

Shotcrete Segment of the O'Hare and Midway Reconstruction Project

By Cathy Burkert

This project was part of a 5-year, \$39 million contract to repair both Midway and Chicago O'Hare International Airports and its surrounding property. American Concrete Restorations (ACR) was hired to perform over \$2 million of concrete repairs. The first task for this contract was to repair all concrete at O'Hare located at the lower level on the "Arrivals" ramp. This ramp spans approximately 3000 ft (900 m) and is the pickup location for passengers arriving at Chicago O'Hare International Airport from the domestic airlines. The repairs consisted of a majority of the overhead areas located throughout the concrete slab and beam structures at Domestic Terminals 1, 2, and 3.

CHALLENGES

Prior to the start of the project, the specification called for formed concrete repair. The General Contractor submitted the use of shotcrete due to the many site and condition challenges on the project. O'Hare Airport is always hectic, with flights arriving 24/7. To work around some of the busiest times for terminal congestion, the contractor was directed to work at night.

Working night shifts always has major risks and challenges. However, the night shift work for this project was further complicated by a 6-hour shift working time. This 6-hour limit included daily mobilizing of equipment from off site, setup, and cleanup. Because the airport and the arrivals ramp were required to be kept operational during the repairs, these shifts were often interrupted due to delayed flights. The contractor's shifts were often postponed for several hours after the scheduled start, thus shortening its shift by that much more. Weather was usually the cause of these delays and sometimes it wasn't a weather issue in Chicago, but rather in departure cities for arriving flights. Another factor leading to delay was the nightly security checks. Every night, the contractor's equipment needed to be cleared by security, including a thorough search by police dogs.

