

# APPLICATOR

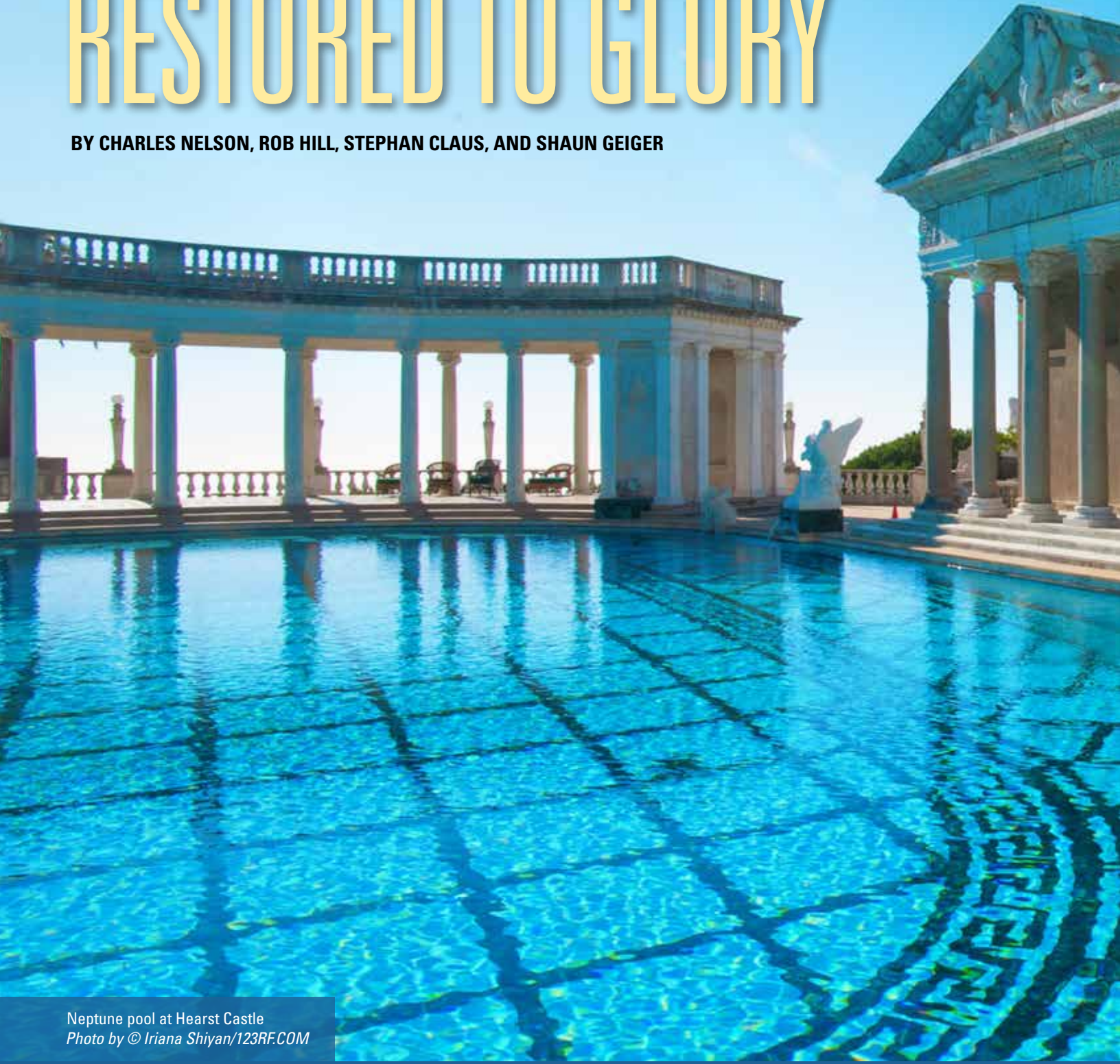
The background of the cover is a photograph of the Neptune Pool at Hearst Castle. The pool is a large, rectangular body of water with a tiled bottom, reflecting the sky and the surrounding architecture. The pool is flanked by classical structures with columns and a balcony. The sky is a clear, bright blue.

