A colossal team effort

A five-year collaboration between a diverse group of trade professionals required attention to detail, creative problem solving and quality craftsmanship to restore the Georgia White marble exterior of the historic Minnesota State Capitol Building in St. Paul, MN

BY JENNIFER RICHINELLI

Photo courtesy of Polycor
Modeled after St. Peter’s Basilica in Rome, Italy, the Minnesota State Capitol Building revealed signs of aging after enduring the harsh winters of St. Paul, MN, for longer than a century. The 111-year-old structure, which was designed by noted architect Cass Gilbert and earned a place on the National Register of Historic Places in 1972, is a solid display of Georgia White marble — quarried in Tate, GA, by the Georgia Marble Co., today owned by Canada-based Polycor. Once the go-ahead was given to restore the deteriorating marble exterior to its original grandeur, it was determined a project of this magnitude would require an extensive team of experts. It was also soon realized among all parties involved that a unified effort would be crucial to achieve a successful stone restoration that was on time and on budget.

The restoration of the stone facade commenced in 2012, and over a four-year period was broken down into five phases, which involved the reproduction of 3,949 custom stone pieces — each one assigned its own shop ticket and unique number. The marble pieces were fabricated by Tennessee Marble Company in Friendsville, TN; Cutting Edge Stone in Alpharetta, GA; and Traditional Cut Stone in Ontario, Canada. Additionally, detailed carvings were produced in Italy by Italmarble Pocai Srl and in Canada by Art Cubus International, as well as onsite by master carvers from Twin City Tile and Marble Company (TCTM), who purchased the stone and facilitated the project. The stone mason for the project was Mark 1 Restoration of Dolton, IL.

With the scope of the restoration so immense — and the skilled team positioned throughout North America and abroad — organization, communication and flexibility were all critical components of the job. It was imperative that a continuous flow was maintained between
the architects, stone producer, fabricators, stone carvers and masons to keep on schedule, and acute attention to detail and accuracy was a must. And above all, it was determined fairly early on that no assumptions should be made.

"It was a really complex team dynamic," said architect Ginny Lackovic of HGA Architects and Engineers. "Many of us had experience with historic restoration, just not at this scale. It's always hard to get large projects started, and this one was no exception. It took a while to sort out everyone's roles and responsibilities, but eventually each step in the process was dovetailed to create a continuous flow of work. The best way to fully integrate the process is to get all key decision makers at the table at the same time. After a few months, we realized that weekly meetings with the full team were the only way to make this happen. Another important aspect was general willingness to be flexible when possible; schedules and processes were adjusted throughout the project in order to accommodate changes in scope or to help other team members stay on schedule.

“One of our biggest challenges was choreographing overlapping phases,” Lackovic went on to explain. "We transferred knowledge from one stage to the next, making adjustments as we moved forward. Flexibility was key, but it took time for people to get comfortable with that aspect of the process. In the beginning, people wanted the process to be more structured. But once we had confidence in the process, which came from mutual trust and respect for all team members, there was more willingness to accommodate change.”

The architect also expressed sentiment for the general contractor for its role in the restoration of the Minnesota State Capitol Building. "A lot of credit goes to JE Dunn (Construction),” she said. “They did a masterful job with overall project and site management. We had good people in the right places.”

**STAYING ON POINT**

Sylvie Beaudoin of Polycor proved instrumental in keeping the stone production and fabrication on track. "Everything went really well and on schedule,” said Beaudoin. “I became involved after the mock-up year phase. The general contractor started saying, ‘They want you there every third Tuesday.’ Communication and reassurance was important. Every month, I’d go to the jobsite in Minnesota to reassure everyone they would have stone. I’d let them know how many were coming, and then they would discuss the next phase. It kept communication going.

“In the beginning, it was intimidating,” Beaudoin continued. “No one knew each other well. All the teams were waiting for me. They wanted to know when the stone was coming. I’d go up there and tell them how it was. I didn’t just tell them what
they wanted to hear. The truth pays. My role was to make sure all the fabricators were doing their part. I would push my fabricators. There was constant follow-up. You have to be on top of it. You can’t let anything slide and don’t assume anything. Incredible teamwork is required and good communication creates successful projects.”

After the restoration was complete and Beaudoin had time to reflect on her role, she realized the importance of it. “At the time, it was nothing to me,” she said. “It was my job to make sure we were there when we needed to be. When I sit back and look at it now though, it was a big deal. At one point, we had four to five fabricators on one phase. I knew who were the faster ones and would give them a little more. I had to go with people who would deliver.”

