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TUNNEL VISION

BUILDING THE TRENCHLESS NETWORK

INSIDE

THE CONSTRUCTION TREND IS TRENCHLESS

Jeff Griffin

Five years ago, few telecom construction projects involved directional boring—usually only when conditions ruled out other methods. But as service providers race to install the network of the future, this and other trenchless methods may see greater use. For example, U S West's Omaha broadband deployment used directional equipment extensively because it was the most efficient and economical way to do the job, according to U S West construction executives.

Earlier this year, a review of figures supplied by utility associations, research organizations and manufacturers showed 20% to 25% of 1994 underground utility work was done via trenchless methods. (There are many trenchless technology procedures that don't apply to telecommunications, and this estimate includes all trenchless construction). The share of trenchless work likely will increase substantially through the end of the century.

Overall, an estimated $8 billion will be spent in 1995 for telecommunications cable construction, according to Porter Childers, executive director-accounting and financial matters for the U.S. Telephone Association. In a study prepared for the National Cable Television Association, Paul Kagan & Associates estimates the CATV industry will install 22,500 miles of new cable and 42,500 miles of rebuild in 1995.

If trenchless construction totals increase to 30% to 35% share this year, and if other telecom projects use directional drilling to the extent U S West did in Omaha, telecom trenchless construction (mostly with directional drilling equipment) will be far ahead of other industries.

Equipment manufacturers see high growth potential in telecom.

"We are seeing a tremendous increase in the use of directional boring equipment for telecommunications installations," says Scott Pollman, product manager for The Charles Machine Works, Perry, Okla., manufacturer of Ditch Witch directional drilling equipment.

No Surface Damage

"This is exactly the type of work directional boring equipment was designed to do—make underground installations under paved surfaces, beneath landscaped areas and in easements already crowded with utility lines, and do the job without a lot of surface damage," Pollman continues. "Many areas can't be trenched, so directional boring is the only choice."

Directional drilling is having a major impact on the installation of new telecommunications systems, affirms Mark Van Houwelingen, trenchless technology product manager for Vermeer Manufacturing, Pella, Iowa.

"Directional drilling can install cable for the Information Superhighway without destroying our yards and streets and rivers," says Van Houwelingen. "That makes homeowners, environmentalists and everyone happy."

U S West has applications on file to build multimedia networks in five other metropolitan areas: Denver; Minneapolis-St. Paul; Portland, Ore.; Salt Lake City and Boise. Most other major carriers have projects under way as well.

Directional drilling equipment is also on the job in the Bay Area of Northern California as Pacific Bell begins work on $16 billion in improvements to its core telephone network.

Leroy Schoon, president of Schoon Construction, Cherokee, Iowa, has been a telecom utility contractor for 27 years. He stresses the importance of keeping up with advances in equipment technology to remain competitive. Schoon has seen equipment change over the years; his crews install cable with trenchers, vibratory plows and now directional drilling equipment.

"Horizontal directional drilling is the underground method of the future," especially in urban areas, says Schoon. "In the future, we will see less trenching and more directional drilling."

Supervisor Gene Wallace of Lithonia, Ga.-based CableCom—a contractor for U S West in Omaha—says much of the Information Superhighway will be installed in areas where not damaging the surface is an important factor.

"From a man in the field," he says, "I believe directional drilling is the future."

At its peak, U S West Communications had more than 100 crews installing more than 500 miles of hybrid fiber/coax technology to serve 52,000 homes in Omaha.

"Directional boring equipment is playing an important role in the placement of fiber optic and coaxial cable along the route of the Information Superhighway," says Tom Smith, executive director-broad-

"Directional drilling is having a major impact on the installation of new telecommunications systems. It can install cable for the Information Superhighway without destroying yards, streets and rivers. That makes homeowners, environmentalists and everyone happy."

band development for U S West Communications.

Directional drilling equipment was used 60% to 70% of the time when work occurred in developed residential areas, according to Smith.

Capabilities of today's directional drilling systems seem custom-designed for the requirements of modern telecommunications construction. Directional drills can install innerduct or cable beneath streets, highways, sidewalks, parking lots and other paved surfaces, in easements with other utility lines already in place, under expensively-landscaped areas, and even below rivers and lakes.

