HISTORIC RESTORATION FOR NATIONAL ARCHIVES AND RECORDS ADMINISTRATION BUILDING

BY RICHARD R. MCGUIRE

The Adam's Express Company Building was originally constructed in the 1911 to 1912 period, being part of the overall Union Station railway facilities in Kansas City, MO. The building sits at the west end of the original rail yards and service buildings at 400 West Pershing Road, and was built along with another adjacent concrete structure to serve the freight and baggage needs of the Kansas City Terminal Railway Company. The famous Chicago architect Jarvis Hunt designed Union Station, which was restored and reopened some 10 years ago and is listed on the National Historic Register.

The building construction consists of a structural steel interior framing system, with load-bearing reinforced concrete walls. The two structural or elevated floors of the original building are supported by steel beams and girders with one-way slabs and embedded twisted-square reinforcing bars of the period. The building is approximately 64 ft (19.5 m) wide by 151 ft (46 m) long, and also has a large-height basement or "concourse" that is connected to the original Railway Express Administration (REA) building to the east, via a 20 ft (6.1 m) wide tunnel that connects the Union Station headhouse with all of the original buildings in the area. At the southwest corner of the basement is the original tunnel access to the Union Station Power House, which is now under development to become the future home of the Kansas City Ballet.

The building was principally vacant for a number of years, except for some storage and office use by Union Station on the first floor and basement and, as such, was not temperature controlled or maintained to any degree, leaving the aging structure to the ravages of corrosion and degradation. As the newly developed Internal Revenue Service (IRS) facility and relocation of the United States Postal Service (USPS) district offices project was being completed in 2007, some attention was given by the Union Station complex developer to provide the General Services Administration (GSA) a proposal to develop a new home for the National Archives and Records Administration (NARA) Central Plains Region headquarters.

Exterior view looking east at Adam's Express Company Building prior to construction

Exterior view of southeast corner of building illustrating concrete façade delaminations and cracks that were repaired

Under the supervision of the GSA, the owner's representative and developer prepared a long-term lease for the new NARA facility, which was to consist of the historic restoration of the Adam's Express Company Building, and the addition of a new warehouse facility for various artifacts storage and processing. A structural engineer was retained by the architect to prepare a structural condition study of the Adam's Express Company Building in August 2007, so as to review the available record drawings; conduct visual, photographic, and sounding surveys of the exterior façade and interior framed slabs of the building, perform forensics testing of the existing concrete for strength, prepare preliminary repair plans and details, and summarize recommendations with an estimate of probable construction repair costs. The condition study was completed in September 2007, and construction was set for early 2008.

PROJECT CONCRETE REPAIRS AND WATERPROOFING

Following completion of the aforementioned structural condition study, the preparation of the construction documents ensued by the design team in late 2007 and construction was started by the general contractor in February 2008. From the start of the selective demolition work both inside and outside of the existing structure, and with an eye towards the historic restoration of the Adam's Express Company Building ever-present, it became evident that a number of previously covered or inaccessible repair issues were being uncovered, that is, the always-challenging "discoveries" side of our practice.

The structural engineering team, working with the repair contractor, examined and confirmed locations, repair quantities, and progress during the selective demolition and building restoration phases; discussing the best approaches and repair materials as need be; and responding to changing weather and construction issues that included an aggressive schedule for the federal government.

Moderate-to-severe corrosion from moisture penetration at the deteriorated roof and its two clerestories, to broken windows and numerous exterior wall cracks and holes, to an actively leaking large and deep basement that is well below the static water level in the area, all took a toll on the original reinforced concrete and structural steel. There was even a nice tree and some weeds growing out of the building's roof—an unintended "green" roof. Proximity to the adjacent Union Station Power House structure, which was constructed in 1913 to 1914 to serve the entire Union Station complex, had also damaged the exterior concrete façade by carbonation, which was found through our testing

View of basement level soffit and walls that are severely delaminated from embedded reinforcing steel corrosion. Note encased structural steel "I" beams

View of interior second floor conditions during selective demolition and repair work. Note moisture damage to wall finishes and soffit (not slab) deterioration

View of one of the two clerestories on the roof that were repaired and restored

Surface preparation with chipping hammer on foundation walls

Completed foundation wall delamination repair preparation, ready for form-and-pour repair concrete to complete area

to be some 1 in. (25 mm) or more in depth as a result of the fossil-fueled powerhouse operation across the street.

