weir sounds more like Niagara Falls, in my view that means something somewhere went

terribly wrong. Consider the target audible qualities you want to achieve. Normal conversation is approximately 65 decibels. A reasonable target for your vessel may be 55 decibels, or half as noisy as 65 decibels.

The information in this short article is not intended to cover all aspects of this design detail. The vanishing-edge courses led by GENESIS do a much better job of expanding your knowledge of water-in-transit options. But hopefully this information will prompt discovery as pool builders and designers rethink the details that create a successful vanishing-edge or water-in-transit design, with a focus on the intent of the design and the possible repercussions. ~

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