



Mills + Schnoering utilizes Revit to reconfigure interior of Statue of Liberty

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Mills + Schnoering Architects LLC (M+Sa) used contemporary technologies to upgrade visitor safety and comfort at the Statue of Liberty National Monument. Due to the complexity of the project, M+Sa used these technologies to design the upgrades more quickly, accurately and cost effectively than with traditional methods. When these improvements are complete, visitors will experience the Statue at its best since its dedication in 1886. In 2011, The National Park Service retained a multi-disciplinary design team led by M+Sa to perform these upgrades for the monument, which reopened on October 28 - the 126th anniversary of the statue's original dedication.

Severely limited space within the statue's pedestal posed challenges for the architects. They designed new staircases and a new elevator to deliver visitors to the observation deck and the crown safely and more comfortably.

M+Sa used Revit, a three-dimensional modeling software, to create a virtual model of the entire monument from laser scans. The interior of the pedestal - 17 s/f at its narrowest and only 27 s/f at its widest - contains massive beams supporting the statue, which further constrict the pedestal's interior space.

Gustave Eiffel, the celebrated engineer of the Eiffel Tower, designed this original support system. Utilizing Revit software, M+Sa configured two new staircases and two elevators within this interior space without touching Eiffel's steel support beams and enormous iron tie-down straps that hold the statue in place. M+Sa used the Revit model to thread the stairs and elevators through the narrow interior, which has little room for error.

Hugh Duffy, project manager at the NPS, said, "By preserving the Statue of Liberty National Monument's historic features, we continue to celebrate her origins as well as her enduring presence into the 21st century." The Statue is a World Heritage Site, the only one in New York State.

"Based on our work restoring numerous historic monuments throughout the country, we knew that traditional methods would be challenging for a project of this complexity and pace," said Michael Mills, FAIA, partner, M+Sa, whose firm specializes in preservation and architectural design. "The space is so tight that even small discrepancies in the design would have made the upgrades difficult to build. Using laser scanning and three-dimensional modeling, we were able to visualize the design that would improve fire safety and egress while preserving the Monument's original features. It's gratifying for us that we were able to assist the National Park Service in its stewardship for an essential piece of American history."

In 2009, M+Sa, then known as Farewell Mills Gatsch, consulted to the NPS on a project to make the stair rails and protective glass on the stairs leading to the crown as code compliant as possible. In October 2011, the Statue closed to begin work on the current upgrades. This project continues the

process of improving safety and accessibility for visitors from all over the world who travel to see this international symbol of freedom.

Significant Enhancements

The life and safety enhancements will increase visitor safety, fire protection, and comfort. New stairs and a new elevator make it easier for visitors to ascend to the pedestal's observation level, which will also be wheelchair accessible for the first time. From the top level of the pedestal, visitors can look up and view the double helix stairs leading through the interior of the Statue to the crown. A new heating, ventilation, and air conditioning (HVAC) system creates a more comfortable environment as visitors ascend or descend the stairs.

History of the Monument

Designed by French sculptor Frédéric Bartholdi, the Statue of Liberty was given to the people of the United States by the people of France on October 28, 1886. The first public elevator was installed in 1906 to provide access to the top of the pedestal. In 1933, President Franklin D. Roosevelt transferred the Statue of Liberty National Monument to the care of the National Park Service. Five years later, the first major rehabilitation was completed on the statue, pedestal, base, and walkways. The monument received additional work between 1984 and 1986, notably replacing the torch and strengthening the outstretched arm. April 2004 marked the beginning of life safety improvements to the Monument which allowed it to re-open in July of that year for the first time since the events of 9/11. In April 2009, further improvements were made to the double helix stairs leading up to the crown, which reopened on July 4, 2009.

About Mills + Schnoering Architects, LLC - Architecture and Project Management

Mills + Schnoering Architects, LLC is a full-service architectural firm with broad experience in design, planning, and historic preservation. Founded in 2011 by former principals of the award-winning Farewell Mills Gatsch Architects, the firm offers expertise in the fields of cultural facilities; courthouses; campus planning and design; and the preservation, restoration, and adaptive use of historic buildings and sites. Other preservation work on National Historic Landmarks includes St. Elizabeths Hospital in Washington D.C; Pearl S. Buck House in Dublin, PA; Merchant's Exchange in Philadelphia, PA; and Nassau Hall at Princeton University, NJ.

About the Team

Atkins North America, Inc. (Construction Manager); Joseph A. Natoli Construction Corporation (Contractor); Keast & Hood Co. (Structural Engineer); Joseph R. Loring & Associates (MEP Engineer); Hughes Associates, Inc. (Fire Protection Engineer); VDA - Van Deusen & Associates (Vertical Transportation Consultant); Becker & Frondorf (Cost Estimator); The Lighting Practice Lighting Designer); The RBA Group (Civil Engineer); Schnabel Engineering (Geotechnical Engineer); David Evans Associates (Value Analysis).

About the National Park Service and Statue of Liberty National Monument

Since 1916, the American people have entrusted the National Park Service with the care of their national parks. With the help of volunteers and park partners, the NPS is proud to safeguard these nearly 400 places and to share their stories with more than 275 million visitors every year. One of those places is Statue of Liberty National Monument. Located on a 12-acre island in New York Harbor, the statue of "Liberty Enlightening the World" was a gift of friendship from the people of

France to the people of the United States and is a universal symbol of freedom and democracy. The Statue of Liberty was dedicated on October 28, 1886 and designated as a National Monument in 1924. The Statue is visited by nearly 4 million people each year.

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