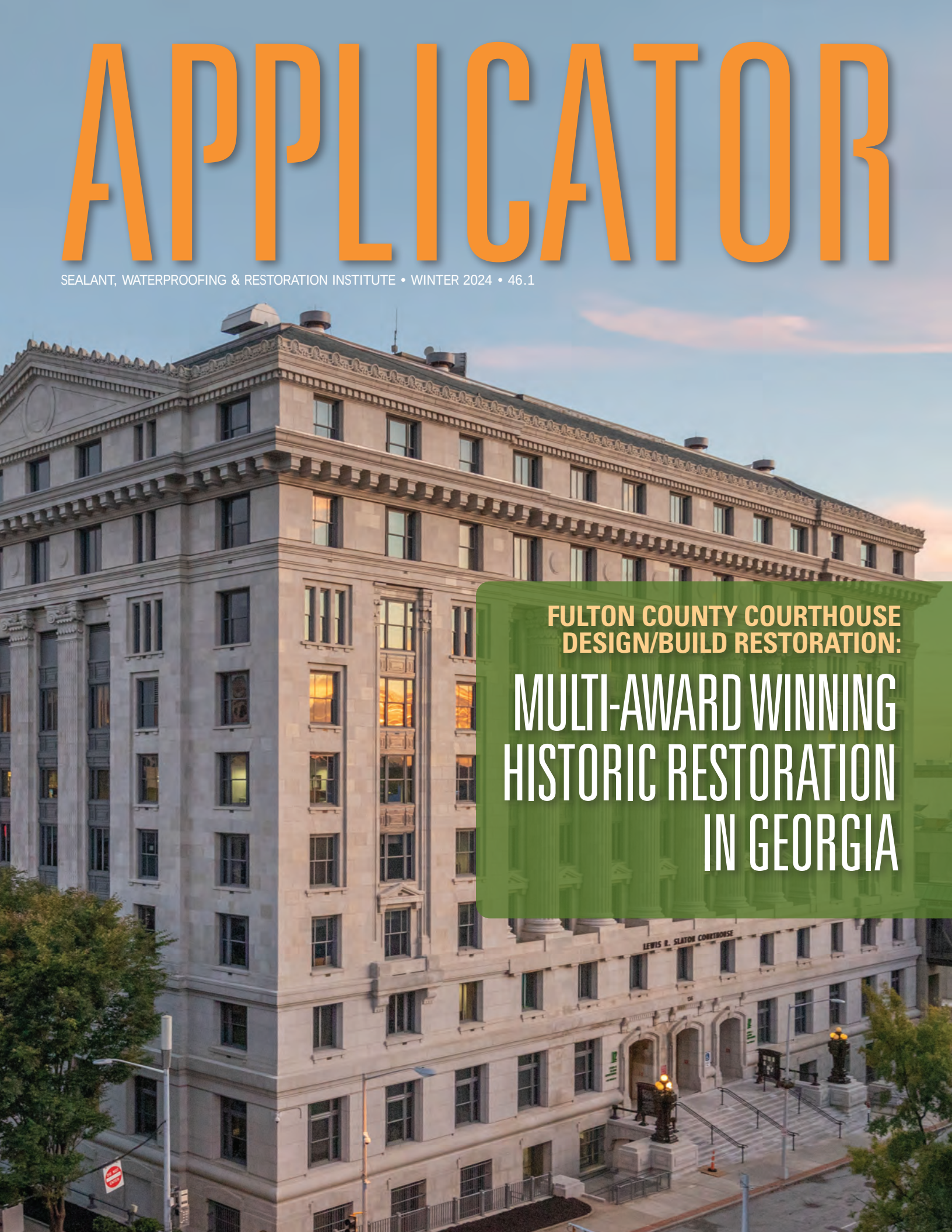
APPLICATOR

SEALANT, WATERPROOFING & RESTORATION INSTITUTE • WINTER 2024 • 46.1



FULTON COUNTY COURTHOUSE DESIGN/BUILD RESTORATION:

