

Harsh Alaska climate no match for HDPE pipe

PROBLEM:

A bluff that overlooks a pristine wetland, clear King Salmon Creek in Alaska, was littered with countless barrels of waste, some of it hazardous, dumped there by the community, local businesses and the United States Air Force. From the 1940's to the 1970's King Salmon used the bluff as a dumpsite.

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

In the mid-90's, the Air Force hired a crew to get rid of the mess, Bristol Environmental and Engineering. After considering several ways to take care of it, it was decided that the plan least costly and least damaging to the bluff was to dig up the exposed waste and cover all that was underneath with an earthen "cap" to keep all the waste in place. An infrastructure of perforated dual-wall high density polyethylene pipe, 12 inches in diameter, was installed to collect any contaminants leaching out. The underground drainage system captures water from a spring near the bottom of the bluff and sends it to a treatment station that filters out any contamination before any of the water goes into the wetland.

INSTALLATION DETAILS:

A filter sock slipped over the pipe makes the ideal method of collecting any possible seeping ground contamination. The sock allows contaminated water to filter through the pipe, while keeping soil out. The contaminated water is then funneled safely through a solid HDPE pipeline to the treatment station.

Project: Solid Waste Drainage System

Location; King Salmon, Alaska

Engineer: Jim Carruth

Contractor: Rick Green Bristol Environmental

Timing: 1996

"Alaska is really the perfect example of just how versatile this pipe is. It can be used for most applications under the widest variety of conditions. And the best part is, you don't have to worry about it once it's in the ground. It'll do its job. And it'll last."

Rick Green, Project Coordinator of Bristol Environmental Atlanta Parks & Recreation

Perforated pipe key in park drainage project

PROBLEM:

A creek running through Cleveland Avenue Park was overflowing on a regular basis, leaving unwanted ponds in the grassy areas as clay beneath the shallow topsoil would not allow stormwater to percolate back down into the ground.

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

Atlanta Parks & Recreation solved the problem by using 4" and 6" perforated

polyethylene pipe to improve the hydraulic performance of a series of French drains running through the park and alongside a ball field. • The Artis Group, Decatur, Ga., installed 1,000 linear feet of perforated pipe down the center of the drains to speed water flow. The smooth interior of the pipe provided greater hydraulic efficiency than ditches alone.

INSTALLATION DETAILS:

Azimi covered the pipe with a filter fabric, gravel, native soil, and finally, sod. "The swales are (draining) much better now," Azimi said. □ He finished the job by installing a polyethylene pipe drainage system beneath a playground area that featured a 12" deep sand surface over the native clay soil, and improving the nearby sewer lines. "The drain helped us provide a dry play area one hour after it rained," he said.

Project: Stormwater Drainage System

Location; Cleveland Avenue Park, Atlanta, GA

Engineer: M. Nasim Azimi, C.E. City of Atlanta Parks & Recreation

Contractor: The Artis Group, Decatur, GA

Timing: Fall 1997

"Corrugated polyethylene pipe is good to work with in any application for its strength and easy handling."

M. Nasim Azimi, Civil Engineer, Atlanta Parks & Recreation

Superior hydraulics relieve neighborhood flooding

PROBLEM:

Several homes along Forrest Drive, a residential street in North Pekin, Ill., near Peoria, suffered serious flooding during periodic heavy rains. The land along the drive was very flat, and the village's old ditch-and-culvert drainage system was incapable of handling even 1.5" of rain, creating frequent floods for area residents.

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

The superior hydraulics of smooth interior corrugated polyethylene pipe helped relieve the flooding problems. Frank Hardy, North Pekin's Superintendent of Public Works, designed a new stormwater management system entirely of corrugated polyethylene pipe. Corrugated pipe's smooth interior provided maximum hydraulic capacity under minimal fall conditions. "This problem was solved...because of the superior Manning 'n' value of corrugated polyethylene pipe. We could make the water flow, with little fall at all," Hardy explained. The new system feeds into a nearby creek, and has eliminated the flooding problem completely. • Working with both coupling bands and bell-and-spigot joints, Hardy said his crews were able to install HDPE much faster than other types of pipe. He also felt comfortable stockpiling the pipe along Forrest Drive even though many children live in the area - he said he would have been hesitant to do that with metal or concrete pipe.