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## HEARST CASTLE'S NEPTUNE POOL: RESTORED TO GLORY

# HEARST CASTLE'S NEPTUNE POOL: RESTORED TO GLORY

BY CHARLES NELSON, ROB HILL, STEPHAN CLAUS, AND SHAUN GEIGER



Neptune pool at Hearst Castle  
Photo by © Iriana Shiyani/123RF.COM



located in San Simeon, California, halfway between Los Angeles and San Francisco, Hearst Castle is an iconic California landmark with a rich history including visits from dignitaries and celebrities such as Clark Gable, Charlie Chaplin, Winston Churchill, and Calvin Coolidge. Construction began on Hearst Castle in 1919 as a collaboration between media mogul William Randolph Hearst and Architect Julia Morgan, the very first woman architect licensed in the state of California. The design of the property is based on European designs Mr. Hearst viewed on a childhood trip to Europe, but its primary construction was steel reinforced concrete. The estate features 165 rooms on a vast property of over 127 acres and was completed in 1947. The property has a variety of wildlife including zebras brought in by Mr. Hearst, as well as vast gardens of flowers and fruit trees. The property has been owned and operated by the state of California since it was donated to the state by Mr. Hearst in 1957, and it still operates as a major California tourist attraction today.

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Hearst Castle is located on 124 acres and has 165 rooms, a pool that holds 345,000 gallons of water, exotic animals, vast gardens and fruit trees.

The Neptune Pool was originally constructed in 1924 and was expanded twice after its construction to reach its current size of 104 feet long by 58 feet wide. It holds an impressive 345,000 gallons of water. The pool features multiple Italian marble statues and fountains and is lined by 9,000 square feet of Vermont marble. Due to seismic movement and the lack of waterproofing materials at the time of construction, the pool has leaked water for most of its 90-year history. Before the renovation of the pool, it was estimated that the pool lost nearly 5,000 gallons of water per day. California had been experiencing prolonged drought, prompting the state to set aside nearly 10 million dollars to

stop the water leaking. The renovation lasted nearly four years and was completed in 2020.

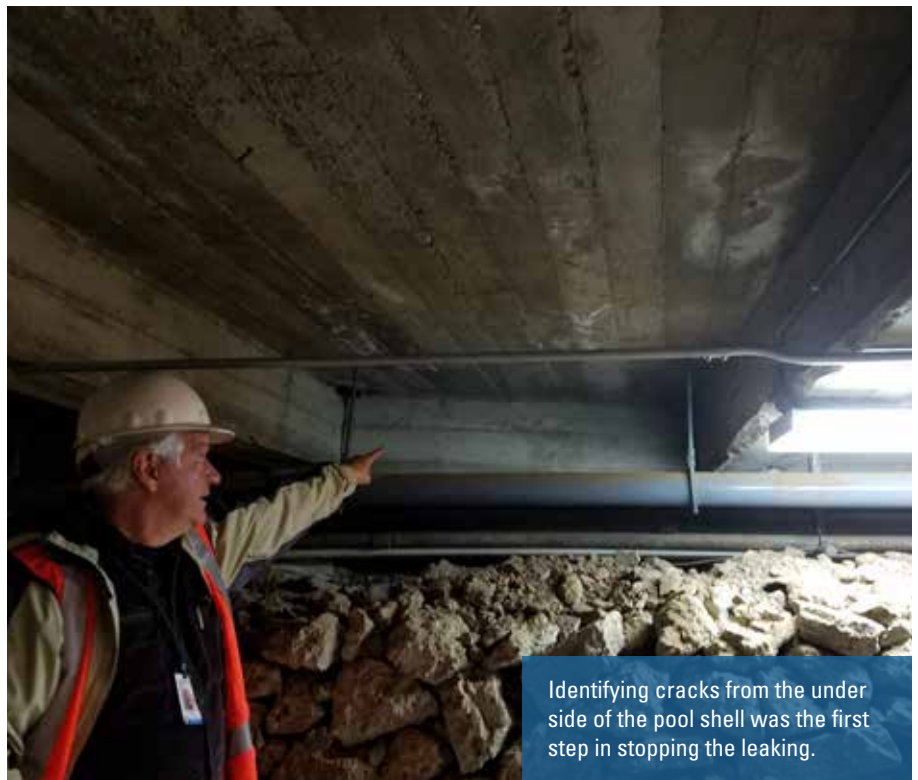
The Neptune Pool repair was the winner of a 2019 Preservation Design Award for Craftsmanship given out by the California Preservation Foundation. The California Preservation Foundation Awards showcase the best in California historic preservation. About the Neptune Pool repair project, the jury noted the audacity and scale of the work, stating “this was such a courageous project to take on, and the craftsmanship is incredible. They did an impressive job...”