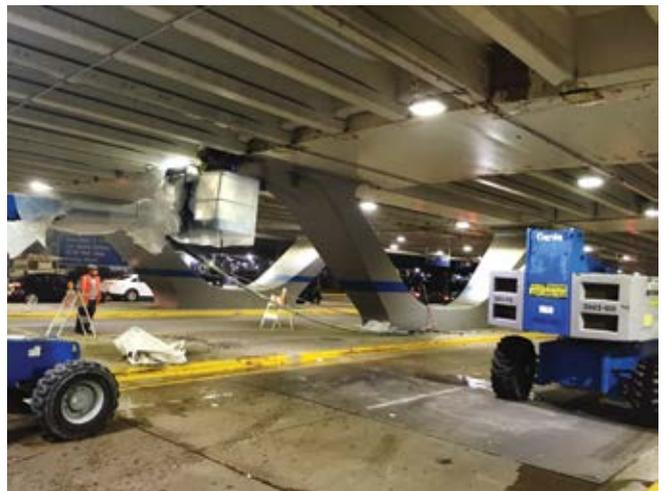
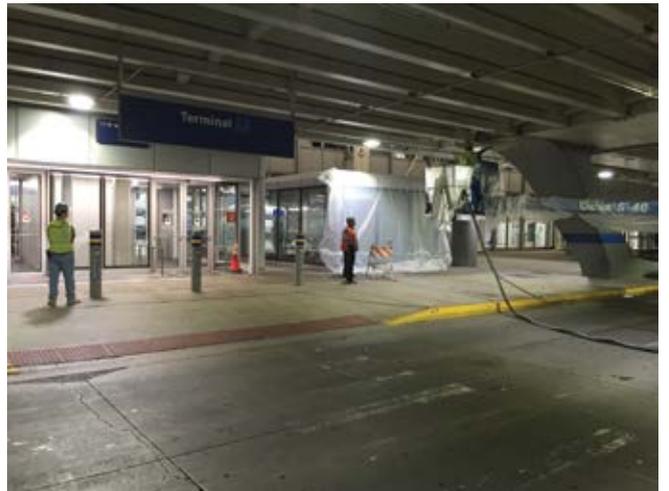
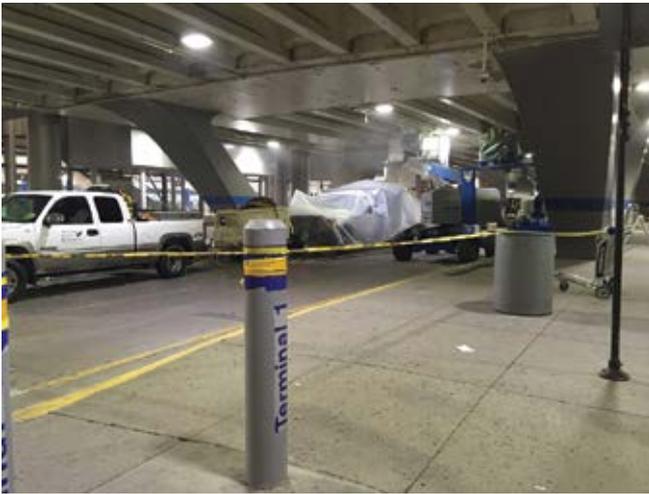
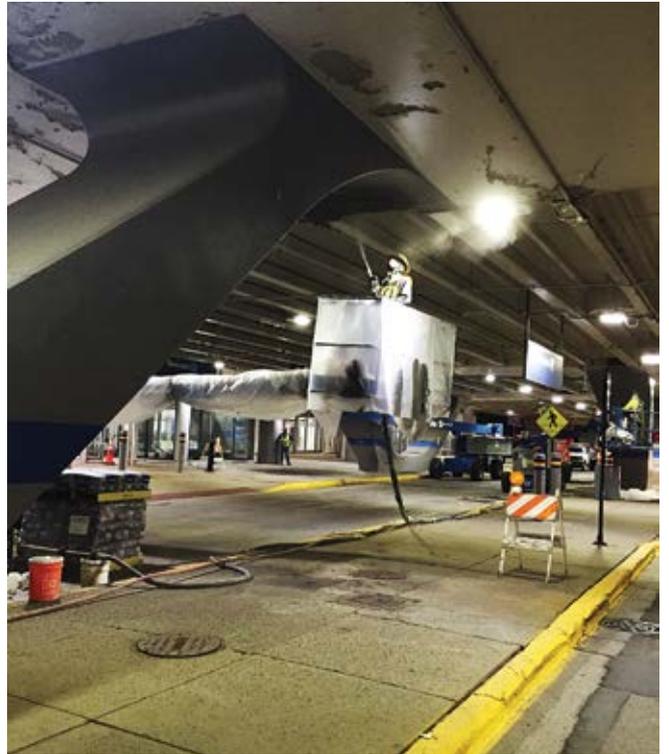
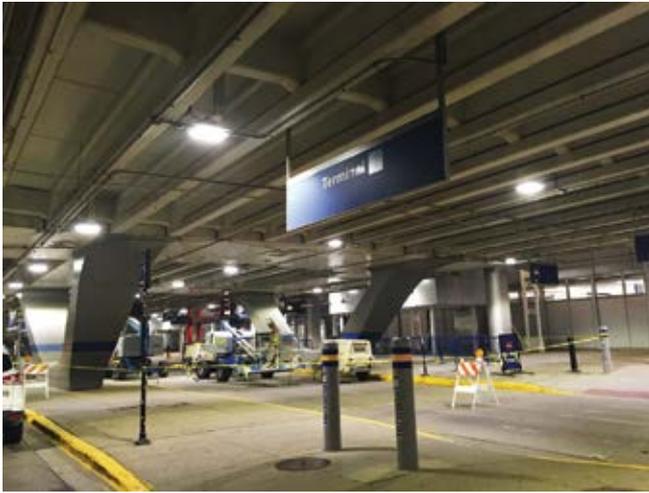
An additional challenge was managing the congestion of the pedestrian and motor traffic. The contractor was only given 100 ft (30 m) of one lane or roadway at a time. O'Hare's arrivals ramp has five lanes, all separated

by pedestrian medians, including two taxi lanes (Lanes 1 and 2), two bus/limo lanes (Lanes 3 and 4), and a regular commuter pickup/rental car lane (Lane 5). The contractor was given the first 100 ft (30 m) of Lane 1 for a period of time until completed and the second 100 ft (30 m) of Lane 1 upon completion of the first 100 ft (30 m) and so forth. No more than 100 ft (30 m) of one lane could be closed off at the same time. Not only was the contractor given restricted access, some of the repairs were in areas with difficult access, such as repairs over the taxi vestibules. Most of the areas were also congested with lighting, police cameras, and other conduits throughout, not to mention the actual vestibules the passengers exited from the airport terminals.

Most of the "obstructions" used sheet plastic for protection from dust, debris, and overspray. The pedestrian vestibule exits were closed and pedestrians detoured to other vestibules. Each 100 ft (30 m) work area was surrounded by orange barriers and caution tape to help keep the exiting passengers from entering the work zone. Because some pedestrians were focused more on their phones than the world around them, the contractor set up safety officers around the work zone to help direct the pedestrian traffic.