INSTALLATION DETAILS:

The new system consisted of 900 feet of 15" - 24" corrugated polyethylene pipe. The 15" pipe was laid at a pitch of 0.0028" per foot, and the 24" pipe at 0.0015" per foot. The pipe was laid beneath 12" of cover, using tees covered with metal grates as catch basins. "This let us real easily look right down into the pipe and inspect it for debris," Hardy said.

Project: Stormwater Drainage System

Location; Forrest Drive North Pekin, IL

Engineer: Frank Hardy, Village of North Pekin

Contractor: Village of North Pekin

Timing: Spring, 1997, October, 1997

"Now the homeowners don't worry about floods with every storm!"

Frank Hardy, Superintendent of Public Works, North Pekin, IL.

Underground system maximizes park land

PROBLEM:The Everett Parks & Recreation Department had limited space to create a new park on Silver Lake - less than four acres. Plans included a dock, a pier, a grass play area, restrooms and walkways. Local environmental regulations mandated that the park include a water quality-enhancing wet pond to manage runoff, but park designers didn't want to waste space on an oversized pond

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

Engineer Ryan Sass immediately turned to corrugated polyethylene pipe for its ease of use and minimal cover requirements. He designed a 160-foot long storm drain of 8" and 12" pipe to channel runoff from the parking lots to biofiltration swales. In addition to its ease of installation, Sass selected HDPE for its cost-effectiveness - for the pipe itself and the manpower required to install it. "I very quickly eliminated products other than polyethylene pipe because of this," he said.

- Sass is planning to add 350 feet of 36" corrugated polyethylene pipe for underground water storage between the pond and the park's biofiltration system. The "U"-shaped storage pipe will provide extra storage space for stormwater runoff and eliminate the need for a larger pond to accommodate the area's frequent rains.

INSTALLATION DETAILS:

Sass selected the 8" to 12" pipe based on its ability to handle a 25-year storm event. "I wanted to keep the diameters relatively small to keep the velocity up and keep the drain self-cleaning," he said. The new storm drain was buried one to four feet below the surface, which provided significant cost advantages during installation.

Project: Stormwater Drainage and Storage System

Location; Hauge Homestead Park, Everett, WA

Engineer: Ryan Sass, P.E., Everett Parks & Recreation

Contractor: Ohno Construction, Seattle, WA

Timing: Phase I, Fall, 1997, Phase II, Spring, 1998

"I use smooth interior corrugated polyethylene pipe almost exclusively because of its good flow characteristics and its ability to be used with only one foot of cover."
Ryan L. Sass, P.E. Everett Parks and Recreation, Everett, WA

Smoothwall pipe proves ideal for water meter pits

Problem:

The town of Bosanquet needed a way to install its water meters in homes without basements. The outdoor installation had to be below ground level, yet easily accessible and resistant to frost, rain and snow damage. • Attempts to use concrete pipe and precast concrete pits proved to be expensive and inconvenient. The backhoes and bulldozers needed for installation were difficult to maneuver between homes, and the concrete pits were too narrow to easily inspect and repair the water meters. They were also ineffective in keeping the water meters from freezing in the Canadian winters.

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

Peter Hegler, P.Eng., working for the town of Bosanquet, designed his own meter pits using 30" (750mm) diameter smoothwall high density polyethylene pipe. So far, he's used 2,000 feet of pipe to create about 400 meter pits; he's in the process of building new pits to install an additional 400 meters along a new 54-mile water line. "You get twice the product for half the price of the all-concrete pits," Hegler says. He has shared his idea with representatives of other nearby municipalities, and received a very favorable response.

INSTALLATION DETAILS:

Hegler cuts the pipe into five-foot lengths, installs it vertically below the ground, and covers the top with foam insulation and a concrete lid. "The 1" (30mm) dead space between the walls of the pipe provides enough insulation to keep the meters from freezing. The installation is much easier, since we can make field adjustments by hand," he says.

Project: Water Meter Pits

Location; Bosanquet Regional Water Supply, Bosanquet, Ontario, Canada

Engineer: Peter Hegler, P.Eng., Bosanquet, Ontario

Contractor: Town of Bosanquet

Timing: 1997-present

"The polyethylene pipe is easier to handle, it's lighter weight, and it's cheaper to use."

