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Painting Bridges

- What about a Universal Spec?
- Ben Franklin Bridge Rehab Ahead of Its Time

Painting Tanks on Ships: What the U.S. Navy Is Doing

Making Respiratory Protection Programs Work

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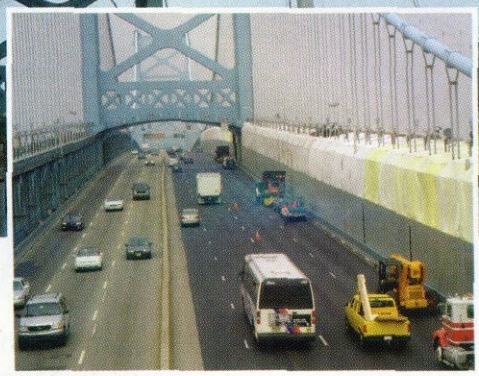
Case History

Repainting the Benjamin Franklin Bridge: A Project Ahead of Its Time

By Lori R. Huffman, JPCL-PCE



(top) Blasting and painting the bridge were well-contained, so traffic continued above and below the bridge. (inset) Solid sheeting on the roadside protected vehicular traffic. (bottom) Phase four included cleaning and recoating corroded trusses. Photos courtesy of Corcon

Being ahead of schedule on a bridge project is good; being one year ahead of schedule is almost impossible, but one contractor is on track to do just that with its work on the Benjamin Franklin Bridge. Connecting downtown Philadelphia, PA, and Camden, NJ, the 80-year-old suspension bridge is an icon of Philadelphia, says Vijay R. Pandya, P.E., project manager for the Delaware River Port Authority (DRPA). The bridge had been painted on an average of every seven years since its construction, including 25 layers of lead-based paint—at a thickness of 50 mils or more—when the project was conceived, says Pandya.

Overcoating the failing paint was overruled by a consultant, who recommended total removal of the coatings.

The DRPA divided the recoating of the Benjamin Franklin Bridge into five phases, with each phase let as a separate contract. The fourth, encompassing the removal and replacement of coatings on the stiffening truss over the Delaware River, is the job of Lowellville, Ohio-based Corcon, Inc. The scope of the project included total removal of the coatings to an SSPC-SP 10 finish and the application of a three-coat organic zinc-epoxy-urethane system to a total dry film thickness range of 10 to 12 mils (250 to 300 micrometers). The contractor's work began September 23, 2003, with site work, final submittals, and yard preparation, says Lou Lyras, president of Corcon. Blasting and coating began in April 2004. The contract calls for the entire phase to be completed by December 2006, but Corcon finished the first half in December 2004, more than six months ahead of schedule. If work continues at the present pace, the project will be done by December 2005, a year ahead of schedule.

Containment, Dust Collection, and Blast Method Combine for Successful Job

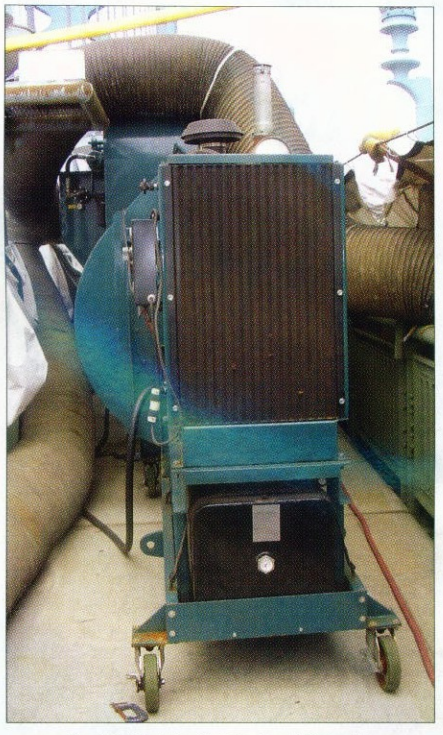
The contractor divided the work on the truss into four sections: the New Jersey north side to the middle of the span, the New Jersey south side to the middle, the Pennsylvania north side to the middle, and the Pennsylvania south side to the middle, says Lyras. The project is complicated by the operation of PATCO High Speed Line electric commuter

Continued

trains, which run every 3 to 4 minutes during rush periods and every 20 minutes during mid-day on both sides of the bridge, in addition to heavy vehicular traffic averaging 111,200 each weekday.

The configuration of the bridge span required special planning. Because the contractor wanted to locate the dust collectors for the job on the bridge deck and as close as possible to the containment, it was necessary to develop equipment that would fit the parameters of the span, while taking into consideration the existing obstructions. Suspended cords attached to the deck every 20 ft 6 in. In addition, cord boxes, decorative lighting, and lamp posts contributed to the complexities of maneuvering equipment on the deck, says Steve Lyras, project manager for Corcon. Using measurements provided by the contractor, the equipment manufacturer designed a lightweight, 30,000 cfm modular dust collector, made up of two pieces, which could be transported by crane and lowered onto the bridge sidewalk deck. The design and approval process took approximately six months, says Lyras. Even with the modular design of the equipment, the transportation process was complicated. "We're dealing with inches," he says, referring to the access to the sidewalk deck. The dust collectors, once assembled, can be wheeled from section to section of the work area.