MULTI-AWARD WINNING HISTORIC RESTORATION IN GEORGIA

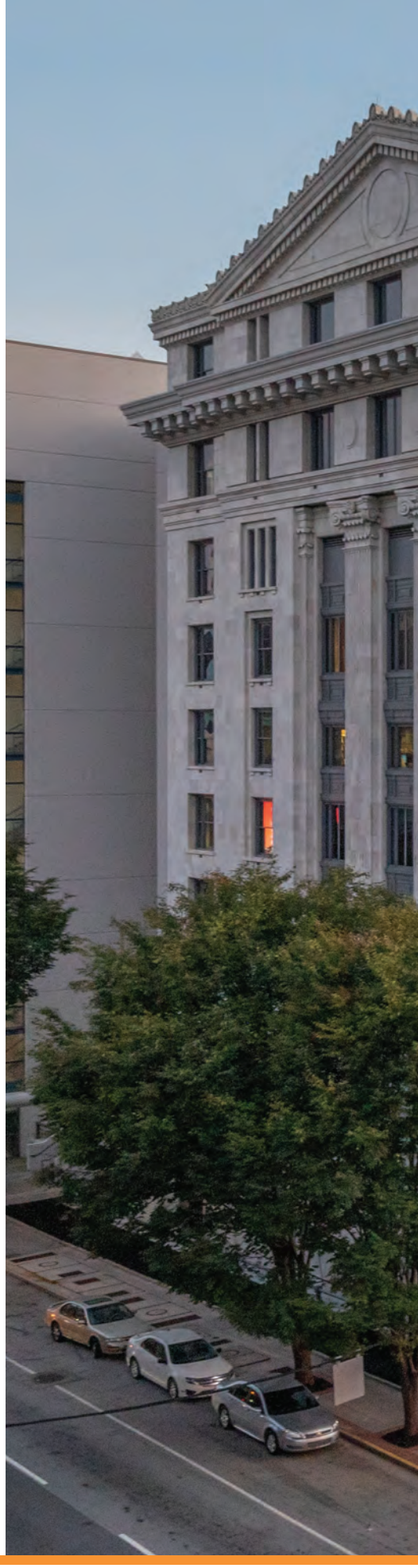
FULTON COUNTY COURTHOUSE DESIGN/BUILD RESTORATION:

MULTI-AWARD WINNING, HISTORIC RESTORATION IN GEORGIA

BY BRETT LAUREYS, WISS JANNEY ELSTNER, ASSOCIATES, INC. AND JOHN KROUSE, BOSTON VALLEY TERRA COTTA

The Fulton County Courthouse (a.k.a. The Lewis R. Slaton Courthouse) in Atlanta, Georgia, has a rich history dating back to its construction in 1914. Designed by the architectural firm A. Ten Eyck Brown and Morgan & Dillon, the courthouse reflects a neoclassical/beaux arts design that includes imposing columns and intricate detailing. The original courthouse cost $1.25 million to construct. Over the years, the courthouse has been witness to pivotal moments in Atlanta's history.

During the civil rights movement, the courthouse played a significant role as a venue for trials related to desegregation efforts and civil rights activism. Notably, it hosted the trial of Martin Luther King Jr.'s assassin, James Earl Ray, in 1969. The courthouse became a symbol of the struggle for racial equality, witnessing legal battles that shaped the trajectory of civil rights in the United States.



The Fulton County Courthouse in Atlanta, Georgia.

The courthouse is 10 stories in height and includes symmetrical façades of granite stone and terra cotta masonry. The original steel framed windows were replaced in the 1990s and the original ornamental cast iron spandrels remain between the windows. The main entrance to the courthouse is emphasized with monumental granite stairs and ornamental bronze railings, lamps, and doors. The sloped roof at the top of the courthouse is covered with membrane roofing, since the original slate shingles were removed in the 1960s. Throughout its existence, the Fulton County Courthouse has undergone several interior and exterior renovations all of which have attempted to preserve its historical significance. The building was added to the National Register of Historic Places in 1980 and continues to serve as the main civil courthouse for Fulton County.

