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ROADS & BRIDGES

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Drainage Installation

Innovative Drain Systems on Salt Lake City's I-15

ADS N-12 ProLink Ultra® Pipe Lowers DOT's Cost While Increasing Confidence.

TEA-21 Means More Work, Changes for Paving Industry

Digging Up the Dirt on Excavators

The pipe has a neoprene gasket on the outer rim of the spigot end of the pipe to meet all soil-tight applications.

Largest design-build freeway project counts on PE drainage pipe

Revamped 12-lane interstate to be main Winter Olympic thoroughfare

The $1.5 billion design-build I-15 project in Salt Lake City is relying on corrugated and smooth-lined polyethylene pipe, not only to channel water from the roadbed, but also to help the project be completed in time for the 2002 Winter Olympics (See *The Reconstruction of I-15*, February 1998, p. 29). The objective to complete this project on time is a priority because delay penalties start at $50 million.

Corrugated polyethylene pipe (PE), which can be handled with minimal equipment by a one- or two-person crew, is providing a long, lightweight alternative to concrete pipe, according to its maker, Advanced Drainage Systems (ADS), Columbus, Ohio **(Circle 927)**. The PE-pipe's long "stick" length is designed to reduce the number of joints needed, which also saves labor and installation time. More than 33 miles of PE pipe, mostly 24- and 30-in. diam., is being used for the gravity storm drain system: I-15 general contractor Wasatch Constructors expects the PE pipe to save about 15% in materials, labor and time compared with concrete pipe.

The pipe being used is the ADS N-12 ProLink Ultra series with an integral bell and spigot to provide a secure gravity storm drain system.

"Wasatch Constructors expects the PE pipe to save about 15% in materials, labor and time compared with concrete pipe."

"Because it is PE pipe, we don't have to string it out along the trench like we do concrete," said Marwan Farah, project roadway/design coordinator for I-15. "About a foot-and-a-half of granular fill is placed into the trench as pipe bedding. The granular fill depth depends on the amount of clay in the soil. The crew then lays pipe sections into the trench and 'pops' them together. A foot of fill is placed over the pipe and packed down. Then we totally backfill the trench. Usually, the trench is about 3 to 4 ft. deep for the 24 in.-diam. pipe, with some sections buried 14 to 15 ft. deep below the sub-base.

"The trench is easily dug with a backhoe. The pipe's even profile eliminated the need for additional 'dig-outs' to accommodate the bulging bell found on concrete and other PE pipe."

The pipe has a neoprene gasket on the outer rim of the spigot end of the pipe to meet all soil-tight applications. It also meets AASHTO and ASTM specifications for "soil tight" and water exfiltration isn't a concern, the maker said.

Tom King, ADS engineering vice president, explained, "Many storm sewer systems today use joints with performance levels measured by ASTM tests. Our N-12 ProLink Ultra joints, designed as soil-tight, comply with the more stringent performance tests."

The pipe also features a smooth interior wall for maximum hydraulic flow and a corrugated exterior for strength.

Information for this article was provided by Advanced Drainage Systems.

Big project, little time

The I-15 Utah DOT (UDOT) project carries some staggering numbers. The $1.5 billion project will demolish and replace 17 miles of major interstate highway, including 144 bridges and overpasses.

Two facts prompted this project, called the biggest design-build freeway job in North America. The 30-plus-year-old I-15, Salt Lake City's main north-south route, had reached the end of its natural life span and had to be replaced. UDOT also decided that the route should be expanded to handle increased traffic volumes.

The new I-15 includes advanced traffic management system components that link 550 traffic signals, hundreds of traffic sensors, 130 video cameras to monitor traffic flow and three traffic control centers throughout the Salt Lake valley. It will carry traffic to skiing and other sports sites for the Winter Olympics in February 2002.

But the project's biggest challenge is its short time frame — 4½ years — which necessitates giving top priority to materials, construction methods and time-saving methods.

The job went to Wasatch Constructors, a consortium of contractors and design companies, led by Kiewit Construction, Granite Construction and Washington Construction.

Kiewit Construction, of Omaha, NE, is one of the largest general contractors in the U.S. and builds more lane-miles of interstate highways than any other contractor.

Granite Construction, Watsonville, CA and Washington Construction, Boise, ID, share the highway and civil construction of I-15. Design is handled by Sverdup Civil, St. Louis, MO, and DeLeuw, Cather, of Pasadena, CA.

