



Reinventing a campus cornerstone

When restoring the University of Virginia's rotunda, careful attention was paid to the carving of Carrara marble columns, which shape the structure's design

BY HEATHER FIORE



Photo courtesy of Anna Wesolowska-Hedman

After serving many years in public office, the third president of the U.S., Thomas Jefferson, founded the University of Virginia (UVA). As an established architect who focused on classical architecture, Jefferson helped create the "academic village" at the UVA, which was completed in 1828.

The village is a U-shaped complex of buildings located within the 28-acre campus that sits on an elevated slope and incorporates a rotunda. The rotunda, known as the centerpiece of the university, was inspired by The Pantheon in Rome and features 16 solid white marble capitals.

When Jefferson originally designed the building, stone carvers from the Ricci family in Carrara, Italy, were commissioned to carve intricate designs into each of the 16 marble columns. However, in 1895, a fire destroyed much of the rotunda, including the custom-carved columns. American architect Stanford White of McKim Mead & White in New York City was subsequently hired to design the restoration of the rotunda. While he did an impressive job, the construction team in this era opted to use an alternate source for the white marble capital replacement, in lieu of

the original Carrara white marble, which proved unsuccessful over the course of the next 100 years, as the capitals eroded and the acanthus leaves of the Corinthian capitals began to fall off, which are 30 feet above the rotunda entry platform. For safety reasons, the UVA clad the rotunda in a black screen for many years following.

In 2009, noted historic preservation architectural firm, John G. Waite Associates, Architects (JGWA) in Albany, NY, was tasked with restoring the rotunda back to its original luster. "It's the visible symbol of the university and a much



For the rehabilitation of the rotunda at the University of Virginia (UVA), which was completed in 2015, the main focus was replicating the marble capital columns that were incorporated into the original design from the early 1800s.



Since an 1895 fire destroyed the majority of the building, the architects and stone fabricators only had partial columns and fragments to work off of, as well as a couple of old photos. To begin, three-dimensional digital scans of a capital base and three smaller upper capital fragments of existing 1823 capitals were taken, creating a one-quarter-round composite marble and clay model. Photos courtesy of JGWA

beloved building," explained John G. Waite, FAIA. "It's also the last building that Jefferson designed before he died. It was designed to serve as the symbol, as well as the heart and soul, of the university."

Positioned in the front of UVA's campus, the rotunda houses the library on its upper levels and lecture rooms on its lower floors. "The building has symbolism on all levels," said Waite. "Every other college that was done before then and at that time always had a chapel in the design that was prominent. The University of Virginia did not, and the rotunda symbolically was the chapel, the cathedral of the university; Jefferson was not a great fan of organized religion."

REVIVING THE ROTUNDA

With a failed attempt to repurpose the structure in the late 1970s, which would have converted it to a president's office, the rotunda was most recently designed to serve as the hub for student activities, containing classrooms, seminar rooms and a library. "The goal was to make it once again as Jefferson intended, an integral part of the students experience at the university," the architect explained. "The key part was to replace the marble capital columns which were disintegrating. For the first two years, we did a historic report, which included researching everything to find out about the original construction and modifications over the years. We did a very detailed analysis of the building as well — what was historic, what wasn't, what was put in as part of previous restoration that wasn't accurate and reflected what Jefferson wanted — and out of that came the program and the design of the restoration."

JGWA paid careful attention to the history of the building and renovated it to reflect what the original plans included. "When Jefferson originally designed the rotunda, there was a gymnasium behind a wall," said



After the model was crafted, a two-dimensional hand drawing was completed to detail all the ornament on Corinthian capitals, followed by the development of a full-round three-dimensional digital shop drawing. Lastly, three-dimensional full-round CAD files were used to CNC route solid blocks up to 80% complete, leading to the careful hand carving of 16 full round capitals, which each weigh 6,300 pounds and measure 4' 8" x 4' 8" x 3' 10." Photo courtesy of JGWA

Waite. "After 1895, White took those spaces, which were all destroyed, and built what is called the 'Terrace,' rooms around a courtyard that are considered to be historic in their own right. We gutted those additions and put in new classrooms and administrative office spaces — modern spaces that can be altered in the future."