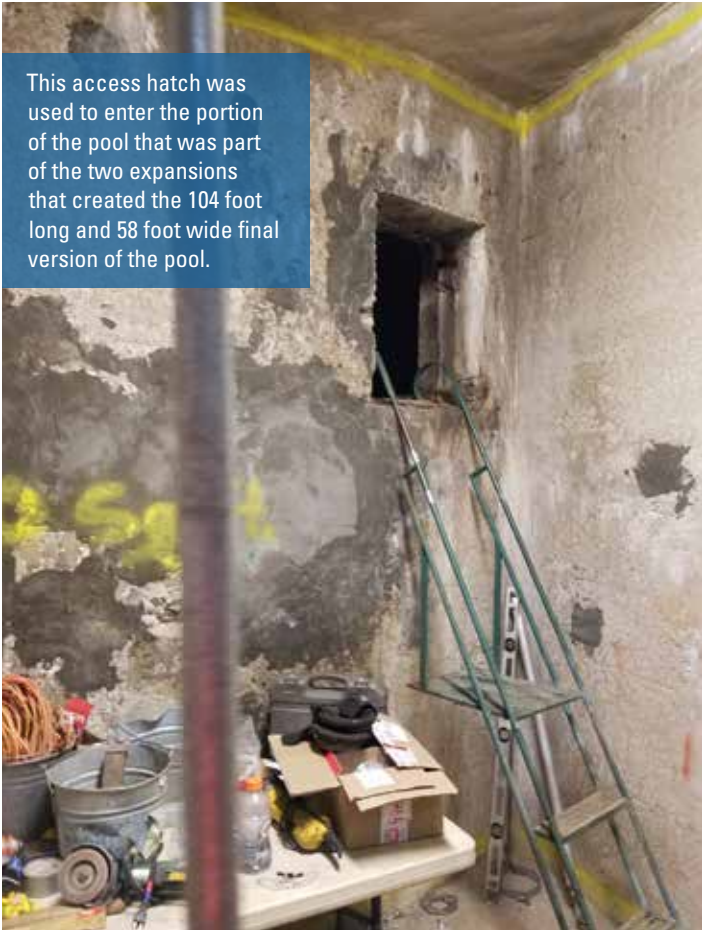
The Neptune Pool hosted swimmers such as Joan Crawford, Howard Hughes and Charlie Chaplin.

## THE CHALLENGES

Initial challenges included access to the work areas, working within the parameters of the state guidelines, working with independent and state inspectors, preparation of the substrates for work, and meeting a tight project schedule for the waterproofing scopes. Additional challenges throughout the project included wildfires that caused the evacuation of the tourist center and the animals on the property, vast temperature differences between the visitor center at the coast and the actual property which could vary up to 20 degrees, heavy marine layers most days that burned off in the late morning resulting in large mid-day temperature increases. There were some obvious logistical issues associated with working on the remote California Central Coast, where there is virtually nothing around in any direction, including medical facilities in the event of a serious accident.



