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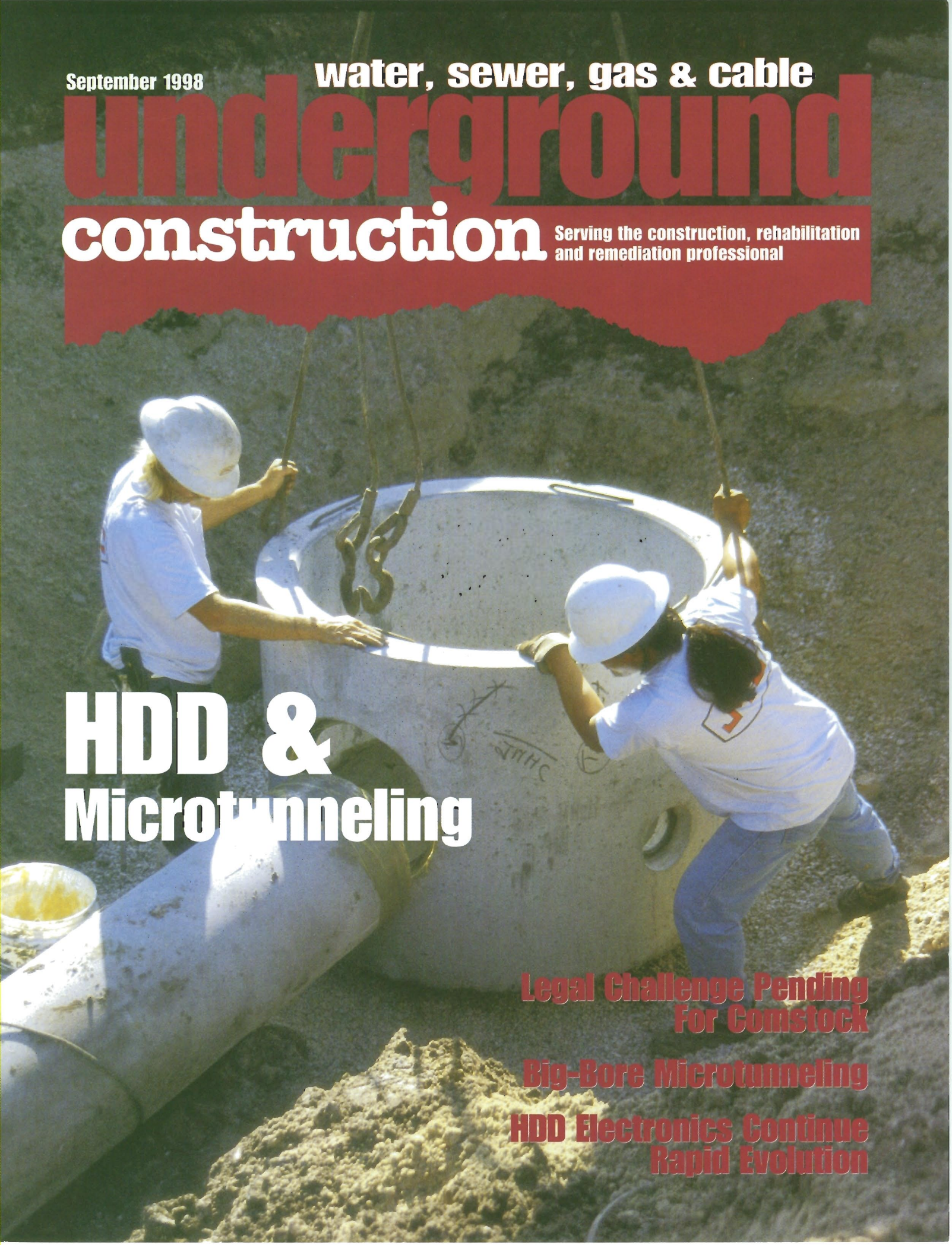

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Watertight Storm Sewers Provide Long-Term $avings

Design professionals and system owners have known for many years that infiltration of groundwater into sanitary sewers can be an expensive problem. More recently, many of these same professionals have become aware and are concerned with infiltration into storm sewers. Although groundwater is "clean water" and does not need to be treated, its infiltration creates a different set of problems which may be more far reaching and expensive to remedy than previously considered.

The problem of infiltrating storm water can affect the entire highway infrastructure. In most cases, leaks erode backfill into pipelines leaving voids around structures and under streets or other improvements. Although it costs money to clean the debris out of the pipeline, it is much more expensive and inconvenient to replace backfill or repair damage caused by settlement due to voids created under the street. The problem is compounded in high traffic areas, particularly at busy intersections in large cities. Since most repairs do not go to the root of the problem, it is necessary to repair the same structures over and over again.

