PRODUCTEMPHASIS

By Neda Simeonova & Clare Pierson

The 90-Inch Double-Stopple Project

In October 2005, the FAA approved the O'Hare Modernization Project (OMP), setting in motion plans that would add one runway, relocate two other runways, add one terminal and a new air traffic control tower, and create new access roads at Chicago's O'Hare International Airport—a massive $6.6-billion airport improvement project at one of the nation's busiest airports that sees 2,700 flights daily.

To make room for the new 9L Runway, the OMP required (along with the relocation of a creek and construction of a new storm water basin) that almost a mile of a 90-in., 25-year-old high-pressure concrete water main be relocated without disrupting drinking water service to 300,000-plus residents in seven communities.

Patrick Armstrong, regional general manager with TDW Services, Inc., said, "The new runway was scheduled to be built over the running pipeline where maintenance would've been impossible."

Operated by the North Suburban Municipal Joint Action Water Authority (NSMJAWA), the line flows up to 90 million gal per day at 165 psi.

TDW as the general contractor

After three years of evaluating different project options, the city of Chicago and the water main owner, NSMJAWA, learned about T.D. Williamson, Inc.'s (TDW) hot tapping and plugging technology. The city chose TDW's technology because it would save about $80 million over the next best method, and yet achieve the same results.

Armstrong said, "To replace the pipe would have been extremely expensive, not to mention bad publicity because area communities would be left without water."

TDW was awarded a sole source (noncompetitive) contract to design-build a bulkhead and thrust restraining system and the Hot Tapping & Line Stopping equipment and fittings required for hot tapping a 90-in PCCP water main. Then they had to plug and isolate a section of the line while water flowed uninterrupted through a bypass line during the final phase of the relocation project.

The sole source contract awarded to TDW is a very rare occurrence for mega-municipalities like Chicago, according to TDW. Competitive bidding is usually an absolute must—unless there is no other company that can provide the required technology and expertise. Being a sole source was an important advantage; however, once selected, the pressure to perform up to expectations—especially as an integral part of such a high visibility project—became a motivating factor for everyone involved at TDW.

The scope of TDW's work was extensive and included the following tasks:

1. Provide concept design work ahead of the contract for the conceptual thrust restraint system, and the Stopple Equipment preliminary design and work-sequencing schedule, to allow the relocation project engineering to proceed using the Stopple option.
2. Design and build the special Hot Tapping and Stopple equipment components needed to complete the job.
3. The equipment was assembled and tested at TDW's Tulsa facility, and a test fixture that simulated the project pipe size was utilized; the test was performed with water pressure at 265 psi.
4. Provide final thrust restraint system design, complete with calculations and professional engineer-stamped drawings. TDW utilized Stanley Consultants for this work.
5. Construct the soil retention system and thrust blocks at the two airport sites. TDW utilized Benchmark Construction to build the blocks and soil restraint system and utilized Stanley Consultants for some of the project management functions.
6. Perform 12- and 60-in. Hot Taps on the 90-in. PCCP water main without flow interruption.
7. Perform 90-in. Line Stops by inserting 90-in. Folding Head Line Stops through the 60-in. tap opening.
8. Retract the Stopple plugging heads, recover all equipment and restore the sites.

To make room for a new runway, Chicago's O'Hare Modernization Project required that a 90-in. water main be relocated without disrupting service to 300,000-plus residents in seven communities

Focus On Funding

Water and wastewater professionals always want to know where the funding comes from for major infrastructure repair projects, such as this TDW line stopping/hot-tap project. Typical sources of funding include taxpayer money from the municipalities, loans or grants from the EPA and state/federal allocations. The O'Hare Double-Stopple Project was funded a little bit differently than normal, however.

The O'Hare Modernization Program (OMP) is a $6.6 billion project.

The 90-in. JAWA pipeline relocation, along with the line stopping and hot tap project, are both part of site preparation for a new runway at the international airport in Chicago. Each are each part of Phase One of the OMP, which is allocating $2.9 billion to complete enabling projects and initial improvements to the airport.

No state or local tax dollars are being used to carry out the plans of the OMP. Twenty-three percent ($657.5 million) of the funds came from Passenger Facility Charges, 12% ($362.9 million) came from the Airport Improvement Program's entitlement and discretionary dollars, and 65% ($1.9 billion) came from General Airport Revenue Bond proceeds.

In August 2003, the city sold approximately $986 million in General Airport Revenue Bonds (GARBs), showing that investors had confidence in the OMP. The bond sale was a record for O'Hare with more than 50 institutional investors placing orders.

The total awarded contract value for the 90-in. JAWA Relocation was $15.2 million, awarded on Nov. 17, 2005. The contract value of the line stopping/hot tap project was $5.8 million, awarded on Mar. 13, 2006.

As of April 2007, the OMP has awarded a total of $652.8 million in construction contracts.

A modernized O'Hare is expected to create 195,000 more jobs, and another $18 billion per year in economic activity. The plan is expected to save the airlines approximately $370 million and passengers $380 million a year.