Directional drilling causes little surface damage, substantially reducing restoration requirements—and costs. Cable can be installed under busy downtown streets without stopping traffic.

Directional boring equipment is relatively new; the first models didn't appear until the late 1980s. Early research and initiative came from electric and natural gas utilities.

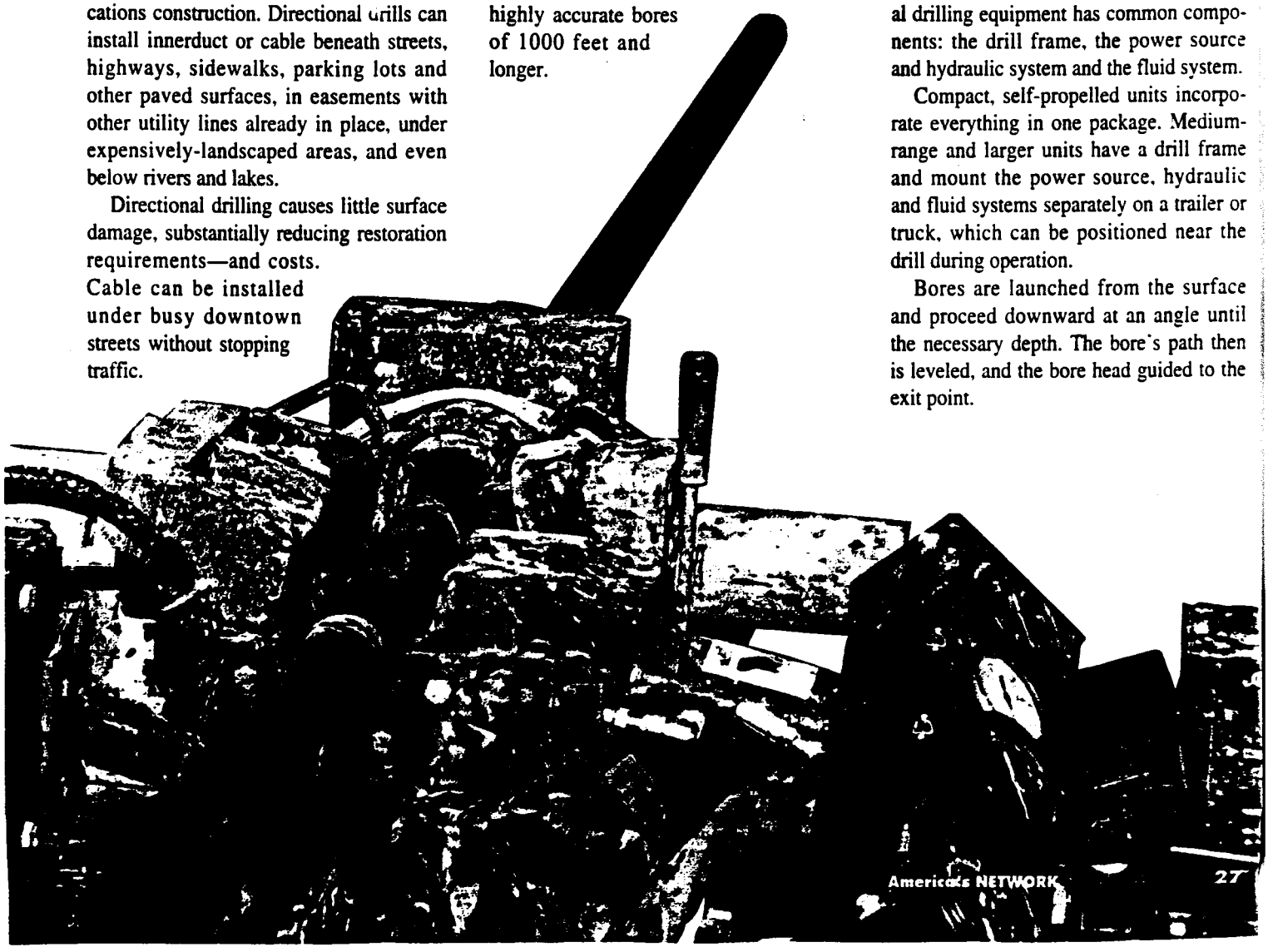
Equipment improved rapidly, and today directional drill models for utility work range from compact units for service lines of 100 feet or less to larger models that can make highly accurate bores of 1000 feet and longer.