RECREATING A 150-YEAR-OLD STRUCTURE

In 2013, after the extensive design process, Rugo Stone, LLC, in Lorton, VA, was selected to aid JGWA with the restoration, particularly with the supply and carving of marble that was used. "We came as close as we could to the marble



Representatives from Pedrini, Rugo Stone, JGWA and the UVA observe the completed prototype in Carrara, Italy. A couple of weeks were spent on each section of the capital, according to the architect. "The top was more critical because it projected more design elements," he said. Photo courtesy of JGWA

that Jefferson used in 1825," said Waite.

With the main focus on replicating the marble columns, Rugo Stone and JGWA began by foraging through old photographs, since there wasn't one complete column intact. "All we had to work with was one partial lower capital base and two or three small fragments from the upper portion of the upper capital, as the original capitals were fabricated in two portions (lower and upper)," explained

Bill Lazar, vice president of operations at Rugo Stone. "There were no close-up photos, just an image from 1895, which showed the capitals at a 100-foot distance. There were also no original drawings and architectural design plates, which would confirm the original design.

"This is a critical point to understand, as the overriding design goal of the project was to replicate what Jefferson would have designed and what the Ricci family

would have carved in 1825," Lazar went on to say. "It is also important to know that as much as the intent was to replicate the original capitals, the preference was to provide the new capital as a single piece of marble."

"Each capital was an individual design. There wasn't enough physical information to put the pieces together and figure out what a column capital was originally like," Waite added. "We had pieces and



Once the prototype was tweaked and approved, professional sculptors at Pedrini srl in Carrara, Italy, created a full-size mock-up in the Carrara C marble from the Campanili Quarry. Photo courtesy of JGWA



Several months were spent on the carving and creation of the 16 marble capitals, which were then carefully transported over to the UVA.



Since the height and width of the entry to the rotunda was limited, Rugo Stone created a lateral conveyance system to remove the existing capitals and replace them with the new ones. Photo courtesy of JGWA

really clear photographs from before the fire which we were able to enlarge. We then generated three-dimensional computer designs based on the photographs, field dimensions we took and fragments."

Rugo Stone has a close relationship with a Carrara-based stone fabricator, Mario Pedrini srl, who were able to reproduce the original columns using the three-dimensional, digitally scanned images. "Pedrini and their artist, Mr. Gianluca Ceccarelli, prepared a two-dimensional, full-scale hand drawing of the Corinthian capital, used by the design team to develop a proportionally correct development of the upper portion of the capital, which was more complex than

the base portion," said Lazar. "Once the two-dimensional drawing was approved, Pedrini created a marble model of the lower portion of the capital in a one-quarter round. A clay model for the upper portion of the capital, in a one-quarter section round, was created on top of the marble lower portion to provide a full height one-quarter model in marble and clay. Through multiple designer visits to Carrara, the clay and stone model was approved."

Waite, who traveled with Rugo's team to Italy, said they spent more than one week observing the final prototype, making little changes wherever needed to ensure the precision of the new capitals.

The partial capital was then reproduced in Carrara C marble from the Campanili Quarry, followed by the full round Corinthian capital.

"This capital became the basis of comparison for the next 15 capitals, which were carved over the next 10 months," said Lazar. "Pedrini used two 6-axis robotic machines to shape the column capitals, and the remaining 20 percent of the work was performed by a skilled team of ornamental carvers. The carving of the capitals is a perfect example of Pedrini's use of modern machining and traditional hand carving to produce highly ornate capitals in an unprecedented short time period."

INSTALLATION FEATS

Once the capitals were produced, installers were tasked with removing all existing column capitals and replacing the new capitals with virtually no overhead space, given the low profile of the rotunda's portico roofs. "The real challenges were to get the mechanical systems in and excavate under the building," said Waite. "You have no idea mechanical facets are below the building; they're completely invisible. The rotunda itself is put back exactly as it was historically."