Unfortunately, problems caused by storm sewer infiltration do not surface immediately. Of course, storm sewers don't leak when they are new. Inspectors make sure of that. In fact, most contractors have to stop any leaks that develop during the first year of their product's life. Some developers and municipalities require even longer warranty periods.

Most leaks begin after a pipeline is a few years old and they usually start where a pipe enters a manhole, catch basin or some other structure. Leaks start at the connections between pipe and structures because rigid mortar joints in most storm sewers make it the weakest point in the system. When the connections are made with brick and mortar, the slightest movement or vibration will create a crack in that connection and the water can begin to seep in. If the joint is close to the surface, freeze/thaw conditions can serve to accelerate the condition. More pronounced movement can shear the pipe at the connection. Most other joints in the system can tolerate movement and vibration because they are protected by some sort of flexible connector or water stop.

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Design professionals and system owners have known for many years that infiltration of groundwater into sanitary sewers can be an expensive problem.

Flexible connectors

The facts show that almost everyone involved with storm sewers benefits when flexible connectors are used between pipes and structures. Contractors benefit because flexible connectors increase production and reduce overhead and supervision. Developers and engineers also benefit from contractors' increased production, and they especially like the faster inspection approvals and reduced call backs which often result from the use of flexible connectors. The greatest benefits, however, accrue to the sewer system owners and the people who ultimately pay to purchase and maintain the system.

The long-term cost of leaking connections can be staggering. Slight settling of structures takes a big bite out of roadway maintenance budgets every year, and a serious pavement failure can easily cost $10-15,000 to repair. Danger and disruption may not show up as a budget item, but most elected officials, and the people who work for them, know the costs are significant. Property owners are well aware of the reduced property values which result from the "run down" look that patched streets, curbs and gutters give their neighborhoods.

In some parts of the nation, flexible connectors have been used by leading contractors, even when they were not specified. JMHC, Inc., Longwood, FL, is one of those contractors. Steve Blomeley, president of JMHC, says his company has been using flexible connectors since 1989, and there is no way they would go back to brick and mortar.

"There are so many benefits of using flexible connectors that I'd be hard-pressed to think of them all," he said. "First of all, it's hard to accurately estimate the cost of using brick and mortar connectors. It's different with every crew, every job, and every structure. But, I know almost exactly what it will cost to use flexible connectors. And, I know I will not have to go back later and stop leaks. Plus, I'll get at least 10 percent more total production when I use the flexible connectors, often 20 percent. That gives me a competitive advantage," he explained.

"We cost a structure almost as if it were another piece of pipe. We include the cost of the structure, the connectors and whatever materials go under it. The materials then, are a fixed cost. You don't have the variables of lost bricks, cement that gets caught in the rain, whether or not water is available, how long you'll have to wait before you backfill, and other variable costs that go into brick and mortar connections. We have very identifiable, fixed costs. That's important if you have 100 structures on a job and you're leaving yourself open to just how long it will take to seal up a 48-inch pipe, how much material it will take, and what quality the connection will be," he said.

Phil Diana, Pipe Supervisor, Kearney Development, Tampa, FL, agreed with Blomeley. "I know that flexible connectors look like they cost a little more up-front, but we more than make it up in the long run because I'm going to be able to put more pipe in the ground, and it won't leak. When you come to a structure, it's almost like setting another joint of pipe. Within half an hour you're out the other side and already backfilling around the structure. They really let you smoke. I can probably lay an extra 100 feet of pipe a day when I use flexible connectors," he said. "I've been using them for 14 years, so that represents a lot of extra pipe they've let me put in the ground."

Richard Vanderhook, Executive Vice President, Chapman Contracting Co., Tampa, FL, pointed out that flexible connectors can also significantly reduce dewatering costs. "With brick and mortar, you can't backfill until the mortar dries. In Florida, water can get pretty deep in five hours, so you have to keep pumps running. Even then, when you go back you have to lift the mud out before you can start compacting. All that waiting, pumping and lifting costs money," he said. "Flexible connectors let you keep moving."

System owners save

While contractors get more production and fewer leaks by using flexible connectors, the biggest savings accrue to system owners for years into the future. This fact was addressed by Marc Eshelman, P.E., special projects group leader, P. B. Booker Associates Inc., a consulting firm in the St. Louis area.