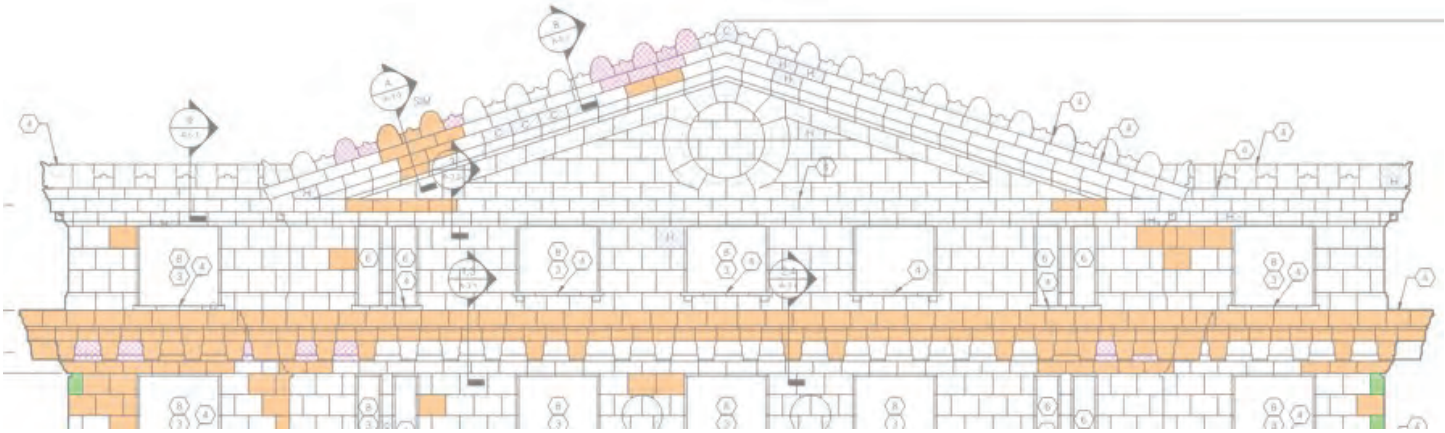
Ornamental bronze railings, lamps, and doors reflect the courthouse's neoclassical/ beaux arts design.

"The courthouse became a symbol of the struggle for racial equality, witnessing legal battles that shaped the trajectory of civil rights in the United States."

In 2016, Fulton County commissioned an engineering firm to review the overall condition of the exterior façade of the courthouse after cracked and displaced terra cotta façade elements were observed at the 9th floor cornice. The findings of this initial study revealed that there were several hazardous conditions on the exterior façade of the building that were in danger of falling and, in 2017, Fulton County installed emergency overhead protection above the sidewalks and entrances to protect the public. Based on the extent of deterioration, cost of access to fully evaluate the exterior of the building, and the preference for permanently addressing the hazardous conditions in a timely manner, Fulton County and their program manager, CBRE | HEERY, decided to solicit the project to specialty design-build teams that could provide a turnkey long-term solution.

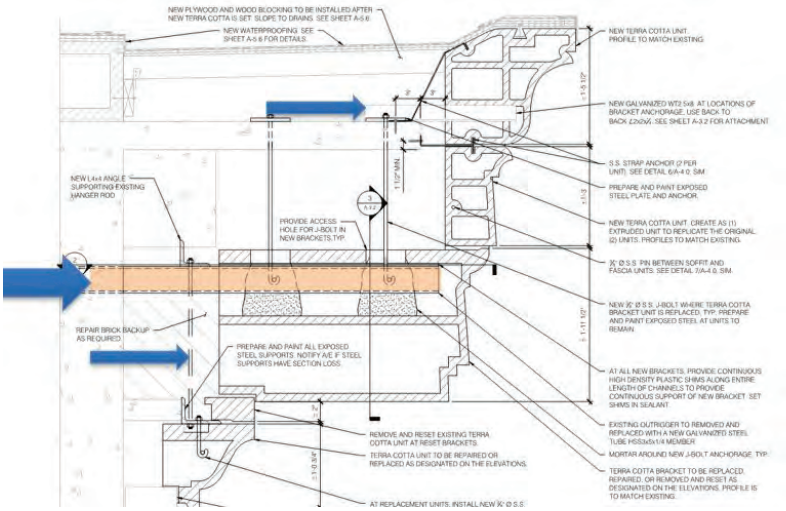
The design-build approach is not common for exterior restorations; however, it can be advantageous as it can be more efficient, especially for a project with long-lead time items like terra cotta. For this project, Fulton County's procurement department issued a request for proposal (RFP) based on a preliminary restoration scope of work developed after the initial engineering study. The goal for the project was to restore the exterior building envelope while preserving the original aesthetics of the landmark structure while adhering to the Secretary of the Interior's Standards. The primary scope of restoration in the RFP included full removal of the terra cotta cladding at and above the 9th floor cornice and re-cladding with alternate materials. Other scope of work items included roof replacement and cleaning and repair to all terra cotta and granite. Overall, the scope of work was conservative on the extent of terra cotta repair and replacement.

Close-up of the damaged 9th floor cornice.



