PRECAST
SOLUTIONS
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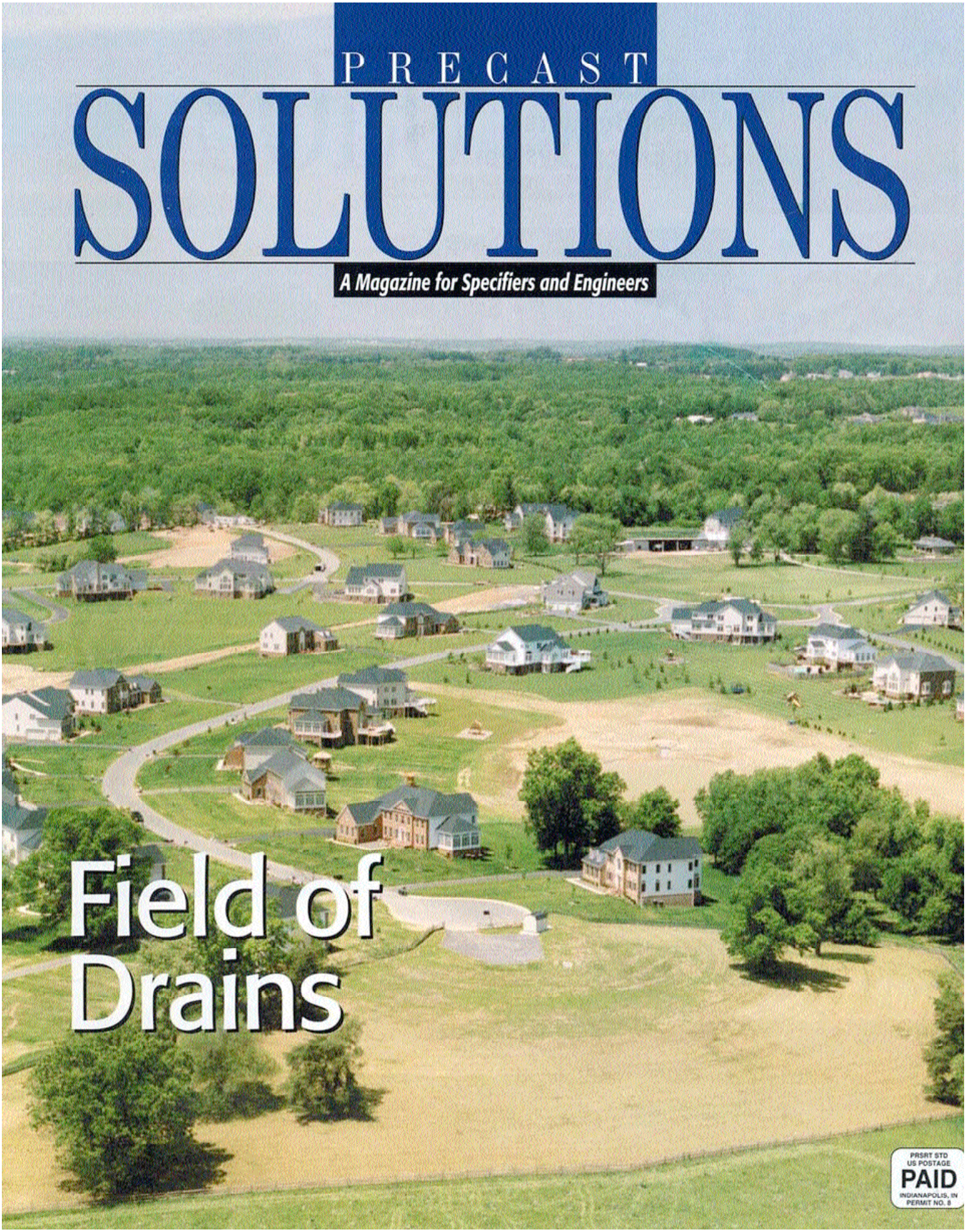
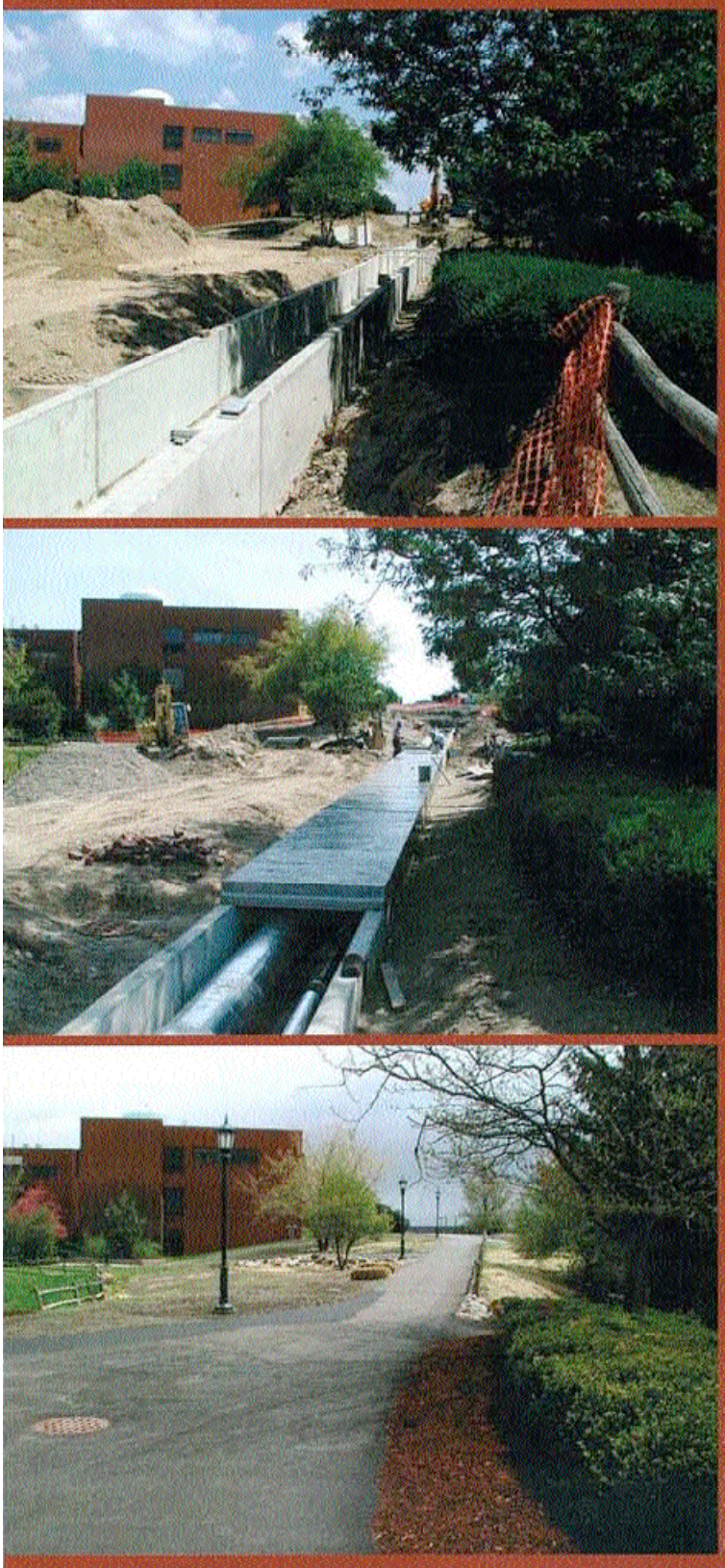


