An Update of *Historic* Proportions

Crews needed a complex access system that limited stress during restoration of the 258-year-old Independence Hall in Philadelphia.

A COMPLEX ACCESS SYSTEM EASES THE RENOVATION OF ONE OF AMERICAN HISTORY'S MOST PROMINENT BUILDINGS

By Vincent Brennan; Photos by Erik Highland

Only a few structures in the United States fully embody the spirit and history of the United States. Some say the White House is a prime example; others favor the Golden Gate Bridge or the Empire State Building. However, none of those structures comes close in significance to the actual birthplace of the nation: Independence Hall. Located in downtown Philadelphia, Independence Hall was host to the signing of the Declaration of Independence, the Second Continental Congress and the Constitutional Convention. The country's forefathers, including George Washington, Benjamin Franklin, James Madison and Alexander Hamilton, gathered there to delegate and create a new government free of British rule. From a structural point of view, Independence Hall *is* the United States.

Completed in 1753, Independence Hall is a prominent display of American tradition and freedom. As one of the most popular tourist attractions in the country, millions of visitors flock to the site each year to see history in its original form. With any building, not to mention a 258-year-old one, the wear and tear of tourism and weather conditions can accelerate the need for renovation. Independence Hall was no different.

Climbing the tower

Because of its own history with restoring other celebrated buildings, Superior Scaffold (Philadelphia) was selected to erect the access system to facilitate restoration efforts. The focus of the project—which workers will complete this fall—is Independence Hall's tower, which originally was home

The Independence Hall access system shifted the weight-bearing sections of scaffolding to allow restoration crews to work around historical artifacts.

to the Liberty Bell. Recently, engineers determined that the tower (built in 1828) was unstable and required numerous structural repairs.

Superior's CEO Guy Bianchini explained how his company devised an access plan to supplement the original structural system with modern materials.

"The wood and supporting rods that keep stability were removed and replaced. The entire façade received an overhaul, including all of the glass, copper and wood artifacts, the clock faces, the siding and paint," Bianchini said. "Cosmetic interior renovations took place, and other systems were completely and carefully replaced, like the HVAC, sprinkler and electrical systems.

"Even the weather vane and the golden ball that sits on top (of the tower) were regilded."

But that repair process was the easy part of the $5.6 million project. From the designing and planning phase, Superior helped create a complex access system specially designed to limit the amount of stress on the original structure. After supplying restoration-access systems to other high-profile jobs in the Northeast, Superior engineers were able to take

Getting Around the Challenges

With the number of historical artifacts involved in the Independence Hall project, restoration crews faced numerous challenges. Two of their most significant tests: erecting the scaffolding system and the scrim.

- **Scaffolding.** Workers needed to erect an access system that would enable them to reach every aspect of the building renovation. A major problem around which they had to work was not being able to move or remove priceless artifacts, such as copper urns. Leaving those items in place, then, crews had to shift the weight-bearing sections of scaffolding to allow access where usually they would have had none.

  Similarly, to refurbish the giant, glass clock faces of the edifice, the scaffold erector, Superior Scaffold (Philadelphia), installed a clear and stable platform. The firm also erected scaffolding up the narrow spindle that holds the building's stylized weather vane so crews could finish tower renovations.

- **Scrim.** To camouflage the restoration work and allow visitors a glimpse of the building obstructed by the scaffolds, workers attached a scrim of decorative polyester panels to the access system. The scrim's 150 printed pieces, paid for by a generous donation from Friends of Independence (www.friendsofindependence.com), created a carefully crafted reflection of what the final Independence Hall would look like.

  Because scrim systems can easily catch the wind when certain weather conditions develop, Superior engineered the scaffold structure to withstand excessive wind ratios. Doing so was an engineering feat considering the tremendous pressures on the structure and the need to maintain the integrity of a building that stands 12 stories tall.

The fragile Independence Hall building required a 172-foot-tall system scaffold with backup towers for extra stability.

Crews attached a decorative scrim to the scaffold surrounding Independence Hall that requires constant monitoring in regard to wind speeds.

that experience and apply it to the Independence Hall project. According to Bianchini, that's a primary reason Superior won the job over other competitors.

"Superior previously worked on many high-profile historic jobs, such as the Philadelphia City Hall, the Philadelphia Museum of Art, the Philadelphia Music Academy, the University of Pennsylvania Quadrangle and the cast-iron façade restoration project at the John Wannamaker Building," he stated. "We were hired because of our reputation, quality and customer service."

Utilizing the system

Since the first day of the restoration, the preservation of the building has been the utmost priority for all restoration personnel involved. The access plan certainly illustrated the cautious feeling associated with the project.

"The biggest challenge was trying to erect a functional scaffold without harming one of the most beloved historical buildings in this country, while also contending with the usual wind, rain, sleet and snow," Bianchini explained. "We had to work very closely with Structural Engineer Jonathan Price from Keast & Hood (Philadelphia), Senior Project Manager Jay Reddington and Project Manager Joe Winters from general contractor Daniel J. Keating Co. (Philadelphia) and the United States Park Service to devise an appropriate standard for a very fragile building. It was a real team effort and everyone involved contributed greatly."

To do so, Superior built a 172-foot-tall system scaffold that surrounded the famous structure's clock tower. The scaffold landed on the ground and upper roof of the structure.

