

UNDERGROUND IS TOP OF MIND

Charleston Region in West Virginia proving how annual reviews are vital to maintaining infrastructure

Sept. 17, 2002 – The Charleston Region of the West Virginia-American Water Company has a budget of \$1 million per year for water main replacements. It's a program that has been in place since 1984. That means Charleston is going on 20 years of constant upgrades and close monitoring of its infrastructure.

A routine checkup revealed a faulty pipeline at one of the region's 20-plus river crossings – corrosion was to blame for a 4-inch leak in a 24-inch diameter ductile iron pipe. The system was unintentionally providing the river with an extra 3 to 5 million gallons of water per day that should have been coming out of customers' taps.

Charleston Region Manager Ron Belcastro, P.E., made the decision to slipline more than 1,000 feet of 20-inch high density polyethylene (HDPE) pipe into the 24-inch original pipe at a cost of about \$125,000. He estimated that replacing the system would have cost about half a million dollars.

The larger question becomes, if one of the nation's most conscientious municipal water systems is routinely repairing leaks that account for more than 20 percent of its water supply, what's happening in the communities where there's not as close a watch?

Costs piling up

According to reports in The Washington Post, about a quarter of the water handled in that city's treatment plants leaks out through a deteriorating infrastructure which can lead to contaminated drinking water and higher water bills for taxpayers. The Washington, D.C. metro area has about 66 million gallons of "unaccounted for" water per day.

But the nation's capital is not alone. The Environmental Protection Agency (EPA) estimates that the U.S. is in need of about \$250 billion worth of infrastructure rehabilitation in cities nationwide. That number has grown from about \$140 billion just three years ago. More information about the costly road ahead for our water pipelines can be found on the EPA's web site www.epa.gov and on the Water Infrastructure Network's (WIN) site, www.win-water.org.

"Back when the systems like the one in Washington, D.C. and many others were installed, engineers installed the best pipe they had available at that time," says Dave Allison, PE, applications engineering manager for the Plastics Pipe Institute (PPI). "But that pipe, some of which was installed 75 or 100 years ago, has served its design life."

Charleston's Belcastro makes comparisons between water and other utilities like electric and phone companies – businesses that have a higher rate of private ownership than water companies.

"There are some (water piping systems) that are in bad shape, and others are not," Belcastro says. "It's a function of how a system has been funded and managed. In publicly owned systems, public officials are sometimes reluctant for political reasons to raise rates to pay for pipe maintenance. And the next ones in that office have the same hesitations. So it comes down to a long-term neglect, which ends with a desperate plea to Congress to bail them out. Infrastructure needs constant, annual attention. Otherwise you'll be looking at huge projects instead of smaller, manageable ones."

Material selection

Sliplining with HDPE pipe – the method Belcastro used for his river crossing project in West Virginia – is one way municipalities can rehabilitate their infrastructures. But he believes that there's not one kind of pipe that is ideal for every application every time.

“Anyone who says to just use one kind of pipe for everything all the time – no way,” Belcastro said. “That's why all different kinds of pipe and pipe materials are manufactured. I like to pick the right kind of pipe that's right for the job I have at hand.”

For the river crossing job in West Virginia, Belcastro chose HDPE “for advantages like heat-fused joints that are impossible to pull apart, flexibility for the turns and bends in the pipeline and especially the resistance to corrosion.”

According to Allison, metal pipe manufacturers strive to prevent corrosion by either coating their base materials with electrically insulating materials or providing some sacrificial material, which will corrode before the base metal. Because corrosion is an electrolytic process that requires the presence of electrically conductive materials – and polyethylene is a non-conductor – polyethylene is not subject to corrosion.

Rich Gottwald, executive director of Plastics Pipe Institute, says the heat fusing creates a pipe joint that actually becomes as strong or stronger than the pipe itself.

“Using HDPE pipe to move water is a great way to be sure that none of the water is getting away,” Gottwald said. “Because the pipes don't corrode and the joints are so strong, that means all the water stays in the pipe until it gets to where it's supposed to go.”

Another advantage of the heat fusing process, according to the PPI report, is the elimination of the need for restraining devices on joints and fittings. They are another costly hardware item, also subject to corrosion effects, that must be installed to produce a complete system when using non-HDPE systems.

Waiting for an emergency

It's accepted within the water industry that about 75 percent of cities report that they're aware corrosion is a problem in their water pipes. But in some cases, the city officials believe that the corrosion is a minor issue.

“It's that catastrophic event that prompts them to take a closer look at what condition their infrastructure is really in,” Allison says. “That's sometimes what it takes to bring about changes or improvements.”

Allison cites an example of why infrastructures can sometimes go years without preventative maintenance. Citizens in San Francisco recently voted to freeze their water rates at 1999 levels through the year 2006. The reason was that they thought too much money was being spent on improvements to the system.

Meanwhile, stories with headlines like “Hayes Valley Water Line Breaks,” were appearing in the San Francisco Chronicle in late 1999. An excerpt from that newspaper article states, “A spokesman for the Water Department said the cast-iron pipe, like many in The City's water system, apparently has been in the ground since the 1930s.”

Solutions

The implementation of annual maintenance programs like the one in Charleston, W. Va. is the exception and not the rule across the country. Organizations like the EPA, PPI, WIN, the American Society of Civil Engineers (ASCE), the American Water Works Association (AWWA) and many others are coming forward with recommendations. They're calling for increased funding from the federal government, the establishment of water trust funds, and other actions aimed at strengthening the partnership among governments at the local, state, and federal levels and between public and private participants in the water and wastewater infrastructure community.

“Every utility, no matter what it’s providing, needs a consistent, comprehensive plan,” Belcastro said. “It comes down to knowing your system and prioritizing the maintenance in order to address the weak spots and avoid large headaches.”