The restoration was an elaborate process involving a dedicated team of professionals. The project endured for four years, requiring extensive scaffolding and protection from the Midwest’s harsh winter elements at times.

Photo courtesy of Polycor
THE EXISTING CONDITION

Before the actual restoration began, the stonework needed to be assessed — a process that continued throughout all five phases, according to Lackovic. "Initially, exterior work was not included in the scope of the capitol restoration project," explained the architect. "Several focused asset preservation projects were subsequently initiated to address water infiltration. One of these projects, focused on mitigating water infiltration at the dome, required extensive scaffolding. This gave investigators the opportunity to inspect architectural features at close range. Preliminary observations confirmed that some of the more sculptural elements, such as column capital features and window hood bracket scrolls, were consistently unstable. Because these features were located over areas accessible to the visiting public, a
recommendation was made to provide overhead protection until a more comprehensive survey could be undertaken.

“HGA was immediately commissioned to perform hands-on surface evaluation of stone using swing stages and mechanical lifts,” Lackovic went on to say. “Unstable fragments were also either removed or stabilized. This was the first opportunity to examine upper-story features of the main building wings. A large number of fragments, including several elements of significant size — 10 to 15 pounds — were found to be easily removed with light tapping. Emergency stabilization was also required to prevent displacement of a 150-pound pilaster veneer panel located directly above the accessible drive lane. The results of this survey led to the recommendation that a comprehensive exterior facade survey be performed as soon as possible.”

Wiss, Janney, Elstner Associates, Inc., based in Northbrook, IL, performed this survey, sounding nearly every piece of stone on the building. “Information generated from this provided the foundation for early work-scope projections,” said Lackovic. “As part of the planning process, extensive full-scale mock-up trials were designed to test the various repair strategies under consideration. In order to ensure that repair strategies were critically reviewed across a wide spectrum of influences, trials were performed in three locations. This allowed us to review results at various times of the day, in different ambient conditions. It also allowed investigators to evaluate whether exposure to differential climate factors influenced the natural weathering process. The trials provided an invaluable opportunity to explore options, demonstrate installation procedures, test process, inform schedule, generate unit accurate prices based on actual time and materials, and judge overall aesthetic impact ahead of time.”

The architect went on to explain that the project was phased based on the number of repairs that could be executed within a given time frame with a set amount of scaffolding available. “Evaluation was an ongoing commitment,” she said. “Every decision was tested and revisited, adjusted and reconsidered at every phase, and from phase to phase. Frequent changes required flexibility on everyone’s part.”

While a significant number of stone pieces needed to be replaced on the exterior facade of the Minnesota State Capitol Building, the objective of the restoration was to preserve as much of the original stonework as possible. “Stone that was good enough to keep received minor repairs — cracks were filled, minor chips were occasionally patched and rough granulated surfaces were smoothed to facilitate water runoff,” explained Lackovic. The color-matched epoxy for the bonding and anchoring during the Dutchman installation, as well as any re-attaching of broken marble, was supplied by Bonstone Materials Corporation in Mukwonago, WI. The products included Bonstone® Clear Gel Epoxy and Last Patch™ Dymond. “We also provided a color-matched UV-stable — non-yellowing — patching system for the Dutchman joints and for chipped corners when needed,” stated Paul Klees of Bonstone.

**THE QUARRYING AND FABRICATION PROCESSES**

Once the first phase launched in 2013, Lackovic and her team worked closely with Polycor to select blocks for the project that matched the desired physical properties. “Blocks were hand selected, ranked and set aside for specific features,”
said the architect. “Existing stone is highly variegated in color, and veining patterns have random orientation, for the most part. We did not have the luxury to match color and veining for every piece of stone due to cost and schedule implications. The compromise was to select blocks with midrange color and tone as a standard and then fleury-cut the blocks to help blend new work with existing. Where veining pattern was more intentional, we photographed the piece and requested that Dutchman be cut to match where possible.”

Beaudoin made it her mission to keep everything moving efficiently. “I went to the quarry and selected blocks and had them cut,” she said. “I inspected every slab and gave the fabricators their deadlines.”

Although Polycor chose to control the fabrication, the responsibility of vetting the companies ultimately rested on Twin City Tile and Marble Company, according to Joe Becker, vice president of the company’s stone division. “Relationships were strengthened and expectations realized during the many visits to the fabricator facilities,” he stated.

