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Bradshaw Construction: A Contractor with Tunnel Vision

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BRADSHAW
CONSTRUCTION CORPORATION



A Contractor with Tunnel Vision

By James W. Rush



A 101-in. Lovat TBM holes through on a project Bradshaw Construction completed on the University of Virginia campus in Charlottesville.

Company History

Tunneling has been in the Bradshaw family since the 1950s when Lester M. Bradshaw Sr. left his Kentucky home to find work building the Chicago subway system. With the experience gleaned there, as well as in the utility tunneling industry, Bradshaw founded Eastern Tunneling with partner Bill Voss in the early 1960s.

The philosophy in the early days was simple. "Eastern Tunneling was a hand-mining tunneling company," Bradshaw said. "We would work in rock and soft ground, and we did some compressed air tunneling. Having worked at larger companies, my father and his partner were able to use techniques that a lot of the smaller contractors

didn't have experience utilizing. We did the jobs no one else could do."

In 1982, Eastern Tunneling split. Lester Bradshaw Sr. started L.M. Bradshaw Contracting Inc., and Voss started SEC, which later went on to complete the first microtunnel in the United States, according to Bradshaw. It was at this time that Lester Sr.'s four sons — Lester Jr., Joe, Jeff and Bob — got involved in the business. Lester, Joe and Jeff still work for the company.

L.M. Bradshaw continued Eastern Tunneling's legacy of constructing specialty hand-mined tunnels. It wasn't until Lester Sr.'s retirement in the late 1980s that Bradshaw delved into the realm of mechanized tunneling.

"The industry was going more toward mechanization, so it was a natural transition," Bradshaw said. "In the early days, a lot of the equipment didn't work well in the variable geology that we found ourselves working in day-to-day. But improvements over time have made mechanized tunneling more applicable and we've had to adapt."

The decision to take on mechanized tunneling was also a way to grow, according to Joe Bradshaw, vice president. "At that time, the traditional hand-mine tunneling market was both limited in size and relatively saturated with competition. In response, we realized that diversifying tunneling methodologies was necessary to increase our market opportunities,

Some companies have been accused of having tunnel vision, but for Bradshaw Construction Corporation, that's a good thing.

That's because Bradshaw Construction specializes in tunnels — all types of tunnels. Hand-mined, wood-box, compressed air, TBM, NATM, EPB, MTBM. You name it. If it's a tunnel, Bradshaw builds it. In fact, the Ellicott City, Md.-based contractor takes pride in the fact that it can complete the jobs that others can't — or won't.

"We're able to build any type of tunnel that the project dictates," said Lester Bradshaw Jr., company president. "Whatever ground conditions or obstacles are present, we are able to provide the client with a solution based on our extensive background in the tunneling industry."

With roots in the industry spanning a half a century, Bradshaw Construction has completed projects all along the East Coast, from Maine to Florida, in all types of ground conditions and with all types of tunneling methods. And all with quality in mind.

"We consider ourselves a performance contractor," Bradshaw said. "We like to do the tough jobs and the jobs that demand performance."

and efficiently utilizing new technologies would also increase our competitiveness and market share within our traditional markets."

The company now utilizes TBMs, earth-pressure balance TBMs for soft ground, microtunnelers and pipe jacking and auger boring machines to augment its expertise in hand-mining, compressed-air tunneling and NATM.

Though the means may have changed, one principle has survived intact. "A key factor in being successful as a tunneling contractor is understanding soil behavior — understanding what the soil is going to do when it's excavated," Joe Bradshaw said. "As an organization, we learned a great deal about soil behavior from our experience in hand-mining, in that only a miner's strength and ingenuity was available to deal with whatever Mother Nature had to offer, and we were able to apply that knowledge to mechanical excavation."

"This tenet can be summed up in a saying our father taught us from a young age, 'Given enough money and time, it's possible to build a tunnel through muddy water.'"

In 1995, ownership and management of the company passed to Lester Jr. and Joe, and it was renamed Bradshaw Construction Corporation. Since that time, the company has built on its already impressive resume of successfully completed projects.

Orme Street Phase III-Atlanta, Ga.

For a sewer tunnel project in the heart of Atlanta, Bradshaw drew upon its wealth of experience to provide an attractive solution for the owner. The project required constructing a 2,000-ft tunnel adjacent to two seven-story housing units amid the campuses of Georgia Tech and Georgia State universities.

Working 30 to 50 ft below the surface and 15 to 25 ft below the groundwater table, the soft ground and mixed-face soil con-



Building underground facilities increasingly requires working in proximity to existing utilities and structures, like this project in Baltimore's Inner Harbor.

ditions posed significant challenges. Typically, dewatering would have been used, but the threat of settlement in the area around the housing units dictated another solution. As if this was not difficult enough, prior settlement of these buildings at the time of their construction necessitated utilization of a groundwater recharge system, so that no lowering of the water table would occur during the tunneling operations.