Field of Drains



Three views from the same angle show the progress of the steam pipe and precast concrete tunnel construction project at the University of Vermont.

Champlain Consulting Engineers

Full Steam Ahead

A temperamental utility meets its match.

By Carolyn Cosmos and Chuck Hooper

If you think you've heard it all regarding site installations, consider this: A number of years ago, while installing underground pipes at the University of Vermont, excavators unearthed a wooden coffin. It was sealed in copper and contained three bodies.

While the coffin collision was a one-time event, digging drama is not a rarity on the Vermont campus, according to Bob Howard, utilities superintendent at the Burlington institution. "With a university this old, you cannot safely dig anywhere. We have years and years of systems underground, some of it working, some abandoned," he says.

Howard should know. Among other things, he oversees 8.8 miles of pipe feeding a central heating plant, most of it underground. Howard was the point man involved with a steam pipe replacement project utilizing precast concrete to protect the pipes. Steam heating systems are typical on college campuses and other large institutions, but are very temperamental. More complex and subject to problems than other piped utilities, steam and hot-water heating systems can be complicated and costly to install, run and repair. High temperatures - up to 325 degrees - speed corrosion.

Getting Steamed

In a typical steam heating system, the condensate returns by gravity and leaks can be common, even if the system is new. Dialing in the cost estimates associated with repairing its older heating complex, the University of Vermont converted its hot-water heating system to steam — but with a different twist: It had the pipes installed into precast concrete tunnels, or vaults, buried in the ground.

For the Vermont project, the concrete vaults were cast in 10-foot lengths to create boxes 4 feet wide and 3 feet tall. To make the vault connections tight, the manufacturer, Camp Precast of Milton, Va., installed threaded anchors and angle iron into the ends for bolt tightening. The vaults, installed over gravel, were designed with drainage holes and separately cast lids.

Brian Brosmer

A diagram depicts the obstacles workers had to maneuver around and through in order to lay the steam pipe and concrete tunnel. Obstacles included sidewalks, unusual and valuable trees, fiber optics cable, and electrical and gas lines.

The first installation phase consisted of about 1,000 feet of steam trench snaking to several dorms. It began in June 2001 and finished last fall. An additional 1,000 feet is in the planning and approval stage for phase two. Howard plans to install the entire pipe system within precast concrete vaults.

One of the obstacles of the project involved rare trees. The Burlington campus is known worldwide for its unusual and valuable trees used in university research projects. "We zig-zagged around the trees with great care," notes construction supervisor George Holcomb, superintendent for DEW Construction, the company that managed the project on site. They also weaved around underground utilities, including fiber optics cables and electrical and gas lines.

These multiple aboveground and underground complications made preplanning paramount. The consulting engineers performed early site and utilities surveys to see if the crews could get from point A to point B efficiently on the congested campus, Howard explains. Also, with winter approaching, the need for heat made installation speed a critical concern.

Concrete Solution

Precast concrete held several advantages over cast-in-place. "We were proponents of precast concrete at Vermont from the start," says Greg Bombardier, managing partner of the project's civil engineering firm, Champlain Consulting Engineers. Bombardier cites two reasons: "First, we had better control over the product in terms of quality." Says manufacturer Patrick Camp, "This is a product that can be preinspected before being shipped. With poured-in-place, if there's a problem your only alternative is to rip it out and redo it." The other reason Bombardier chose precast was for the time element. "The university had a tight timeline, and with precast concrete we had speed of installation," says Bombardier.

Holcomb cited other advantages. "It allowed us to do long runs. You can lay 50

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— BOB HOWARD

D.E.W. Construction Corp.

"The university had a tight timeline, and with precast concrete we had speed of installation. It allowed us to do long runs. You can lay 50 to 60 feet of pipe at a time and leave a lot of the area open."

— GREG BOMBARDIER

Concrete tunnels created a dry environment for steam heating pipes, which will extend the life of the pipes well beyond their normal life expectancy.

to 60 feet of pipe at a time and leave a lot of the area open," he said. Compared with burying pipe directly in the ground, the precast vaults make it easier to level the pipes that carry the steam. "It's less messy, meaning less clean up," says Holcomb. "It allowed us to bring the campus back to normal more quickly."

Leaks and Longevity

Although other options offer lower startup costs, Howard said the savings add up over the long term. The precast concrete tunnels not only protect the pipes so they last longer, they are easier to install, and field changes, corrections or repairs can be made quickly and easily.

"With a direct burial conduit system, we have not had especially good pipe longevity," Howard explains. "Piping systems are wet. We have a high water table here, and the original system was metal corrugated pipe that rusted from the outside." It lasted less than 20 years on the average.

