

Masonry Category

Kansas City Municipal Auditorium Exterior Restoration

Kansas City, MO

Submitted by Walter P Moore

Designed in 1933 and occupying an entire city block, the Kansas City Municipal Auditorium has been repeatedly recognized for its national architectural value. Designed by Gentry, Voskamp & Neville, along with Hoit, Price & Barnes, the Municipal Auditorium was constructed as part of a larger art-deco-inspired reimagining of the Kansas City downtown core, which includes nearly a dozen contemporaneous limestone-clad buildings—all within a few blocks' radius.

The Municipal Auditorium itself was designed in a transitional art deco/modern style and clad with Indiana limestone over a steel and concrete structural frame. Relief sculptures on all four façades celebrate the fine arts, local industry, and athletics. Since its opening in 1936, the Municipal Auditorium has been in continuous use for its original purposes as a sports arena, performance space, and special events venue, with minimal interventions and upgrades needed to maintain the building's functionality. The facility is owned by the city government and operated by the city's Convention Center Department.

Over the past 75 years, only minor repairs had been performed on the exterior. In 2010, the owner issued a design-build request for qualifications seeking a project team to perform a comprehensive restoration of the limestone façades, along with

waterproofing repairs and upgrades to the exterior lighting and signage.

PROJECT APPROACH AND TEAM

Led by a design-build general contractor, the multi-disciplinary team included a consulting firm specializing in façade engineering, restoration, and materials conservation; a masonry restoration and waterproofing contractor; an architect experienced in historic preservation; and an architectural lighting consultant. While the traditional design-bid-build process generally allows adequate time for assessment, repair design, and coordination among the team members, the nature of this design-build project required a team able to meet the technical challenges of a historic restoration project while still having the flexibility needed to maintain a fast-track schedule.

Refinement of the project scope and schedule were critical at the earliest stages of the project to ensure that owner deadlines and strict budgets could be met. The team performed a series of preliminary visual assessments, resolved staging issues and scheduling for the project execution, reviewed record documents, sourced and priced replacement materials, mocked up cleaning products in place, and prepared a comprehensive matrix



Test area for approved cleaning product



Dispersed hydrated lime being injected into crack

of potential risks involving working with historic masonry and unforeseen conditions concealed within the façades.

CONSULTANT AND CONTRACTOR, HAND IN HAND

When the suspended scaffolding was rigged, this was the first opportunity for both the contractor and the engineer to see the condition of the masonry close up. Because the façade consultant was providing an overall quality assurance review of the completed masonry restoration work, a process was developed so the masonry contractor could maintain steady work progression and still provide the design team with the ability to assess the façade area, provide repair designs based on conditions observed, and review completed work.

Depending on the size of the scaffold drop and the complexity of the repairs, three reviews were typically performed at each drop:

- Preconstruction survey—The façade consultant and masonry restoration contractor performed a detailed masonry assessment and developed repair solutions;
- Progress review—The façade consultant observed the work in progress and worked with the masonry contractor through unforeseen conditions; and
- Punch list review—The façade consultant reviewed completed work, identified items for replacement or correction, and quantified specific repair tasks.

With as many as four suspended scaffolds active at any one time, this three-part quality assurance process proved both successful and necessary to track completed work quantities and develop a workable punch list process.

MASONRY RESTORATION

The order in which to perform the masonry restoration work was just as important as the actual repair items to be accomplished. The design-build team met on several occasions during development of the proposal to discuss the quality, cost, and schedule implications related to the order of work. It was eventually agreed that the tentative order of restoration work would be as follows: clean the limestone, repoint mortar joints and replace sealant joints, then perform masonry and other repairs.

While not necessary for structural or waterproofing purposes, cleaning the façade was a high priority for the owner because of the exposure of the exterior to decades of air-borne pollutants. Through a series of systematic mockups, a two-part architectural biocidal cleaner was selected for general cleaning of the limestone, with spot cleaning performed with a well-diluted acidic cleaner only as needed. Areas of limestone not perfectly cleaned by the biocidal treatment received only one additional application of spot cleaning. Preventing



Damage to medallion



Displacement of large parapet and coping units



Damage to ashlar unit

damage to the limestone surface from overly aggressive cleaning was important to both the design-build team and the client.

