Sewers

PHILADELPHIA DIVERS SLIPLINE TO KEEP BIG SIPHON IN SERVICE

A PHILADELPHIA WATER DEPT. CONTRACTOR is completing a tunnel sliplining installation that kept a dual siphon in service during repairs. The siphon carries about 12% of the city's untreated wastewater under the Schuylkill River. The job required specially designed pipe sections, low-density grout, foam bulkheads to seal tunnel sections and, most of all, divers capable of working in nasty conditions.

"We're all pretty proud of what they've done," says Stanley Niemczak, project engineer with the Water Dept.'s design section. "Their visibility was about 8 in., but they kept it going the entire time and didn't discharge anything into the river."

After engineers noted increasingly irregular flow patterns last summer from a pump station serving the Southwest treatment plant, the city hired Walker Diving Co. to inspect and clean 50-year-old twin siphons that cross the river on the outskirts of the University of Pennsylvania campus. During wet weather the siphons feed the pump station up to 185 million gal per day collected from sanitary and storm sewers. The corrosive, abrasive effluent has eaten away sections of the ⅛-in.-thick steel pipes that line the siphon's twin tubes that extend 600 ft through bedrock beneath the river. "I'm not sure why that steel was so thin," says Niemczak. "I suspect it was used as a form for the concrete" that formed the 50-in.-dia tubes.

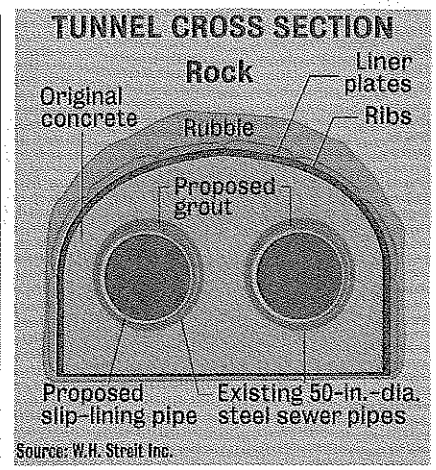
During wet weather, flaps of loose steel would catch solids, clogging the tunnels. The city originally planned to dewater one tube at a time during repairs last summer, but divers hired to clear the blockages found a void about 15 ft from one 60-ft-deep vertical access shaft. Anthony Kopicki, Philadelphia Water Dept. project engineer, believes that an air pocket in the concrete formed during the siphon's construction a half century ago. Once the effluent corroded through the thin steel, a breach connected the tubes. Suddenly, a tough but straightforward job became much more complicated and expensive.

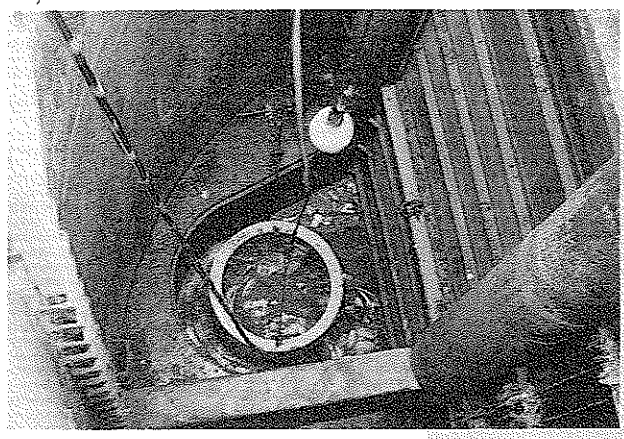
Alternatives considered and discarded because of cost or technical difficulty included installation of a new parallel siphon, a barge-mounted pipeline above the river and a thermally treated, resin-impregnated replacement liner.

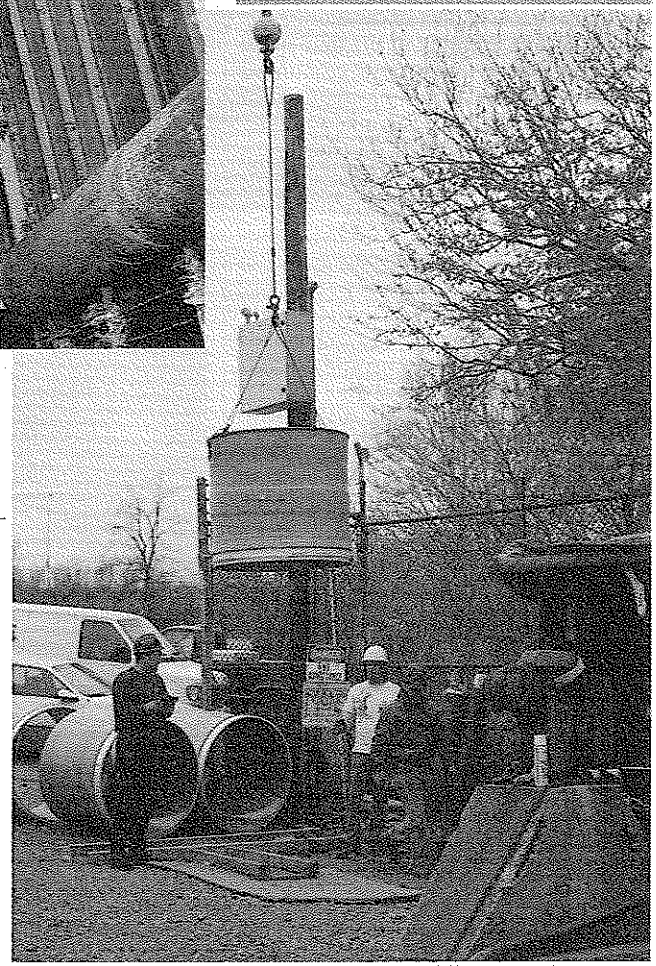
In a bid package issued last November, Walker's parent company, Hammonton, N.J.-based W.H. Streit Inc., beat out three other competitors with a bid just under $2 million. Streit began planning to implement a sliplining repair plan conceived by Niemczak and other engineers in the design section. "Sliplining 200 3-ft sections of pipe 60 ft underwater seems impractical, but it really is the safest and most effective way to go," says Niemczak.

"The supplier designed a section that could clear the 90° turn from vertical shaft to horizontal, with a rubber gasket and bell-and-spigot connection," says Gregg E. Sparks, Streit vice president of operations. With a diver in the tunnel securing the fittings, each 3-ft section was lowered from the surface and fitted into the last section in line. A crane-mounted cable from the opposite bank jacked the section into place, advancing the assemblage forward, 3 ft at a time, until 200 sections covered 600 linear ft in a tube. Next, teams of divers, relieving each other at 90-minute intervals, repeated the process in the second tube. Work in the tubes finished Aug. 2, Sparks says. The final vertical shaft and inspection should be finished by Sept. 1, he says. ❑

By Andrew G. Wright







SLIPPING IN Contractor removes fiberglass pipe sections from staging area, right, and lowers them through access shaft, above. Sections are jacked in place below the riverbed.

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