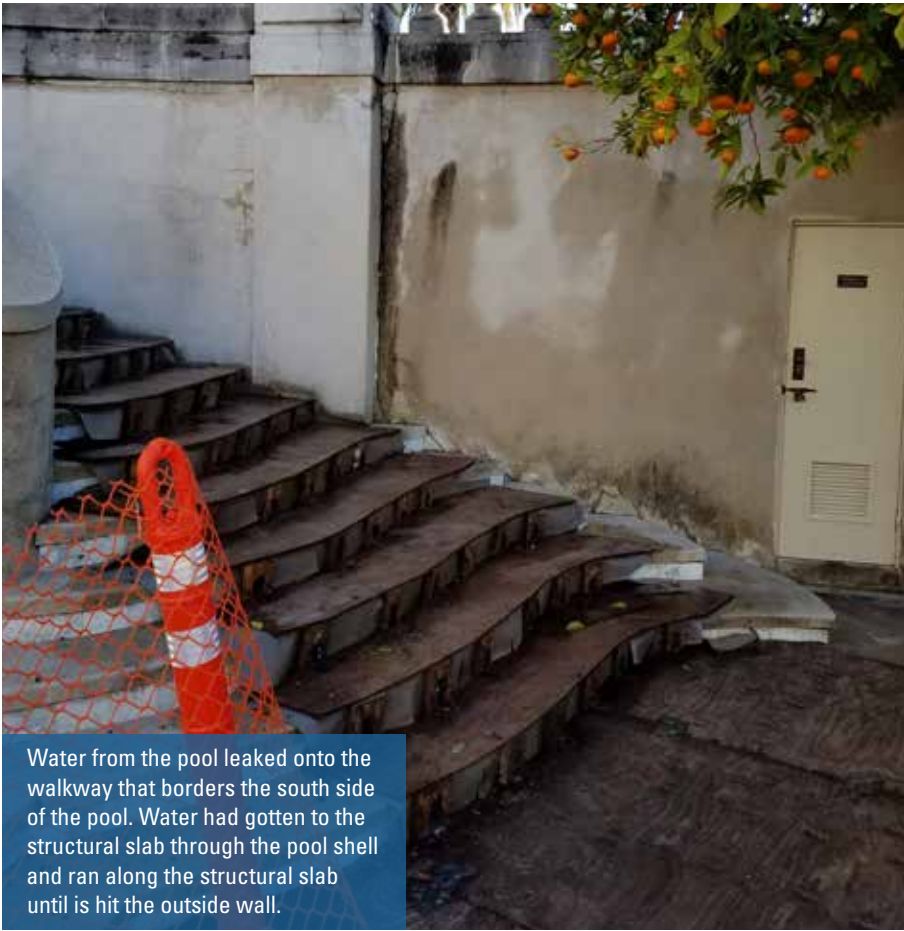
Identifying cracks from the underside of the pool shell was the first step in stopping the leaking.



This access hatch was used to enter the portion of the pool that was part of the two expansions that created the 104 foot long and 58 foot wide final version of the pool.



Due to years of water leakage, stalactites ranging from ¼ inch to 20 inches had grown from the bottom of the shell.



Water from the pool leaked onto the walkway that borders the south side of the pool. Water had gotten to the structural slab through the pool shell and ran along the structural slab until it hit the outside wall.

“Due to seismic movement and the lack of waterproofing materials at the time of construction, the pool has leaked water for most of its 90-year history. Before the renovation of the pool, it was estimated that the pool lost nearly 5,000 gallons of water per day.”

## THE PROJECT

The plan for stopping the water leak began with the identification of cracks in the pool shell. Repairing the cracks, totaling nearly 5,000 linear feet, involved injecting urethane foam grout into the cracks, mainly from the under side of the pool shell. The workspace under the pool ranged from two feet to four feet, making access to the furthest points of the pool difficult for the installers to get to. Because the pool shell was 14 inches thick, getting the equipment to drill the injection ports into the right areas, with enough room to drill at the correct locations and angles, created unique challenges, at times requiring minor excavation of soil to gain proper access to the work areas. Due to years of water leakage, stalactites ranging from ¼ inch to 20 inches had grown from the bottom of the shell. This helped the installers identify the cracks that needed to be injected from the bottom side. Once the injection was completed, multiple cores were taken from the shell over the cracks to make sure the foam grout had migrated throughout the crack. Once the inspectors for the state of California had approved the injection efforts, waterproofing inside the pool shell was ready to begin.