Directional drills are rated by thrust and pullback capacities. Compact models start at 3500 pounds of thrust-pullback capability; larger utility machines are rated to 30,000 pounds or greater, with many models in between. More than a dozen manufacturers make and sell utility-size directional systems.

Regardless of size and brand, directional drilling equipment has common components: the drill frame, the power source and hydraulic system and the fluid system.

Compact, self-propelled units incorporate everything in one package. Medium-range and larger units have a drill frame and mount the power source, hydraulic and fluid systems separately on a trailer or truck, which can be positioned near the drill during operation.

Bores are launched from the surface and proceed downward at an angle until the necessary depth. The bore's path then is leveled, and the bore head guided to the exit point.



DIG IN: *Crew operates directional system in San Jose, Cal., as work begins on Information Highway project in Bay Area.*

Trenchless *continued from page 27*

Bore head location, depth and position of the slanted face of the bore head are monitored on the surface with electronic tracking equipment. The drill operator uses data on the face position of the drill head to adjust the direction of the bore.

As the bore progresses, sections of drill pipe are added. Once the bore head exits the ground, cable or innerduct is connected and pulled back through the initial bore. A back reamer may be used to enlarge the hole's diameter to accommodate innerduct. Sections of drill pipe are removed as the material is pulled back to the drill frame.

Drilling fluid assists in the initial bore and lubricates the hole during pullback. Fluid additives are chosen according to soil conditions.

On the U S West Omaha project, bores ranged from 200 to 500 feet to install primary legs of the network. Homes were connected to U S West's main line system at nodes, each serving about 400 homes. From the nodes, cable carries telephone and video signals to an underground network where hybrid cable is spliced together.

Many construction sites contained fences, swimming pools, underground sprinkler systems, gardens and other obstructions that made trenching difficult. Existing buried utilities also limited trenching.

As work got under way, CableCom, one of two primary contractors, found trenching slow going and the cause of numerous complaints. Supervisor Wallace decided to try directional boring and purchased a compact, self-contained directional drilling system, small enough to maneuver and work in tight spaces. CableCom bores averaged 300 feet during the project.

Stan Lebakken of Communicor Corp., Minneapolis, the other primary contractor, says he realized at the outset directional boring would be needed for 50% to 60% of the work. To avoid existing utility lines, Communicor simply bored five or six feet below utilities already in place. After each bore, cable or innerduct was pulled back through the hole.

No Paving Cuts

Ultimately, contractors and subcontractors used 29 directional drills in Omaha. Crews also used 30 pneumatic piercing tools to punch holes under streets, driveways and sidewalks so paving would not have to be cut.

An AT&T fiber optic installation in Atlanta illustrates the benefits of directional drilling in busy urban areas. The project involved the installation of 30,000 feet of 4-inch innerduct for long-distance fiber optic cable. Cannon Construction, Brookhaven, Miss., subcontracted boring to Southern Boring, Hiawassee, Ga.

Lane Thomason, president of Southern Boring, says his crew used one Ditch Witch boring system (30,000 pounds of thrust and pullback). In addition to the 4-inch innerduct for AT&T, the machine pulled in an additional 4-inch plastic pipe for the city of Atlanta. All the work was downtown, much of it in the heart of the central business district. Initial plans called for trenching, says Thomason.

"It's hard to imagine the disruption and mess excavations would have caused," he says. "The cost would have been much higher because of street repair work that would have been necessary."

No streets were closed during the job. The drill frame was positioned at the sides of streets or on sidewalks. Part of one lane for a portion of a block was blocked during each bore. Several bores had to make sharp turns, and the crossing under Peachtree Street in the middle of downtown required a steep up grade.

"Throughout the job, traffic always moved smoothly," says Thomason. "The project was finished on schedule, and everyone was very pleased."

Directional boring may not completely replace other methods. Trenchers and vibratory plows also played a part in the Omaha project and will continue to do most of the work in unimproved areas free of utilities and where surface disturbance isn't a factor.

U S West's Smith does not foresee the percentage of cable installed with directional drilling increasing over present levels, but points out the anticipated volume of broadband construction will mean the total miles of cable installed by this method will increase significantly through 1996 and beyond. ■

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