WJE identified the terra cotta units that required repair or replacement during the initial close-up assessment and logged them electronically in PlanGrid®.

Based on previous large-scale restoration projects and relationships through the SWR Institute, Mark 1 Restoration (Mark 1), Wiss, Janney, Elstner, Associates, Inc. (WJE), and Boston Valley Terra Cotta (BVTC) teamed to pursue this design-build restoration project. During the bidding process, the team determined that the scope of work outlined in the RFP was not very sympathetic to the historic materials on the building and there was significant cost associated with replacement of large portions of the façade with panelized alternate materials. With this in mind, the team chose to make a strategic investment in the project during the bidding phase by performing a drone survey of the façade and developing an alternative repair plan that would include replacement of damaged portions of the façade with in-kind terra cotta units and reducing the portion of the façade that would be removed and rebuilt. The team also developed a more detailed and comprehensive plan for replacement of the slate and low-slope roofing on the building. Overall, this revised restoration approach was more sympathetic to the original construction by using in-kind materials for replacement and this approach was more cost effective allowing the Mark 1-led team to become the low bidder on this public bid project.



Cornice assembly.

After a lengthy bidding/contract period, Fulton County awarded the project to Mark 1 Restoration on June 11, 2019, with a maximum 30-month project duration. In July 2019, the site was mobilized and the close-up assessment and restoration work began. For this design-build arrangement, Fulton County agreed to allow some of the construction activities to begin prior to WJE finalizing the full restoration design in order to save significant time in the schedule. Due to the longer lead times for replacement terra cotta units, it was critical for WJE to identify the replacement terra cotta units as soon as possible and BVTC could begin the color matching process, sample removal, and development of shop drawings for fabrication. WJE identified the terra cotta units that required repair or replacement during our initial close-up assessment in July and August 2019 and logged them electronically in PlanGrid® with a repair or replacement designation to be used by Mark 1 and BVTC. Within days of WJE's survey, BVTC performed their survey/documentation of the terra cotta units requiring replacement and identified units to be removed as samples. Starting this fabrication time during the design phase of the project was key in saving nearly five months off the original schedule.

Soon after sample removal, BVTC began the color matching process. The original glaze on the courthouse had a Granitex finish, which mimicked the granite on the lower three floors of the building. This finish was difficult to match primarily due to the dense manganese speck that was added into the historic terra cotta clay body. When the manganese speck in the clay was near the surface of the terra cotta block, the manganese melted into the Granitex glaze. This small diameter speck added to the already complex base coat. The base coat involved a grey and off-white splatter on top of the manganese speck which gave the appearance of granite.

BVTC opted to match the historic Granitex glaze by adding the manganese speck into the glaze as opposed to adding it to the clay body itself. This ultimately was a cost savings in raw material, and it achieved the same overall visual results. Reproducing the surface texture on the terra cotta units was

also tricky as it required a random rake that was added by hand to every individual piece of terra cotta. BVTC sculpted the texture in clay and cast that texture into custom rollers and rubber sheets, cut up into hand rake tools.

The goal for the color approval process was to prepare an initial 6 inch by 6 inch by 1/2 inch tile glazed and textured within the middle range of the three historic range samples that were identified by WJE. This tile had to express the midpoint for the texture and for the color of the Granitex glaze with added manganese speck. After this, 12 inch by 12 inch by 3/4 inch range samples were developed. The larger range samples were produced by applying the Granitex glaze with a combination of using three different types of spray guns. This allowed for the varied density of the off-white splatter coat and the final dot application of the manganese speck. This process was quite involved and required approximately four months from the time BVTC received the three historic range samples, to final approval of the range samples.

A final but important step, BVTC agreed to do a small run of approximately 12 full size samples to illustrate the approved range tiles including glaze and texture on various profiled terra cotta units. This proved helpful to all the team members as an added visual since the Granitex finish varied in appearance with the different profiles and finish of pieces. Any unit that fell outside the approved color range, too light or too dark, was rejected and these were used as a benchmark for all quality assurance/quality control for the glaze and texture application.

By the fall of 2019, Mark 1 had erected fixed scaffolding around the entire building to allow for full close-up access of the façade and provide a "hard deck" to safely access the sloped roof at the top of the building. WJE worked closely

Fixed scaffolding was erected around the entire building to allow for full access to the facade and provide a "hard deck" to safely access the sloped roof.

with Mark 1 and Midland Engineering (Midland), roofing sub-contractor, to create openings and coordinate repair details for the final design of the exterior façade and roof restoration. Per the contract, the design-build team was to provide design submittals to Fulton County at 50 percent, 95 percent, and 100 percent design. These submittals included drawings, specifications, and cost estimates. Overall, it was important that our final design was in line with the project budget and our competitive bid submittal. If the design varied from the budget, value engineering and/or re-design was required by the project team.