Motor traffic was another challenge, specifically the taxi cabs. The taxi drivers seem to be oblivious to construction zones and, as you can imagine, are not the most relaxed drivers. To ensure the safety of the workers and surrounding area, arrow boards and traffic control were set up in close coordination with the airport operations manager. It was imperative to maintain excellent communication with the operations manager, as the contractor was only allowed access to the site after the operations manager approved it each night. The contractor's access was strictly controlled by operations, and sometimes resulted in mobilization delays from the staging yard that was totally out of the contractor's control.

While logistics was a very large challenge on this project, performing the actual work came with its challenges as well. As previously mentioned, each shift included daily mobilization from the staging yard, cleanup, and demobilizing. The work zone had to be completely opened to the public and spotless come sunrise. Dust was certainly an issue during



Challenging restrictive work conditions

concrete removal, but we also found cleaning of the debris created during the shotcrete operation—for example, from breaking the prepackaged shotcrete bags—was an issue. While the construction workers were protected with proper personal protective equipment including respirators, the pedestrians were not. Therefore, the contractor used water to control the airborne dust and large fans to move the air.

In addition, the contractor was challenged with keeping overspray and rebound from attaching to the nearby “obstructions.” While plastic, tarps, and netting were used to try to contain the majority of overspray and rebound, many of our workers’ only task was to continually clean the work area of all debris, overspray, and rebound. Additionally, each night, the entire work area needed to be power-washed to ensure the area was clean and safe when opened back to the public.

SIGNIFICANCE TO THE PROJECT

As in all projects, time is of the essence. The use of shotcrete and its versatility had many advantages compared with form and pour. The use of prebagged shotcrete material that was mixed on-site for wet-mix placement provided a high-quality, consistent mixture that was fresh and never a problem with being “too old.” Ready mix that would have been used in a form-and-pour approach would have a much shorter open time to work with after factoring in the drive time from the plant. There would have also been risk of a form blowout and the potentially catastrophic impact on the motor and pedestrian traffic below. In comparison, our shotcrete used accelerator in the wet-mix process to ensure that each patch reached a sustainable final set before opening the site back to the public. With only 100 ft (30 m) of area available at any one time, the small area needed for the shotcrete equipment was significantly less than bringing in large ready mixed concrete delivery trucks. Also, if a problem occurred with concrete placement in the middle of a form-and-pour patch, it would require removal of the form. The shotcrete placement by ACI Certified Nozzlemen, provided by a qualified contractor and inspectors, enables constant visual confirmation of full encapsulation of the reinforcing bar. Pumping into a blind form could result in voids, poor consolidation, or reduced bonding to the original concrete, thus requiring removal and replacement of the patched areas after form removal.

This substantial shotcrete project was the result of the general contractor recognizing the benefits of shotcrete placement as a substitute for the originally specified form-and-pour method of concrete repair. Proven past experience by ACR with its credentials and qualifications on other high-

profile shotcrete projects demonstrated the benefits to using shotcrete on a project, allowing the airport work to be accomplished more efficiently, more safely, with higher quality and significant time savings. Ultimately, the Owner was thrilled about the limited amount of disruption the construction project caused its customers and operations, allowing them to keep the airport fully functional throughout construction.



Cathy Burkert received her bachelor’s degree in business management and thereafter started working at American Concrete Restorations, a Chicago-based shotcrete contractor. She joined the laborers’ apprenticeship program to learn the intricate details of the trade. After 2 years in the program, she began running

her own shotcrete crews and shortly after earned the title of Field Office Coordinator. In March 2009, Burkert became the first female ACI Certified Nozzlemaster for the wet-mix, vertical, and overhead processes. She has been involved with two award-winning ASA infrastructure projects: the Abraham Lincoln Memorial Bridge in 2008 and the Dan Ryan Expressway in 2009. Burkert currently serves as Treasurer for ASA.

2016 OUTSTANDING REPAIR & REHABILITATION PROJECT

Project Name

Structural Bridge Repair at O’Hare International and Midway Airports

Project Location

Chicago, IL

Shotcrete Contractor

American Concrete Restorations, Inc.*

General Contractor

McDonagh Construction

Architect/Engineer

CARE Plus, LLC

Material Suppliers/Manufacturers

Spec Mix Inc.* and Putzmeister Shotcrete Technology*

Project Owner

City of Chicago – Department of Aviation

*Corporate Member of the American Shotcrete Association