To protect the traveling public and the environment, the two work areas, facing the roadway and the train tracks, respectively, were each contained within structures the contractor built from a combination of steel deck sheets and conventional tarps, says Lou Lyras. Steel deck sheets were the predominant material used for the containment structure. The tarps were used only where needed, and usually not close to the blasting operations. Because steel decking can be reused and tarping cannot, using far fewer tarps than customary was less expensive over the long term for the contractor, Lyras says. Once the job was done, the contractor would have to have the tarps tested for hazardous levels of leachable lead, treated as needed to meet environmental requirements, and then disposed of properly. The fewer the tarps, the lower the treatment and disposal costs. In addition, the deck sheets made for a sturdier containment that was not at the mercy of high winds, he says. "Throughout a number of thunderstorms, the tarps were never removed and the containment always stayed up. If [the containment had consisted only of tarps], we would have had problems," Lyras says.



Customized dust collectors fit on the narrow sidewalk of the bridge.

Maximizing air flow within the containment was a priority for the contractor. The contractor wanted to avoid running large ducts from dust collectors on the ground to the containment. Two concerns motivated this decision: the possibility of the reduction of airflow through long lengths of ductwork and the complexity of the structure. "All jobs are constrained by how much air flow can get into the containment," says Lyras. With the dust collectors near the work area, air flow would improve, the containment could be enlarged, and more blasters could work inside.

The contractor placed lightweight modular dust collectors on the sidewalk near the containment. Two dust collectors were used for each containment, Lyras says. The improved air flow provided by the dust collectors helped reduce workers' lead exposure, despite the high lead content of the coatings, he says. According to Tom Psaras, vice president of Corcon, the dust collectors exceeded the 100 ft/minute requirement for horizontal airflow within the containment.

The type of containment and dust collection contributed to increased productivity on the job. In addition, says Lyras, the use of recyclable steel grit blasting, with its aggressive cleaning and low dusting properties, aided efficiency.

Performing the Work

The contractor employed approximately 50 workers for abrasive blasting and coating operations, says Lyras. Two blasting crews of six workers each abrasive blasted the bridge using recyclable steel grit. The remaining workers made up the containment crew and two painting crews. All blasting was completed in the daytime hours, so that noise would not be an issue with nearby residents, adds Pandya.

Once the blasting was completed on one section, the blasting crew helped the painting and containment crews with their work, says Lyras. This helped the contractor keep ahead of schedule by ensuring the timely removal and re-erection of the containment at subsequent work areas.

Focus on Safety Protects Workers and Environment

According to Pandya, the general contractor was required to hire an independent health and safety firm to mon-

itor compliance with safety, environmental, and waste disposal requirements.

Worker health has been an enormous concern during this project, says Lyras, because of the exceedingly high levels of lead generated from blasting the aged coatings. "We were aggressively controlling lead exposure on this project, and not at the expense of production," he says. At the beginning of the project, the contractor saw a few spikes in the blood lead levels of several of its employees. In an effort to reduce exposures, the contractor switched from qualitative to quantitative fit testing for respirators, he says. "It was surprising how many masks didn't fit," he says, noting that the respirators would pass the qualitative smoke test but fail the 20-minute quantitative computerized test.

The contractor used ten different types of respirators on the job, tailoring the respirator to the worker and his task. Using a quantitative fit testing unit resulted in safety personnel and workers using respirators with a better fit as well as an appreciation of the differences in fit among various types of masks, says Lyras. "Everyone wanted to be fit tested," he says, including the inspectors and engineers. By the beginning of the second stage of the project, no spiking was found in employee blood lead levels, and all blood lead levels were normal, he says.

Pandya praises the contractor's worker protection efforts, noting that there have been no lost time accidents during the project. He adds that environmental monitoring, performed by a consultant, has shown the success of the containment and dust collection system. Area air monitoring results are within regulated limits, he says.

Bringing the Project in under the Deadline

If work continues at its current pace, Lyras believes that the job will be completed in December 2005, one year ahead of schedule. Cooperation among the owner, the consultant, and the contractor has played a major role in this success, says Pandya.

Urban Engineers, Inc. (Philadelphia, PA) and its subconsultant KTA-Tator, Inc. (Pittsburgh, PA) are providing consultation and inspection services. Safespan (Tonawanda, NY) manufactures the scaffolding. Advanced Recycling Systems (Lowellville, OH) manufactures the recyclable abrasive blast units and the 30,000 cfm dust collectors. MAB (Philadelphia, PA) supplied the protective coating system. TSI International (St. Paul, MN) manufactures the quantitative respiratory fit testing unit.