Since Rugo was limited to the height of its machinery, specifically its crane, the installation team had to create a lateral conveyance system to transport the capitals using a mobile crane and steel channels. "The lifting method was also highly customized and involved a crated steel cart with hydraulic jacks, which lifted the existing capitals off the columns and allowed for the placement of the new capitals," said Lazar.

Although the entire project took more than two years to complete, the installation of the columns took only a couple of weeks and required just five men. "The rotunda has been classified by the United Nations as a World Heritage Site and UVA remains the first and only American collegiate campus to have this status," said Lazar. "It can be argued that the UVA campus, specifically the rotunda, is one of the most important architectural structures in the U.S." ■

University of Virginia rotunda renovation Charlottesville, VA

Architect: John G. Waite Associates, Architects, LLC, Albany, NY

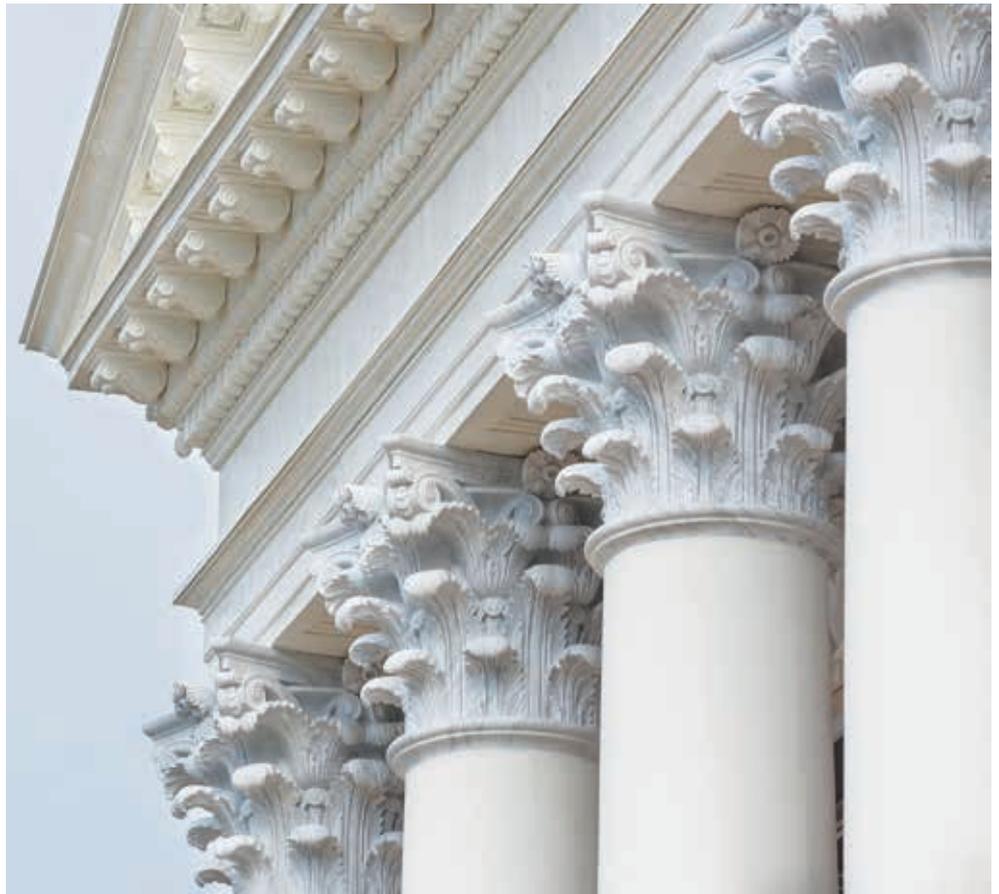
General Contractor: Whiting-Turner Contracting Co., Baltimore, MD

Stone Fabricator: Mario Pedrini srl, Carrara, Italy

Stone Supplier/Installer: Rugo Stone, LLC, Lorton, VA (Carrara C marble from Campanili Quarry in Carrara, Italy)



The finished product is a stunning replication of the original columns from the 1820s.



"The carving of the capitals is a perfect example of Pedrini's use of modern machining and traditional hand carving to produce highly ornate capitals in an unprecedented short time period," said Bill Lazar, vice president of operations at Rugo Stone.