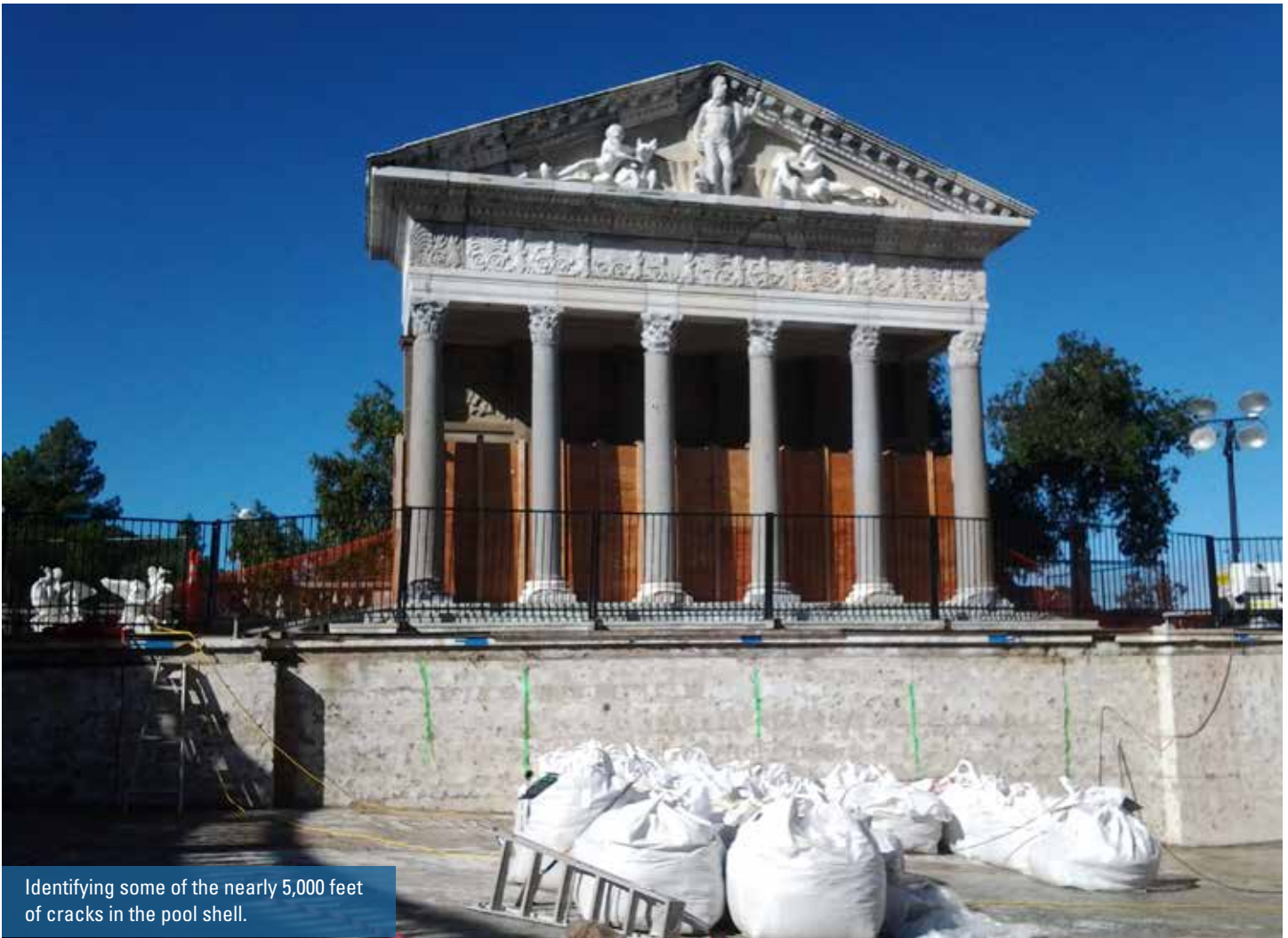
The removal of the existing tiles and mortar bed was difficult and made salvaging the original marble tiles impossible. As a result, the design team was forced to order new marble tiles