According to Becker, individual stones selected by the architect were measured and hand drawn while on the scaffold or swing stage, and TCTM’s field engineer coordinated the onsite creation of digital shop tickets and full-size templates. “After roughly 200 tickets were created, they were sent for approval,” explained Becker. “Approval of the shop tickets resulted in the start of fabrication. This sequence of processing shop tickets was repeated until the phase was complete. Measuring took place through each season of Minnesota. There was not a stoppage during the winter months. A constant challenge our team faced was to make no assumptions in measuring, as there was no consistency of sizes in the same elements.”

Becker stressed the importance of this process. “I think the vital and crucial success of this project was the shop tickets,” he said. “It doesn’t sound that interesting, but they resulted in less than a 1 percent error rate. It was the heartbeat of the whole job. We were all working off the same thing. After the fabricators were through with the shop tickets, they went to Mark 1. Because of the pace of the deadline, Mark 1 had to do demo before the stone arrived so they relied on the shop tickets. To me, they are one of my biggest accomplishments.”

Monica Gawet, president of Tennessee Marble Co., expressed pride in being a part of the restoration project. “Tennessee Marble has been a fabricating partner with Georgia Marble since 2000,” she said. “As a domestic and historic company that does restoration/renovation and historic material, we enjoy collaborating with other domestic partners. We were also excited because JE Dunn is a wonderful contracting company and they chose TCTM. We have known Joe Becker for the past 10 to 12 years. I even knew Sylvie at Polycor. We had done a Georgia White job together. She’s a shining star — very committed and organized.”

“This was certainly unique,” she went on to say. “It was not just fabrication. It was carving and shaping. It was extremely high profile. We were very uniquely qualified to do this. We used a Gmm Litox CNC machine, which can accommodate large pieces. This was certainly critical for anyone doing this type of work. Hand carving would be great, but it’s way too slow.”

In total, Tennessee Marble Co. cut over 500 of the nearly 4,000 custom stone pieces. “Georgia Marble would send us raw material in different thicknesses...”
— nothing was cut to size,” explained Gawet. “There was a tremendous flow. Sylvie would get a batch of tickets of what was needed and Ryan Cole, our production manager, would review the tickets and tell Sylvie, for example, ‘We need X amount of raw material or this size slab.’

Sometimes, we would have to recut thicknesses. They were all over. Part of the challenge was to be good stewards of the raw material. We would utilize material based on the batch she gave us.”

According to Gawet, the turnaround time was fairly quick. “Maybe six weeks,” she said. “The challenge would be that you would get two pieces very similar in shape, but in some cases, there was a difference of 1/4 inch in size or shape. We would program the CNC for minor variations and then finish it by hand. Sometimes, we were programming for just a couple of pieces. Each piece was incredibly custom.”

Cutting Edge Stone was also working diligently to complete their assigned tickets. Over the course of the four-year fabrication span, Polycor supplied the
fabricator with more than 130 full-sized slabs ranging in size from 4 inches in thickness up to 16 inches.

By August 2016, Cutting Edge Stone had supplied 1,125 pieces of stone to the project, with each piece different from the next. Sometimes two or more profiles were necessary on an individual piece of stone. “Our state-of-the-art lineup of 14 multi-axis CNC cutting and milling machines, including six profiling saws from Gmm, three from Omag and one from Prussiani, allowed for efficient and detailed machining of each piece,” stated the company.

Beaudoin would schedule a shipment of completed pieces every two weeks. “I had all the pieces in our system and would dispatch them,” she said. “I would call the fabricators and ask how many they have ready. I would create one shipment to give Twin City, who was my customer.”

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REPLICATING THE STONE CARVINGS

Decorative stones, such as capitals, scrolls, swags and floral patterns, were carved to match the original stonework on the building. During the restoration project, TCTM had master carvers onsite...
to produce full-sized models when two or more matching elements were required. “Replicating a single model, a pilaster capital for example, hand carved by various craftsmen 110 years ago and each pilaster capital slightly differing, proved to be challenging for the entire team,” stated Becker. “Communication between the architects and master carvers was critical, as elements from various building profiles were copied in the models. After models were approved, they were air-freighted to either Italy or Canada to be used by their fabricators.”

According to Becker, 3D scanning and digitizing was used to expedite a new element that could not afford the lead time of a carved model. “While the idea of bringing the 21st century technology of digital template was worth a try, the end result was a mixed lot,” explained Becker. “The scanned model only reflected one element, whereas our carved models reflected the ‘spirit’ of many elements. Also, the scanned model reproduced deteriorated elements and our master carvers had to rework the scanned models to look like a new element.”