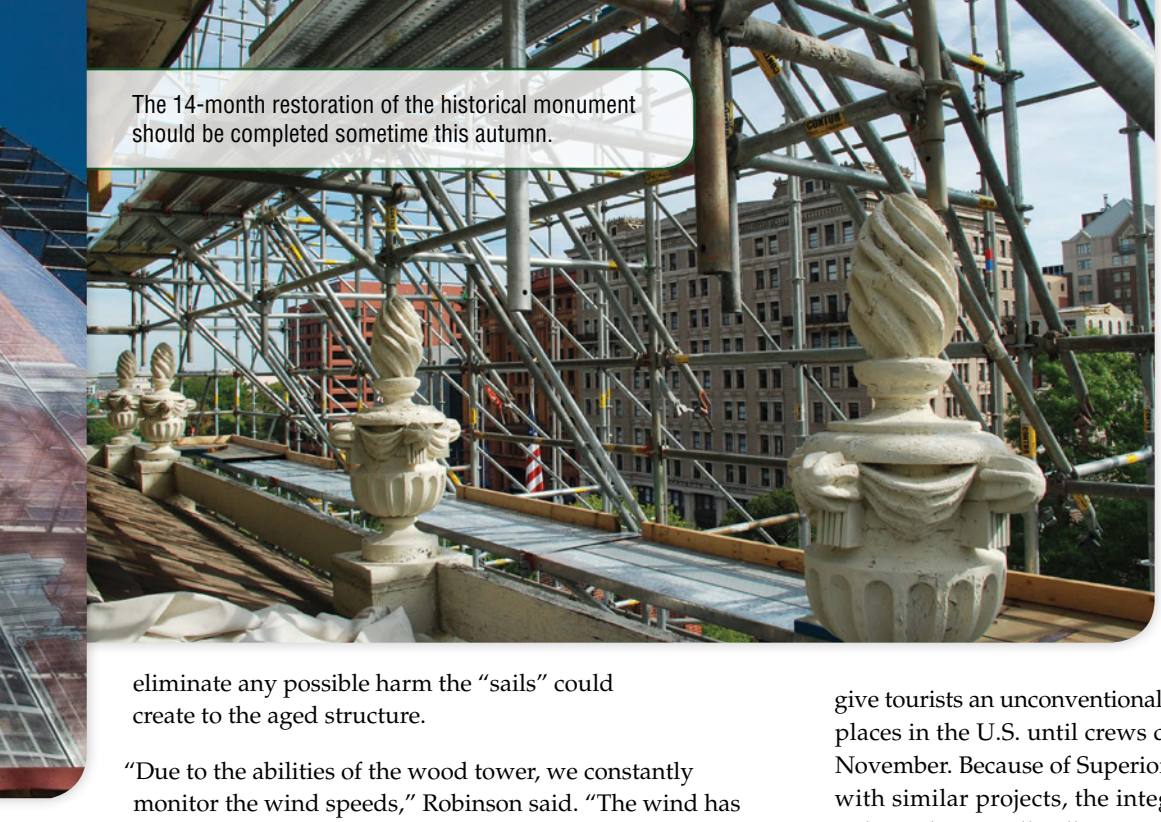
Bianchini noted that Superior engineers called for backup towers to add stability and limited the number of ties to the building. The scaffold accessed the stair tower up to 140 feet with a ladder scaffold completing the final 32 feet along the spire. But that wasn't all. A Betamax MaxClimber 1000 hoist provided additional access for the restoration workers and their materials. Crews installed netting and a decorative scrim (depicting the façade of Independence Hall) on all four sides.

Safe and sound

From an engineering standpoint, it was necessary for Superior to cooperate with strict loading limits for different sections of the historic building. Superior Engineer Bob Robinson said the upper roof load was limited to only 40 pounds per square foot. To install the proper system while adhering to the restrictions, Superior re-shored under the roof to support scaffold that extended another 80 feet in height.

"The only kinds of ties that we were permitted to use were push ties because we couldn't anchor to the building," Robinson said. "We could only butt up against it."

For the scrim, engineers knew from the start that they faced a challenge due to strict wind-load requirements. (See boxed information, "Getting Around the Challenges," on page 21.) In fact, since installing the scrims, the rule has been that if wind speeds top 40 mph, workers have to remove the panels to



The 14-month restoration of the historical monument should be completed sometime this autumn.

eliminate any possible harm the "sails" could create to the aged structure.

"Due to the abilities of the wood tower, we constantly monitor the wind speeds," Robinson said. "The wind has to be consistently over 40 mph (to force the removal of the scrim), but we haven't had to do that yet."

Project managers from the Daniel J. Keating Co. and Superior personnel instituted multiple safety measures for the project. Beginning with Superior's own Operations Excellence Management System (OEMS), which is ISO 9000/14000 compliant, every worker is fully prepared for the jobsite's unique conditions. According to Superior, the OEMS is a dynamic management system that follows all safety guidelines put forth by the Occupational Safety and Health Administration (OSHA), state and local safety and environmental laws.

The 14-month project will give tourists an unconventional view of one of the most historic places in the U.S. until crews dismantle the system/scrim in November. Because of Superior Scaffold's work and experience with similar projects, the integrity and significance of Independence Hall will remain intact for generations to come.

About the author

Vincent Brennan is the editor of *Scaffold Industry*. Contact him at vince@scaffold.org.