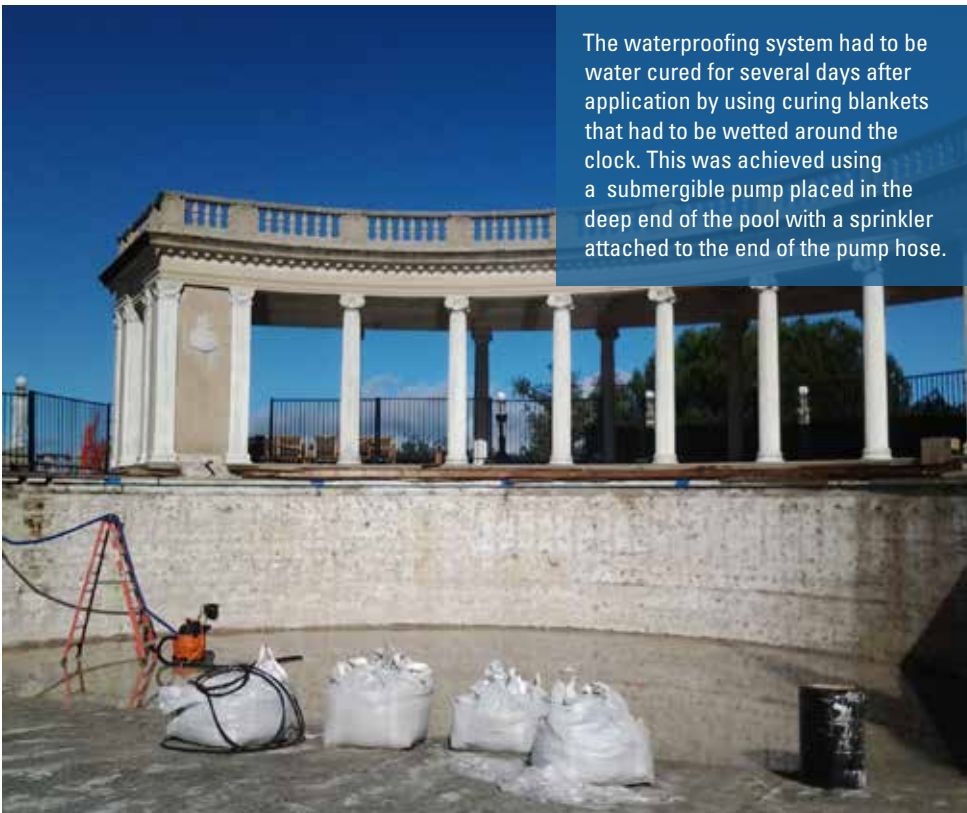
The Italian marble statues were successfully removed from the pool area.



Tiles and the existing mortar bed were removed from the entire pool.



Identifying some of the nearly 5,000 feet of cracks in the pool shell.



The waterproofing system had to be water cured for several days after application by using curing blankets that had to be wetted around the clock. This was achieved using a submersible pump placed in the deep end of the pool with a sprinkler attached to the end of the pump hose.

from the same Vermont quarry that furnished the original tiles. The new tiles then had to be sorted by color gradation to make sure they could blend the shades of white throughout the pool and adjacent basins, so as not to be noticed by the thousands of annual visitors. The Italian marble statues were successfully removed and stored for the duration of construction efforts.

Once the tiles were removed a new set of obstacles was realized. Residue from an existing epoxy was discovered on the pool shell under the original mortar bed which had to be removed before the waterproofing could begin. Because the castle was still open for tourists during the renovation, the state of California would not allow sandblasting as a method of removal for the epoxy residue. The silica dust created





Access to Neptune Pool.

by sandblasting was considered a hazard to the tourists visiting the site. As a result, vapor blasting was chosen as the method of removal. Unfortunately, the vapor blaster was not able to remove the residue fast enough to maintain the project schedule, so eventually, the removal of the residue was done with a 40,000-psi water blaster. The water blaster was effective, and the removal took two weeks to complete with the wastewater being stored and contained for recycling. Now, with the residue gone, application of the shell waterproofing could begin. Honeycombs in the pool shell were uncovered by the removal efforts and needed to be patched in with hydraulic cement prior to the application of the Xypex Crystalline waterproofing. The waterproofing system had to be applied with a specialized spray rig to spray the cement-based materials, while also keeping the substrate wet. The system was applied in two coats and had to be water cured for several days after application using curing blankets. Due to the high summer temperatures during application, the blankets had to be wetted around the clock during the curing process. This was achieved using a submersible pump placed in the deep end of the pool and a sprinkler attached to the end of the pump hose.