Starting out

UDOT's first step was deciding to use the design-build method of construction.

The typical design, bid and build process would have taken eight or more years. Wasatch was given just four-and-a-half years. Still experimental in the U.S., the design-build process has designers and builders working together, with construction starting as the blueprints come off the drafting table.

The design-build concept got its start in commercial construction projects. This is the first time it has been used on such a massive civil engineering project. Farah explained how the materials selection and approval process worked. "We had teams that would rate products and design by points. For drainage, polyethylene pipe was the hands-down winner, providing the savings the I-15 rebuild needed."

There is 33 miles of pipe on the project, Farah said, "and 15% savings using PE pipe instead of concrete over 33 miles adds up quickly and becomes a significant number. An 80-ft. run of polyethylene pipe requires about three joints," Farah said, "while reinforcing concrete pipe (RCP) needs 10. Add that to the ease of handling PE pipe, the fast installation plus the security of the rubber-gasket seal and it was obvious that the ADS product was the choice.

"ADS N-12 ProLink Ultra pipe, supplied in 20′ lengths in diameters from 4 to 48 inches, streamlines installation, requiring less time, manpower and machinery."

"You also have to string out concrete pipe before installation, doubling the risk of cracking the bell or spigot due to rehandling. It also takes more than just a single forklift to move a large diameter concrete section, again increasing chances for damage," he added.

"The PE pipe is tough," Farah said. "We can drop it 100 ft. and nothing will happen to it. If the bell on a concrete pipe is hit, the joint is gone and we have to get a new section. Even metal pipe is easily dinged and that's no good."

When they selected the PE pipe, Wasatch also had to consider a contract stipulation that required it to maintain the roadway for 10 years.

"We certainly didn't want to have to dig up the new road to replace drainage pipe," said Donald Clark, P.E., roadway engineering oversight coordinator for UDOT.

The hydraulics provided by the pipe's interior design will, Clark believes, minimize silt build-up.

"The bell and 'O' ring will prevent infiltration," he said. "Metal pipe would certainly require a drag bucket be pulled through to clean it out and this could damage the pipe and the joints."

Farah knew that virtually nothing would damage PE pipe.

"I spent many years dealing with and overseeing the installation of PE-pipe drainage and leaching systems for mining operations and that is a much tougher environment on the pipe than salt."

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ADS N-12 is easily delivered and light enough to position on the job site.

ADS delivered N-12 ProLink Ultra® pipe in 24″ and 30″ diameters, 1,000′ at a time.

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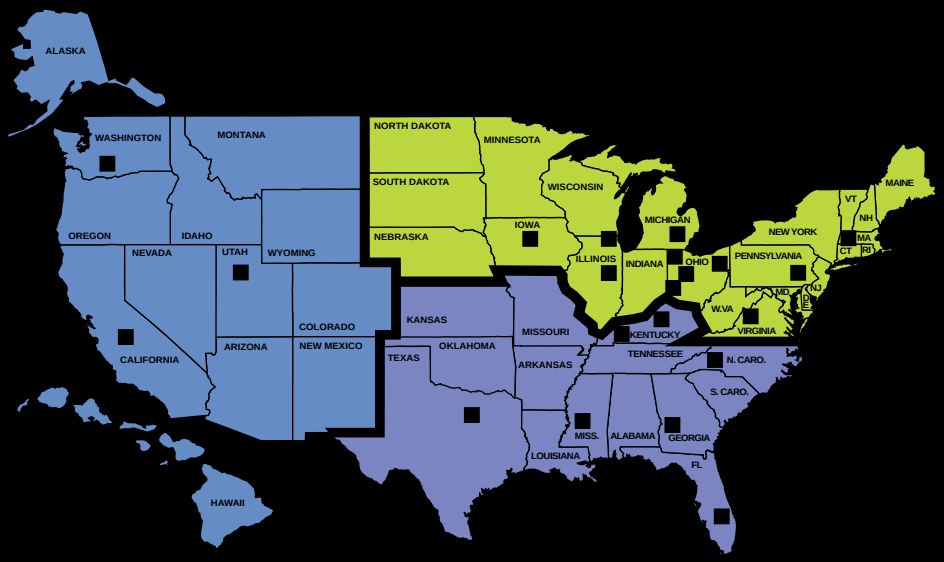

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