"Bradshaw was willing to sit down at the table and discuss various means and methods in the interest of the total project," said Michael Cutts, program director for Integral Building Group, which managed the Orme Street project for the City of Atlanta. "Their willingness to collaborate helped ensure that the project was completed safely, on time and within budget."

After studying the problem, Bradshaw and design consultant Jenny Engineering developed a methodology using compressed air in combination with the New Austrian Tunneling Method (NATM) for the 1,200-ft northern reach. This combination of tunneling and ground support methodologies was the first in North America.

"That was really the pinnacle of our NATM work," Lester Bradshaw Jr. said. "We were able to effectively combine the expertise my father gained from working in compressed air tunnels with modern NATM to provide a solution for the client."

"We had to do just about everything imaginable to build the tunnel — control subsidence, get standup time, make connections and deal with adverse ground conditions," said Eric Eisold, project manager for Bradshaw. "The experience of Bradshaw's engineers and management allowed us to complete this difficult job without any claims or damages to adjacent facilities."

Pentagon Renovation

As part of the 20-year, \$1.2 billion Pentagon Renovation (PEN-REN) project, Bradshaw Construction was hired to construct a 38-ft ID, 49-ft deep shaft. The shaft was part of a scheme to eliminate direct access to the Pentagon via the Washington Metro by creating a new station farther from the building. The new shaft was built to provide entrance/egress to the new station.

The challenges involved constructing the shaft without disturbing Metro operations with excessive vibrations, as well as constructing a new shaft in an area of existing structures and utilities. Bradshaw and Jenny Engineering devised a plan to build the shaft using NATM, which includes lattice girders, welded wire fabric and shotcrete support.



Bradshaw utilizes TBMs, EPBs, microtunnelers and pipe jacking and auger boring equipment to augment its expertise in hand-mining, compressed-air tunneling and NATM.



Bradshaw Construction recently completed a unique project in Washington, D.C., for coal conveyance using pipe jacking to install 96-in. RCP

Using this approach, Bradshaw was able to successfully sink the shaft between an existing escalator and the main station chamber. Both structures were encountered during the excavation, but the flexible system allowed crews to adapt to the conditions and successfully complete the project.

"We have worked with Bradshaw Construction on several projects — including Orme Street and PENREN — and we have found them to be extremely competent contractors with a lot of experience in NATM," said Pakash Donde, president of Jenny Engineering. "They have people who have been doing underground construction for a long time, so it has given them a unique insight. They also have an appreciation of the engineering and design aspects of underground construction, which is refreshing."

Hillsborough River Crossing

Another example of what Bradshaw offers is the Hillsborough River Crossing in Tampa, Fla., which involved constructing a 300-lf tunnel underneath the river as part of a large-scale water infrastructure improvements project. Despite its length, the tunnel traversed variable geology, including limestone, chert, soft sands, clays and silts — 55 ft below the river.

The tunnel required a qualified contractor, but the small size of the project left many large national contractors uninterested. "The size of the tunnel was in the range of what would typically be built by road crossing contractors," Lester Bradshaw Jr. said. "But this project required more sophistication than most road crossing contractors have. So we were able to come in, build the job and make a profit."

The solution involved jacking 100-in. OD Permalok steel casing behind a Lovat earth-pressure balance (EPB) TBM. Once the TBM was assembled, excavation was completed in eight days.

What's Next?

With more people living in urban areas, and the existing infrastructure in those areas degrading over time, the need for new tunnels is on the rise. Additionally, building underground facilities increasingly requires working in proximity to existing utilities and structures, often requiring innovative means and methods.

Recently, the company completed innovative water intake projects in York, Pa., and Greenville, S.C., using microtunneling technology. Bradshaw was also awarded a \$16 million contract to install 6,000 lf of pipe via microtunneling in downtown Baltimore.

It's jobs like the upcoming project in Baltimore that will be on the rise, according to Richard Hawes, senior project manager/senior estimator. "We're going to be microtunneling 6,000 lf and 30 ft deep through variable ground in an area prone to flooding. Plus, we have to cross under waterways twice, an expressway and light rail tracks. But there will be more and more of these types of projects as additional services are needed in densely populated, built-out areas."

Bradshaw Construction's corporate structure, as well as management's extensive and varied expertise in the field, ensures that the company is positioned to play a vital role in the construction of new urban infrastructure for years to come.

James W. Rush is editor of *TBM: Tunnel Business Magazine*. More information can be found at www.bradshawcorp.com.

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