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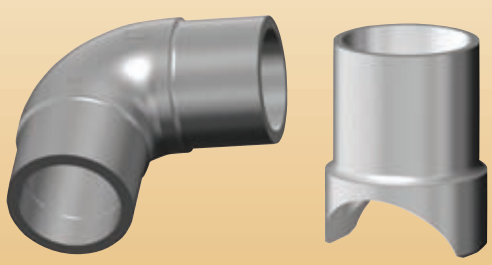

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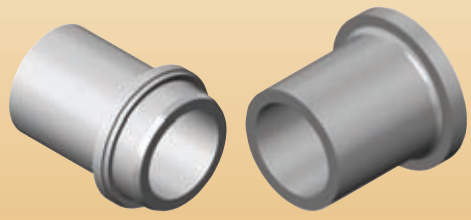

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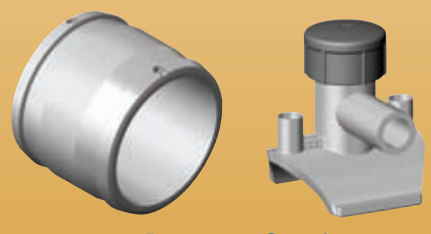

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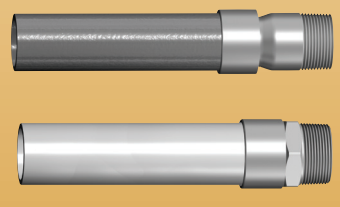

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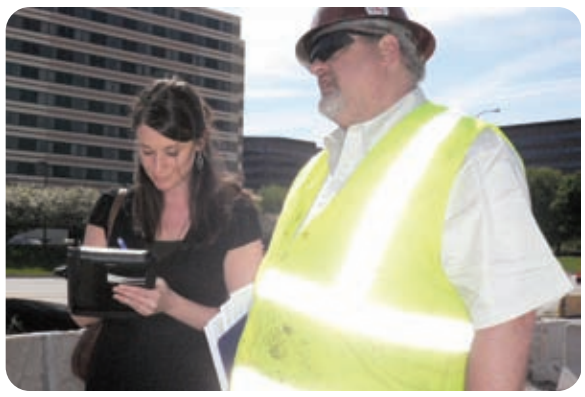

WWD editors spend a day at the site with Patrick Armstrong, to understand the challenges and magnitude of the project.

Project overview & challenges

What made this project unique to TDW and the industry in general is that the existing line was a 90-in. ID (9-ft OD) pre-stressed, concrete pipe with a design internal water pressure of 210 psi, and a bulkhead force of approximately 1.6 million lb. This and other bending moments and forces represented the largest forces ever subjected on a folding head line stop equipment system.

The project presented various other challenges. The construction site was located at the edge of the airport property, near a busy intersection and commercial area that required a Traffic Control permit. The Willow Creek site was located near an active runway, it required a FAA 7460 permit, and was partially in the creek.

"Working on the creek site was very challenging when the water was high," Armstrong said.

Armstrong said other notable challenges for TDW were the installation of 12-ft thick thrust blocks at both ends of the relocated section, as well as taking on the role of general contractor under a design-build contract.

Furthermore, because it was ideal for TDW to complete the project during the low-flow period of October 1 through April 1, workers had to endure Chicago's notoriously freezing winter season. During a particularly brutal stretch of sub-zero weather in February, two 60-in. line taps were completed. The bypass operation started on March 27, 2007 when line stops were set and remained in place for seven weeks. Plugging heads were removed on May 7, 2007 at which time flow was restored to the new section of water line—all without the slightest interruption to service.

The Stopple method in the future

Armstrong said that the technologies that TDW used throughout the project would be "very key to repairing old pipe in crumbling systems" across the country.

(continued on page 47)

Write in 719

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(O'Hare Project continued from page 22)

Workers enjoying a rare bit of sunshine during the project's period of Oct. 1 through April 1.

According to Armstrong, "A lot of our infrastructure in this country is falling apart." Water utilities and municipalities worldwide can now use the success and cost savings experienced in Chicago as a basic blueprint for water line replacement or rerouting requirements.

This project confirms that large diameter concrete pipe relocations can be completed under pressure and without interruption of service; however, detailed mechanical and civil engineering is required to design a thrust restraining system necessary to contain all forces and bending moments. Generally, construction means and methods are dictated by the actual site conditions and permit restrictions, but the Stopple method can greatly reduce the scope of overall project by maintaining the line service. WWD

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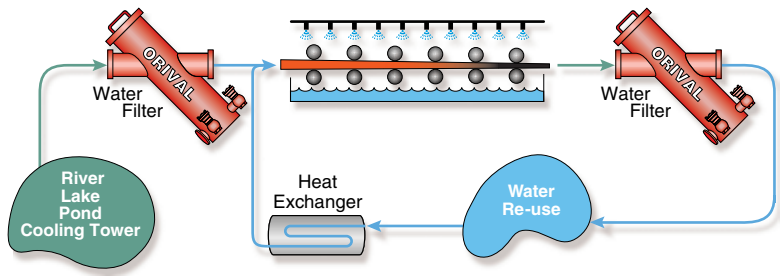

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