Peter Hegler, P.Eng., Bosanquet Regional Water Supply, Bosanquet, Ontario

HDPE performs best in Bow

PROBLEM:

In Bow, N.H., the Public Works Department updates the storm sewers beneath its 110 miles of roads as part of a regular maintenance program. Public Works

Director Leighton Cleverly started by using traditional pipe materials, but didn't like the way they handled or stood up to local conditions. "For the last several years we have used HDPE exclusively. We have progressed from RCP (reinforced concrete pipe) to CMP (corrugated metal pipe), to HDPE, where we will stay," he says.

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

Corrugated high density polyethylene pipe (HDPE) is the only material the Town of Bow uses in its roadway drainage projects. The community of 6,500 residents has 110 miles of roadway, and as old roads are upgraded and new roads built, Cleverly includes storm drains made of HDPE. • Cleverly likes corrugated polyethylene pipe's ability to withstand frost action in the varied soil conditions beneath the town. "Metal pipe and cement pull apart from heat, and the freeze-and-contract movement in the winter. If there's a pocket of clay, water beneath the surface humps it up when it freezes, and that makes metal pipe come apart at the joints," he adds, noting that he hasn't seen any similar problems with corrugated polyethylene pipe. • Additionally, Cleverly likes the safety factor HDPE pipe provides over metal pipe. He describes freshly-cut metal pipe ends as, "razor-sharp," compared to HDPE. "We try to be as safety-conscious as possible," he says.

INSTALLATION DETAILS:

Since 1993, Cleverly estimates the Town has installed at least 5,000 feet of 12"-24" pipe; private contractors hired by subdivision developers have installed hundreds of feet more.

Project: Stormwater Drainage System

Location: Town of Bow, NH

Engineer: Leighton Cleverly, Director of Public Works Bow, NH, Private Developers

Contractor: Town of Bow, NH

Timing: 1993-Present

"HDPE is safe to handle. It's the best thing that's come along."

Leighton Cleverly, Director of Public Works Bow, NH

Corrugated Polyethylene pipe mitigates mine runoff

PROBLEM:

Underground and surface mining have altered much of the landscape of Central Pennsylvania. Over the years, stormwater runoff has permeated the loosened soil, called "strip spoil," and ponded in abandoned mines, leading to acid mine drainage that has damaged concrete highway drainage pipes.

THE CORRUGATED POLYETHYLENE PIPE SOLUTION:

Retained to design a retail center in Clearfield, Penn., L. Robert Kimball and Associates, Ebensburg, Penn., used more than 11,000 feet of smooth interior corrugated polyethylene pipe to construct an extensive stormwater drainage system. "Given the aggressiveness of the groundwater, no other pipe material offered the long life and ease of installation that corrugated polyethylene pipe

possesses," said Drew Smith, project construction coordinator. • The site improvements significantly reduced the production of acid mine runoff by reducing the area of mined land exposed to rain and snow. Stormwater runoff from the parking lot flows into the storm drain system, and into a nearby creek, where it joins a much-reduced flow of acid runoff from polyethylene French drains inside the vacant deep mines. • The HDPE improvements eliminated the Pennsylvania Department of Transportation's (PennDOT) need to replace highway drainage pipes near the development. The acid mine runoff prematurely eroded the concrete pipes, but will not affect the new HDPE replacements.

INSTALLATION DETAILS:

4" - 54" diameters comprised the system. Some was used in unique applications, such as the large diameter pipe that was converted into distribution boxes for adjacent wetland construction. Other pipe was cut in half lengthwise and used as a diffuser for water entering the wetland.

Project: Acid Mine Runoff Remediation

Location; Clearfield, PA

Engineer: L. Robert Kimball and Associates, Inc., Ebensburg, PA

Contractor: L. Robert Kimball and Associates, Inc., Ebensburg, PA

Timing: Summer, 1997

"With the...site improvements, stormwater infiltrating the strip mined soil has greatly reduced the production of acid mine drainage."

Drew Smith, L. Robert Kimball and Associates, Inc., Ebensburg, PA