Most of the reinforced concrete slabs, walls, and soffit repairs were by conventional partial-depth "chip-and-patch" repair techniques, using the specified repair mortars and surface preparation techniques consistent with ICRI Technical Guidelines. Some framed slab repairs on Level 1 were full-depth, "form-and-pour" type repairs due to the severity of the soffit and/or wall corrosion delaminations, making it more cost-effective to affect a full-depth repair method. There were many existing vertical, partial-depth repairs at door and window lintels and sills, and each one had to conform to the original construction dimensions and finish details for the architect's new door and window reproductions. The two existing clerestories at the roof were badly distressed, and the walls and roof were repaired to restore these elements.

As can be seen from the photographs, the existing Adam's Express Company Building had many exterior spalls, cracks, penetrations, and delaminations, which were all located on the construction documents and repaired in kind. Most of the exterior façade cracks were relatively shallow, given the robust 2.6 ft (0.8 m) thick reinforced concrete load-bearing walls, but a good number of the larger cracks were full-depth through the exterior walls, and epoxy crack injection and gels were employed to repair and re-adhere the numerous cracks in both the foundation and above-grade building walls.

Before the work could progress with any efficiency in the large basement or concourse space, the contractors had to remove many years of accumulated storage and debris; and the basement slab was always wet from the many active leaks, and a number of holes in the foundation walls that to be mitigated. Following the general clean-up of the basement space, the contractor power-washed the walls and basement slab to remove many years of mud, coal dust, and various unsuitable materials in preparation for the specified repairs.

As noted previously, some nonmoving, nonleaking structural cracks above the ground-water table were epoxy injected to re-adhere the concrete. The existing pipe penetrations and exterior loading dock freight and coal chute holes were fully infilled with reinforced and doweled full-depth, form-and-pour concrete. Pipe penetrations were routed out and infilled with vertical repair mortars. At the same time the concrete repairs were being made, the repair contractor injected the specified polyurethane chemical grout into the many active leaks to stop the constant infiltration which, of course, was of greater volume during wet weather conditions.

Following completion of the concrete slab and wall repairs, epoxy crack, and urethane grout injections in the basement, the engineer required that the entire basement wall surfaces apply a crystalline waterproofing system to the first floor grade level, which amounted to a total of some 9000 ft^2 (840 m^2) of wall surface. The leaks were checked. For the design team, coordination of the historic restoration of the Adam's Express Company Building with the new construction of the connected offices and warehouse structure, which employed precast concrete exterior walls and roof structure, was paramount to NARA, GSA, the nearby Union Station, and the developer.

Careful attention was paid by the design team to the available record drawings and pictures as the interior structure was being exposed for the required repairs and waterproofing work. As can be seen from the submittal pictures, a

significant amount of wall, lintels, doorjambs, and soffit repairs were found that were badly distressed from corrosion and had to be repaired. When the structural concrete repairs were completed, it amounted to over 800 ft^2 (74 m^2) of slab repairs, 2000 ft^2 (185 m^2) of wall/vertical repairs, 3500 ft^2 (325 m^2) of soffit repairs, and some 400 lineal feet (122 m) of epoxy and urethane crack injection repairs.

NARA Building

OWNER
National Archives and Records Administration
Kansas City, MO

STRUCTURAL ENGINEER
Structural Engineering Associates, Inc.
Kansas City, MO

ARCHITECT
PGAV Architects
Kansas City, MO

REPAIR CONTRACTOR
S & W Waterproofing
Kansas City, MO

MATERIAL SUPPLIERS
Sika Corporation
Lyndhurst, NJ

DeNeef Construction Chemicals, Inc.
Houston, TX

The historic restoration and conversion of the existing Adam's Express Company Building into a high-value, National Archives research, processing, administrative, and visitor's center ensured the original railway freight operation's appearance and integration with a new, connected structure with similar building lines. This gave the Federal Government a lot of "bang for the buck." Severe concrete corrosion and moisture infiltration issues from top to bottom made it critical to both sustain structural integrity throughout and ensure water tightness to protect the occupants and the precious historical records.

***Richard R. McGuire**, PE, is a Senior Project Manager with Structural Engineering Associates (SEA), Kansas City, MO. McGuire has over 30 years of experience and is part of SEA's Restoration and Field Services Group. He received his bachelor's degree in civil engineering from Washington University, St. Louis, MO, and his master's degree in engineering management from the University of Missouri-Rolla, Rolla, MO. He is a member of ICRI, the Sealant, Waterproofing and Restoration Institute (SWRI), the International Parking Institute (IPI), the Midwest Campus Parking Association (MCPA), and the American Institute of Steel Construction (AISC).*

Completed National Archives and Records Administration Building