Since this project began with an active courthouse, all of the façade mobilization and restoration work was to be completed during the evening/night hours. Even though the work was primarily being completed at night, Mark 1 developed a detailed phasing plan for the staging of the site with materials, the facade restoration work, and the roofing work in order to keep Fulton County and the program manager fully aware of the ongoing work. Updating the County Sheriff and other on-site security was critical to the safety of the craftworkers and also the pedestrian traffic in and around the building. This phasing plan was also important for internal coordination, especially for the safety of the multiple trades on site. For example, the top of the fixed scaffolding was the fall protection for the roof team and understanding the sequence of work for each sub-contractor was critical in providing appropriate safety platforms in the sequenced work area. All material hoisting was to be done on the exterior of the building. No interior elevators or hoists could be used during the work.

The design phase for the project was from October 2019 through April 2020. During this time, Mark 1 cleaned the entire building, began repointing the terra cotta and granite, and began demolition of the 9th floor cornice. During the first six months of construction, Mark 1 realized some of the logistical challenges for the project. These included extremely limited storage on site, the site was one of the most heavily trafficked pedestrian areas in Atlanta, and safety/security concerns with the city life around the building at night. Then in March 2020, the pandemic hit and caused many things to change. The courthouse was now empty, the safety conditions/requirements on site completely changed, and

Due to decades of gutter leakage and water infiltration into the 9th floor cornice assembly, the original mild steel structure and anchorage were severely corroded causing cracking and displacement of the terra cotta cornice assembly.

the supply chain for building materials completely changed.

As the team worked through the challenges of the pandemic, the design was finalized, budgets were agreed to, and full-scale restoration was fully underway. The general scope of repairs included the following:

- Terra cotta replacement (2,050 units)
- Isolated granite and terra cotta repairs (1,000 units)
- 100 percent repointing and restoration cleaning of the terra cotta and granite
- Resealing of the perimeter of windows, doors, and penetrations
- Restoration of the granite entrance stairs
- Restoration of the cast iron spandrels and bronze ornamentation around the entrances
- Installation of new low-sloped roofing and gutters
- Installation of a new slate roofing system (13,700 sq. ft.) to match the original
- Installation of a fall restraint system

To save time and money, two of the terra cotta courses were extruded as one course with a false joint to replicate the appearance of the original cornice.

Mark 1 developed a unique lifting mechanism, created from a car motor hoist, to allow the 600 pound brackets to be mechanically lifted and rolled into place beneath the cantilevered concrete structure.

In addition to the general repairs, the most critical component of the building that required repair was the 9th floor cornice. The cornice was over 600 feet long and consisted of three courses of terra cotta set above large, 26 inch wide by 24 inch tall by 40 inch deep, terra cotta bracket units. The cornice was supported from a cantilevered concrete structure and the terra cotta was supported with mild steel double channels, hangers, and lateral anchors. Above and behind the cornice was an original copper sheet metal gutter system. Due to decades of leakage and subsequent water infiltration into the cornice assembly, the original mild steel structure and anchorage in the cornice was severely corroded and was causing severe cracking and displacement of the terra cotta cornice assembly. This unsafe condition required complete removal and replacement of the cornice and repair/replacement of the underlying concrete and steel structural elements.

Due to the cost and schedule implications of 100 percent replacement of the cornice, team collaboration was critical during the design, fabrication, and installation of this new cornice assembly. During the initial design, the team developed ideas on how to disassemble the cornice assembly while preserving several of the large bracket units since not all were in need of replacement. The team also developed re-anchorage details that allowed for several of the large bracket units to remain in place during the restoration of the cornice above. During terra cotta design and fabrication, the team modified the original cornice configuration to allow for extrusion of all the typical terra cotta cornice replacement units and to save significant cost.

"The solution for addressing the re-occurring manganese staining was to replace the most severely damaged/stained terra cotta units, re-clean the areas where the more minor staining re-appeared and thoroughly rinse the wall after cleaning, and apply a clear acrylic coating over the surface of the terra cotta units in high exposure areas."