"Connectors, whether they are flexible or not, seldom cost more than 3 percent of the total job, but the greatest expense of not using flexible connections comes later, if those connections start to leak. Then, you have the cost of going back and uncovering the structure, fixing the problem, backfilling the structure and repairing the street," he said. "Just stopping a leak to prevent subsidence can be expensive, but repairing a sheared pipe or pavement failure is very expensive," he continued. "A pavement failure alone can cost several thousand dollars to repair, plus the danger and disruption. If it's severe, it could cost $10-15,000."

"It is a requirement of Metropolitan St. Louis Sewer District (MSD) that piping must have an adequate water stop where it enters a structure, but we often specify this system for non-MSD projects as well. We have found that when we use flexible connectors, we are less dependent on field conditions and construction methods. We have more confidence in products which have been manufactured in a controlled environment, and we have found that installation quality is more consistent than brick and mortar construction.

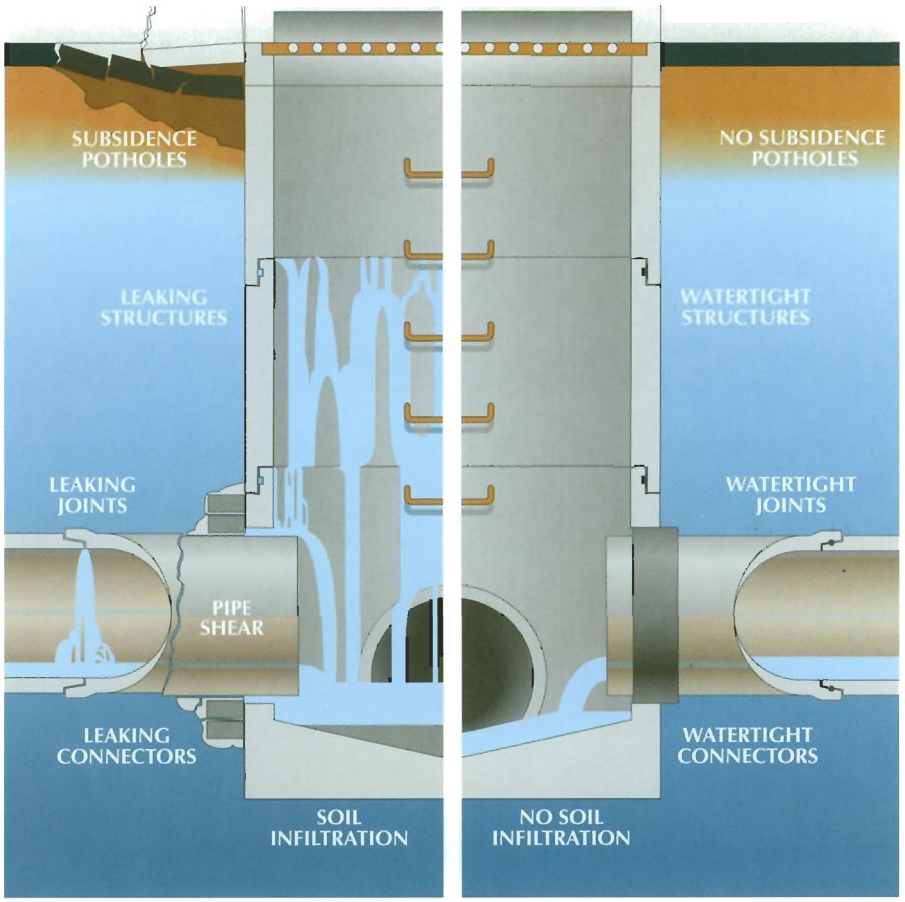
"A flexible connection is an important advantage," Eshelman continued. "Sometimes the soil material around a structure will shift or settle, especially if it's necessary to have the project on a fill site.

Most leaks begin after a pipeline is a few years old and they usually start where a pipe enters a manhole, catch basin or some other structure.

If you have a tightly grouted joint where the pipe goes into the structure, you run the risk of cracking the structure or the pipe. At the very least, the mortar can crack and the watertight seal will be lost.

"We also like the watertight effect of flexible connectors. A lot of our structures are in the street and we cannot afford to have undermining. Flexible connectors result in watertight seals. Therefore, we know the soil around the pipe entrance won't migrate and start to undermine the pavement."

Eshelman believes flexible connectors would be used more if it were not for tradition and a lack of knowledge. "People have used sand/cement grouted connections for so long, they don't really give it much thought. If they did, they would be more likely to use flexible connectors."



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