Addressing overhead hazards and deferred maintenance were the next-highest-priority scope items. At the north elevation, all three medallion sculptures were exhibiting signs of movement-related distress. Cracking and displacement of the curved perimeter stones were observed at all three medallions, with the central sculpture—likely representing theater—experiencing the most severely distressed conditions. To stabilize the sculptures in place, both dry-set helical anchors and adhesive anchors were used. After stabilization, voids within the cracked stones were injected under hand pressure with dispersed hydrated lime putty. The putty was carefully raked back where exposed and patched with a cementitious stone patching mortar to match the adjacent limestone.

Other overhead hazards were identified at the parapets, where the large scalloped parapet and coping units were exhibiting signs of stone anchor failure and possible corrosion-related displacement due to deterioration of the steel structural frame. A similar condition was also identified at one of the ashlar units, where a large piece of stone was removed by hand during the preconstruction survey. Because of the size of the units and the desire to perform minimal interventions into the historic fabric, the design team agreed to stabilize the units in place where reasonably possible with mechanical or adhesive anchors, as appropriate. Where steel was exposed, it was cleaned and a corrosion-resistant coating was applied. At the damaged ashlar unit, a limestone Dutchman repair was designed with blind anchors to blend with the adjacent units.

At the street-level entries along the east and west elevations, suspended limestone soffits were also exhibiting signs of distress, with cracking at the embedded anchor points. With only four anchors per soffit unit (with each unit weighing more than 1000 lb [454 kg]), the loss of even one anchorage prompted concerns about the stability of the units. When possible, soffit units were stabilized in place by anchoring back into the concrete structural frame above with expansion-type mechanical anchors. At one location where stabilizing the unit in place was not possible, a new soffit unit and structural support system were fabricated.

At numerous locations across the entire building, small areas of stone loss or spalls and cracks in the limestone units needed to be patched for both waterproofing and aesthetics. A cementitious stone patching compound—custom-tinted in five colors to match the various shades of limestone—was used to blend the repairs with the adjacent stone. Because the stone at the Municipal Auditorium is variegated Indiana limestone, the patch repairs were so well-masked that natural variations in the limestone were often mistaken for patch repairs.



Exterior view of completed restoration

EXTERIOR BEAUTIFICATION

Led by the preservation architect, the decorative aluminum grilles masking mechanical louvers were cleaned and clear-coated to inhibit further deterioration of the aluminum. At several locations where grilles were missing, new grilles were cast to match the historic originals. Doors were also replaced or repaired as needed, including the installation of new high-speed overhead doors to improve access to the building's loading docks. At the north and south elevations, the theater marquees were upgraded to a modern system. Additionally, the architectural lighting consultant redesigned the exterior lighting system, vastly improving the ability to highlight the important architectural and sculptural features of the building.

SUCCESSFUL TEAM

The masonry restoration work took nearly 1 year to complete and included dozens of locations where stone stabilization, detailed repairs to medallion sculptures, and hundreds of patch repairs were performed; the entire building was cleaned and repointed; sealant joint replacement was done around doors and windows; and lead coping tees were replaced. In addition, water infiltration into the basement was ended by replacing the plaza waterproofing system at the terrace along the east elevation.

The flexibility of the restoration team and the design-build process allowed the Municipal Auditorium to remain in full operation during construction with minimal-to-no impact to users. The success of this project demonstrates how the design-build process can be used for historic restoration. By having the design team and repair contractors work together, a complex project was completed on time and on budget. The exterior restoration was completed just in time for the Municipal Auditorium's 75th anniversary celebration.

Kansas City Municipal Auditorium

OWNER

City of Kansas City Convention/Entertainment
Kansas City, MO

PROJECT ENGINEER/DESIGNER

Walter P Moore
Kansas City, MO

REPAIR CONTRACTOR

The Konrath Group
Kansas City, MO

MATERIAL SUPPLIERS/MANUFACTURERS

Western Waterproofing (Masonry Contractor)
Kansas City, MO

Treanor Architects

Kansas City, MO