Once the application of the crystalline waterproofing had been completed and cured, the pool was filled with water as

the final stage of the waterproofing application. Initially, the pool had some minor leaking through micro cracks, but after two weeks, the crystalline waterproofing had done its job and filled the cracks and capillaries that were allowing the water to seep out. To ensure the chemical process of the crystalline waterproofing had time to fully react within the concrete the manufacturer required the pool to be full for three weeks before the water could be drained. Once the three weeks had passed, the pool was drained and the remaining waterproofing could be completed. Since the crystalline waterproofing applied inside the pool shell would not allow for a proper bond of the fluid applied waterproofing or the mortar bed that would be applied next, the crystalline waterproofing had to be removed from the surface before that activity could begin. The removal of the crystalline waterproofing was done with a 3,000-psi pressure washer, and the debris and wastewater were contained and recycled per California guidelines.

With the injection and crystalline waterproofing activities complete, the tile contractor was able to move in and complete a cement overlay on the pool shell interior to allow for the proper surface required for the secondary fluid applied waterproofing system. While these activities were occurring, our focus shifted to the water filtration

bays located under the pool shell. There were four filtration bays, each one was 15 feet by 10 feet with a depth of 15 feet. Each had an existing asphalt-based membrane that had to be removed, and a new two-component urethane-based chemically resistant membrane, Sika 7600, was installed in the interior of the filter bays. This system was solvent free, so it minimized the confined space requirements the state had imposed on the work. With the overlay on the pool shell complete and application of waterproofing in the filtration system finished, the fluid applied system in the pool shell was able to start.

**Sika products used:**

- 122/123 Repair Mortars
- Armetec 110 Protective Coating
- Sikadur 35 Epoxy Resin

The secondary waterproofing system was chosen by the design team to ensure compatibility and adhesion with the mortar bed system. The pool shell, basins, and alcoves were completely

coated and a three-inch mortar bed was installed prior to the reinstallation of the tile. Due to the complexity of the tile layout, this process took several months. Once the tile had been placed and the pool refilled, it marked the first time in the 90-year history of the Neptune Pool that it was leak free.



**LESSONS LEARNED**

Our takeaway from this project is to expect the unexpected. Throughout this historical renovation and others completed since, we have found that past contractors usually did not have the material and technology available to them to complete the work as we would now. We expect that there will be unforeseen conditions, unusual use of different products, and the delays caused by these conditions. In future jobs, we are better equipped to deal with the unforeseen and have learned to

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Neptune Pool filled and glorious.

pad our production schedule when possible to allow for those unknowns.

#### About the Authors

**Charles Nelson** - Charles Nelson has almost 40 years of industry experience as a field installer of various waterproofing materials, having worked for his father's company, Advanced Waterproofing, one of the pioneers in the deck coating industry in Southern California. Charles was also a sales, technical and architectural rep for several leading manufacturers of fluid-applied waterproofing and traffic deck coating materials. He has been an estimator and project manager for Angelus Waterproofing & Restoration for the last 11 years. Charles works on both new construction and rehab projects. In his spare time, Charles enjoys spending time with his family, including supporting his son and his club ice hockey team by traveling around from state to state. He is also a longtime avid fan of the Denver Broncos!

**Rob Hill** - Rob Hill has been working in the caulking, waterproofing and historic restoration field for over 30 years. He has worked on dozens of the most important historic buildings in Southern California from the Griffith Observatory to the Museum of Man and the San Diego Museum of Art in Balboa Park. Rob attended the University of Oregon where he earned a B.S. degree in Construction Management, with emphasis in Architecture and Finance.

**Stephan Claus** (President) and business partner **Shaun Geiger** (CEO) have owned Angelus Waterproofing & Restoration, Inc. since 2009. Stephan has over 40 years in the waterproofing industry, both on the manufacturing side, including work in the lab, R&D, inside sales, outside sales and technical support, as well as extensive experience on the contracting end for the last 13 years. Shaun graduated California State University, Chico with a BS in Business Administration and has over 20 years of experience in the waterproofing industry, both on the manufacturing side and contracting end, as well.

### SPECIAL OFFER FOR SWR INSTITUTE MEMBERS

Any **SWR Institute** members interested in a rare chance to float where famed stars such as Howard Hughes, Joan Crawford, and Charlie Chaplin once frolicked can contact The Foundation at Hearst Castle. Admission (donation of approx. \$1000 per swimmer) is said to be capped at 40 people, so lucky attendees aren't elbowing one another for the privilege of swimming in one of America's most iconic and quintessential design attractions.