

# ENR

Engineering News-Record

ELECTION RESULTS BOOST INFRASTRUCTURE

MISSISSIPPI MODEL AIDS DELTA PLANNING

THE PAINFUL STATE OF FLEET INSURANCE

ROBOT TIES STEEL ON PENNSYLVANIA BRIDGE

## NATURE'S FAULT

Team replacing dam in seismic zone mitigates risk from ancient landslides, torrential rains and naturally occurring asbestos (P. 38)

**ALSO INSIDE:**  
**FORECAST 2018**



Increases in the use of concrete include Central Park Tower in New York City. The structure will rank as the world's tallest residential building and second-tallest building in the metropolis.

## Concrete Today III

# Ready and Waiting

The market considers if concrete consumption will accelerate

By Kate Gawlik

### WHAT'S INSIDE

- ◆ Preserving History and Water
- ◆ Concreting in the Cold
- ◆ Technological Advances and the Labor Shortage
- ◆ Forming the World's Tallest Residential Building
- ◆ Geosynthetic Solution for Interstate Connector Road



## Preserving History and Water at Hearst Castle

**In California, preserving water in a drought region and maintaining the history of legends are both serious business.** Those involved in the renovation of the Neptune Pool at Hearst Castle, San Simeon, had the opportunity to do both.

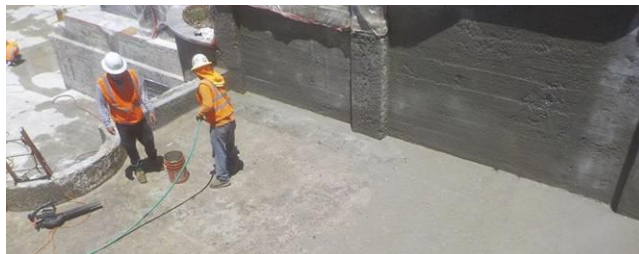
The pool, built in the 1920s with renovations over the decades, has leaked 3,000–5,000 gallons of water per day as long as anyone can remember. In 2014, as droughts worsened, this was no longer feasible.

T.B. Penick & Sons, San Diego, with California State Parks selected Xypex to help stop the leaks. Two coats of Xypex Concentrate were applied to the pool's interior. The pool was filled 14 days later and remained full for an additional seven days before the leak test at day 21. Leaking was witnessed upon initial fill, but over the course of a few days, Xypex crystalline technology activated within the concrete to turn the leaks into a drip to nothing.

The pool's concrete was found to be porous with honeycombing and other defects. These areas were removed and patched with Xypex waterproof patching compounds. Xypex Patch'n Plug was used in areas 6 in. or less, and Xypex Megamix II was used in patches greater than 6 in. After allowing 28 days for the treatment's chemical ingredients to diffuse and crystallization to grow multiple inches into the substrate, the coating was removed with a pressure wash so a

mortar bed with the original and replacement tiles could be laid down and bonded to the concrete.

While only a portion of the \$5.4-million project, the use of Xypex materials was essential to keeping the 345,000-gallon historically significant and filled. ♦



After decades of leaks, the Hearst Castle Neptune Pool has been made leak free.

PHOTOS: COURTESY OF XYPEX

## Placing Concrete in the Cold

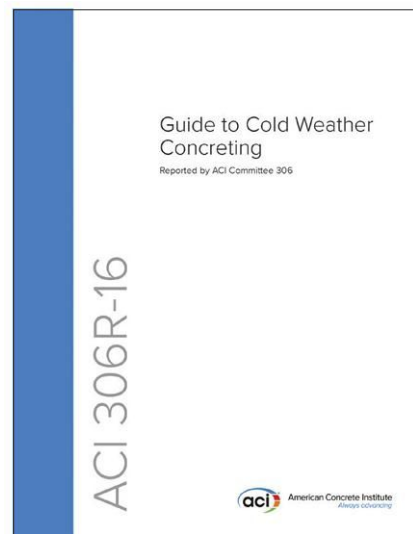
**Can concrete be placed once the cold weather sets in?** Certainly, according to ACI 306R-16: Guide to Cold Weather Concreting.

ACI 306 states that proper cold-weather concreting practices help concrete placed in cold conditions develop the intended strength and durability. When no external water is available, the degree of saturation of newly placed concrete decreases as the concrete matures and mixing water combines with cement during hydration. Additionally, mixing water is lost to evaporation even at cold temperatures. Under such conditions, the degree of saturation falls below the critical saturation.

At about the time that concrete reaches a compressive strength of 500 psi (3.5 MPa), the degree of saturation of the concrete falls below the level at which a single cycle of freezing may cause damage. Most well-proportioned

concrete mixtures reach this strength within 48 hours of placement if the concrete temperature is kept at or above 50°F (10°C). During construction, concrete with a compressive strength less than 3,500 psi (24.5 MPa) may be damaged by repeated freezing-and-thawing cycles while critically saturated. Consider the addition of air entrainment in the concrete and monitoring the concrete strength gain so that 3,500 psi (24.5 MPa) is reached before the protection is removed.

Strategies that provide effective, cost-efficient and environmentally responsible protection of fresh concrete in cold-weather conditions are detailed in ACI 306R-16: Guide to Cold Weather Concreting. Additional information is available through two on-demand learning courses covering updates and field applications, placement research and early-age behavior. Learn more at [www.concrete.org](http://www.concrete.org). ♦



According to ACI 306R-16, concrete placed during cold weather, protected against freezing and properly cured for a sufficient length of time has the potential to develop higher ultimate strength and greater durability than concrete placed at higher temperatures.

IMAGE: COURTESY OF ACI



# The World Standard in Concrete Waterproofing by Crystallization

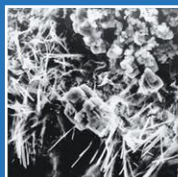
**NO  
EQUAL**



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Concrete  
(Untreated)



Xypex Crystallization  
(Initiated)



Xypex Crystallization  
(Mature)

XYPEX integral crystalline technology waterproofs concrete foundation structures as they're poured and cannot be damaged during installation or backfilling. Unlike membranes, Xypex is added to the concrete at the time of batching avoiding application errors. This sustainable technology also contributes to LEED credits. **When you select Xypex Crystalline Technology**, you've chosen the best... more than 40 years of independent testing, experience in over 90 countries, unmatched product and service standards ... *and still no equal.*

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