By contrast, the concrete vaults created a dry environment for the pipes that carry the steam. "We're expecting them to last 40 to 60 years," says Howard. Bob Burhenn, Howard's counterpart at The Catholic University of America in Washington, D.C., agrees. Catholic University also heats with steam and has put its pipes into precast vaults, resulting in substantially lower costs overall for repairs from leaks.

A leak in a large system of directly buried pipe can be hard to find and can cost as much as $7,000 a day. "And that's just the fuel cost," Burhenn observes. "What is a leak going to cost you if you have to wait until you can see it bubbling up through the mud?" Burhenn notes that speedier repairs are possible with the precast vaults.

Mark Civil, mechanical subcontractor for A.J. Eckert, is another fan of the precast vaults. "From a piping perspective, it's an advantage to the owner to get away from a preinsulated system put directly in the ground where you have no idea what the piping is doing," he says. "The ground can shift, the exterior jacket can get damaged, and the next thing you know you're in trouble."

A temperamental utility such as a steam heating system can be costly to maintain, but adding the protection of precast concrete can extend its life considerably. ■

To find a manufacturer of this product in your area or for more information, visit NPCA's Web site at www.precast.org or call toll free (800) 366-7731.

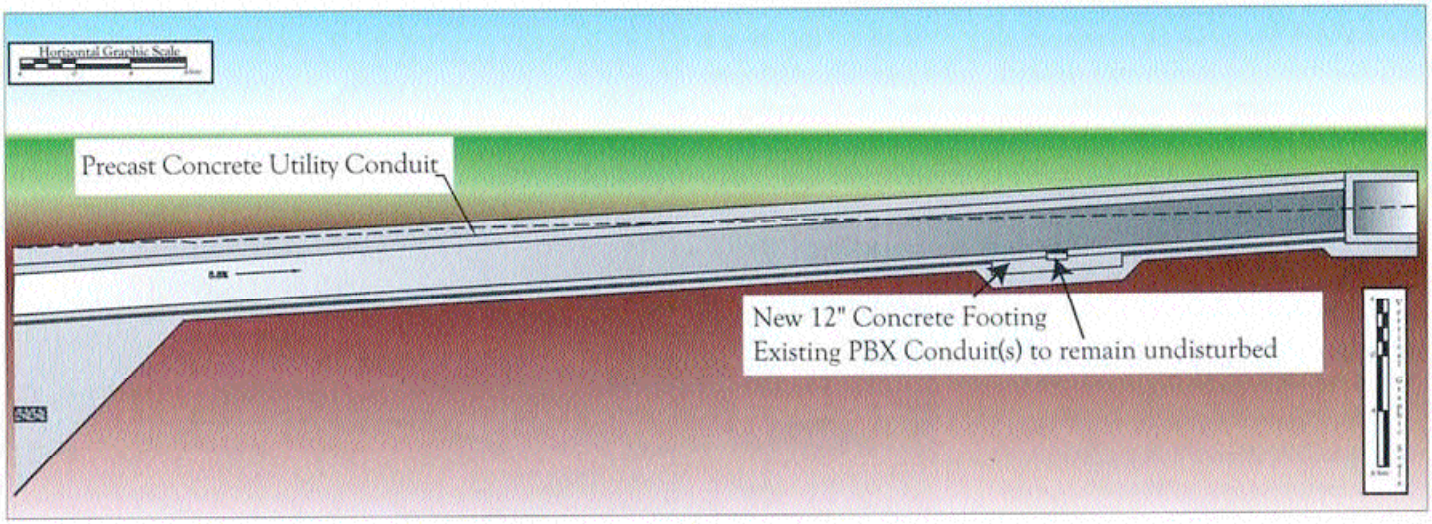
PROJECT PROFILE

Owner: *University of Vermont, Burlington, Vt.*

Engineer: *Champlain Consulting Engineers, Colchester, Vt.*

Contractor: *D.E.W. Construction Corp., Williston, Vt.*

Precaster: *Camp Precast, Milton, Vt.*



Brian Brosmer

A side view of the steam heating project reveals a grade which allows the condensate to return by gravity.