Prior to cleaning, it was determined that there was manganese staining on the surface of the original terra cotta units. Past repair attempts included covering this staining with an acrylic paint coating, which had been unsuccessful.

At the start of the restoration process, several cleaning trials were performed.

The 9th floor cornice gleams magnificently, restored and ready to meet the next 100 years head on.

The other significant project challenge was the staining on the surface of the original terra cotta units. Prior to restoration cleaning, it was determined that there was manganese staining on the surface of the original terra cotta units. This is a brown colored stain that was bleeding through the glaze and the magnitude of the staining varied significantly around the building. From laboratory testing on the original terra cotta units, there was manganese present in the clay body of the terra cotta and also within the terra cotta glaze. Past repair attempts on the building included covering this staining with an acrylic paint coating, which had been unsuccessful.

At the start of the restoration, several cleaning trials were performed, and large-scale mockups were completed with two chemical cleaning products. After the large- scale mockups, a limestone and concrete cleaner with less than 10 percent oxalic acid was found to be the most effective at removing the manganese staining. During cleaning trials, we did note that the glazed surface of the original terra cotta had been aggressively cleaned at some time in the past and the glazed surface of the terra cotta was damaged, allowing moisture to penetrate the terra cotta units more easily. The cleaning of the entire façade was performed prior to any of the restoration work.

Between six and nine months after the initial cleaning, small amounts of brown staining began to re-appear during the humid spring and summer months. WJE performed further laboratory studies on cleaned and un-cleaned samples of the original terra cotta due to the re-appearance of the staining. These studies determined that there was a significant amount of manganese in the clay terra cotta units, the glazed surface of the terra cotta was very thin in some locations, and several holes were observed in the glaze. It was determined that the brown staining was re-occurring on the terra cotta units with more significant glaze deterioration and terra cotta units that were highly exposed to moisture/water penetration. Though the wall was pre-wet prior to the initial cleaning, the team determined that some of the oxalic acid within the cleaner likely penetrated the porous surface of the terra cotta units, dried, and then re-mobilized the manganese within the clay body of the terra cotta when moisture was present. The moisture containing manganese then dries on the surface of the terra cotta, causing the brown staining.

In the end, this condition has been occurring over decades of time and is more severe where the terra cotta glaze is most damaged from past aggressive cleaning techniques and locations of high- water exposure (i.e. ledges, below

The $20M project was completed five months ahead of schedule, and on budget.

leaking drains or gutters, etc.). The chemical cleaner used on this project very effectively removes the staining; however, the stain was found to return, though less severe if properly rinsed. The solution for addressing the re-occurring manganese staining was to replace the most severely damaged/stained terra cotta units, re-clean the areas where the more minor staining re-appeared and thoroughly rinse the wall after cleaning, and apply a clear acrylic coating over the surface of the terra cotta units in high exposure areas. The team also developed a protocol for Fulton County to clean/treat areas in the future where the brown staining re-occurs. This was determined to be the most practical and cost-effective solution moving forward.

The restoration of the façade and replacement of the roof on the Fulton County Courthouse was completed on August 15, 2021. The $20M project was completed in 25 months, five months ahead of schedule, and on budget. The design-build project delivery was very successful in reducing the overall project schedule and ultimately the project cost. It did require a very collaborative project team to adjust for unforeseen conditions and project challenges. The restoration of the Fulton County Courthouse has won the 2022 Atlanta Urban Design Commission Award of Excellence in Restoration and the 2022 SWR Institute Trinity Award in the Restoration Category.

About the Authors

Brett Laureys, PE is a Principal and Director with WJE. Brett has been with WJE for the past 29 years and specializes in the restoration of monumental historic masonry buildings and structures all over the United States. His passion includes research and development of new terra cotta, materials and assemblies, in restoration. In 2022 and 2023, Brett led a research team, coordinated through WJE's in-house research program and the Architectural Ceramics Assemblies Workshop, that developed a lightweight terra cotta rainscreen system that can be used in historic restoration.

John Krouse is President at Boston Valley Terra Cotta. For over 30 years, Boston Valley has developed and manufactured cutting edge ceramic products for their customers. Their product offerings range from all types of historic restoration to our trademarked TerraClad rainscreen products for both external and internal applications. In 2016, John created the Architectural Ceramics Assemblies Workshop with the University of Buffalo and Carnegie Mellon University to raise awareness and test the limits of using ceramics for architectural cladding.