Lackovic explained that the carved pieces arrived at the jobsite for the most part finished to the project standard. “We would send models to Italy and Canada and say, ‘Make it look like this,’” she said. “The pieces would get onsite and they mostly worked, but sometimes they were different. When bringing (a carved piece) up to be installed, there still was the process to make it work. Many times they could get it in the demolition opening, but it didn’t fit. They had to be carved in the field to blend and match. TCTM had four carvers onsite, and then Mark 1 had a few that qualified, that were doing a lot more than just blending. Some were actually creating pieces from scratch — without a CNC machine. The carvers

“Stone that was good enough to keep received minor repairs — cracks were filled, minor chips were occasionally patched and rough granulated surfaces were smoothed to facilitate water runoff,” explained architect Ginny Lackovic of HGA Architects and Engineers. Photo courtesy of Twin City Tile & Marble

The color-matched epoxy for the bonding and anchoring during the Dutchman installation, as well as any re-attaching of broken marble, was supplied by Bonstone Materials Corporation in Mukwonago, WI. Photo courtesy of Bonstone Materials
onsite were absolutely heroic. It was very impressive.”

The architect went on to say that if there was a unique “one-off” piece, time was taken to model it. “It didn’t make sense to send it offsite,” said Lackovic. “We would carve it onsite. Because of schedule though, we had to make sure not to have too many ‘one-off’ pieces. There were only so many people who had skills to do this, and they could only work for so long. They could only do so many pieces a month. It had to be well choreographed.”

Master Stone Carver Margaret “Mimi” Moore of Montana, who has experience working on detailed projects such as the Minnesota State Capitol restoration, was also impressed by the united team effort and efficient process. “I have had the privilege of carving stone for almost 10% of the U.S. capitols,” she stated. “TCTM’s attention to detail was so great. They had an almost null error rate.”

SHARING THE FEELING OF SUCCESS

After years of dedication and hard work, the expansive team involved in the stone restoration of the Minnesota State Capitol Building completed its enormous task in October 2016 — a month ahead of schedule. “No one really knew if the best would be good enough,” said Lackovic. “We were so fortunate to have so many people that are still able to perfect this craft and produce this high-quality work. We ended up with the dream team.”

It is obvious all those involved share the architect’s feeling. In fact, at the time Building Stone Magazine spoke with Lackovic, she mentioned how the team had plans to meet to review the project one more time. “It is unique in a number of ways — just the scale of it,” she said. “We’re trying to figure out a way to quantify it. How do we determine it is the largest restoration?

“It’s also another good way for us to get together and talk one more time,” Lackovic went on to explain. “We’re serious about documenting it — what we did right, what we did wrong and what we could have done differently.”

The group’s meeting will also provide an opportunity for them to congratulate each other not only on a job well done, but for the project winning the Award of Excellence in the “Renovation/Restoration” category, as well as the Grand Pinnacle sponsored by Marmomacc, in the Pinnacle Award competition, which is held annually by the Marble Institute of America+Building Stone Institute (MIA+BSI). The architect firm of Wiss, Janney, Elstner Associates, Inc., as well as six of the companies involved with the project — Bonstone Materials Corp., Cutting Edge Stone, Inc., Italmarble Pocai, Polycor, Tennessee Marble Co. and Twin City Tile and Marble — are association members.

The Minnesota State Capitol Building Restoration
St. Paul, MN
Executive Architect: HGA Architects and Engineers
Restoration Architects and Engineers: Wiss, Janney, Elstner Associates, Inc., Northbrook, IL
General Contractor: JE Dunn Construction
Stone Procurement/Facilitator: Twin City Tile and Marble Company, Eagan, MN
Stone Supplier: Polycor, Inc., Quebec City, Quebec (Georgia White marble)
Stone Installer/Stone Carver: Mark 1 Restoration
Stone Fabricators: Cutting Edge Stone, Inc., Alpharetta, GA; Italmarble Pocai, Massa, Italy; Traditional Cut Stone, Ontario, Canada; Art Cubus International, Quebec, Canada; Tennessee Marble Company, Friendsville, TN
Installation/Restoration Product Manufacturer: Bonstone Materials Corp., Mukwonago, WI (Bonstone® Clear Gel Epoxy, Last Patch™ Dymond and a color-matched UV-stable, non-yellowing, patching system)