Separating Storm Water

The time had come for New Glasgow to remove storm water from its sanitary sewer system.

Corrugated HDPE pipe improves wastewater quality in Canadian town

By Steve Cooper

When a town's goal is to be true to its 135-year-old motto—"Let New Glasgow Flourish"—one of the first places to start is rebuilding the infrastructure. And it is not just a phrase: It is a way of life and path of guidance for the mayor, town council and approximately 10,000 residents of New Glasgow, Nova Scotia, Canada.

New Glasgow Mayor Barrie MacMillan.

The latest project focused on these ambitions is a combined sewer overflow (CSO) program to remove storm water from the town's sanitary sewer system. The installation of new storm sewers for 12 streets and the upgrade of 12 pumping stations will help remove the storm water from the sewer system and make the East River Environmental Control Centre operate more efficiently.

"We are upgrading our infrastructure at every chance we get because it's important," said New Glasgow Mayor Barrie MacMillan. "We want to separate the storm water, and we're doing that at a couple of areas within the town. The major area being upgraded is a tidal estuary for salt[water] and freshwater and is the centerpiece of our riverfront revitalization. This CSO reduction is a critical project for us on a number of levels."

"Today this is a prime concern for the majority of municipalities across North America," said Tony Radoszewski, executive director of the Plastics Pipe Institute Inc. (PPI), a nonprofit trade association that promotes plastic pipe. "In the past, rainwater flowed into the sanitary sewer system and was then treated. Extra storm water would, during times of a heavy rain, create an overflow. This CSO generally discharged into a nearby water body. With the latest EPA [U.S. Environmental Protection Agency] Phase II requirements in the U.S. and similar regulations approved by the Canadian Council of Ministers of the Environment in 2009, controlling and managing storm water runoff is imperative, not only for the good and welfare of people, but also to meet these new governmental standards."

"New Glasgow has found the way," Radoszewski continued. "Their program is a cutting-edge blueprint for successful storm water quality improvements that deliver to federal Canadian mandates requiring the reduction of combined sewer systems. Their example is a good one to lead the way for achieving broad-reaching compliance."

The New Glasgow Example

New Glasgow has seen the effects of weather pattern changes and recently has experienced more severe storms. A few years ago the north coastal city was pounded by several 100-year storms, which resulted in flooding of the downtown area. Even the flow volume from smaller storms due to the combined sewer and storm water system would overload the treatment plant. It was in 2009 that the city decided to take a closer look at the causes and find a solution to its combined sewer system.

A task force led by Bob Funke, P.E., then the town's chief engineer, determined that it was time to construct a trunk line extending from the downtown area to the river and intercept a secondary sewer that

was causing flooding in another part of town.

"We did a fairly good amount of investigation to determine the storm sewer shed areas and pinpointed two different areas where a trunk sewer line would cause positive reduction of CSO," Funke said. "We sized the pipe and found corrugated high-density polyethylene (HDPE) pipe provides a decided advantage."

"Looking at the water volumes and the various friction loss with the various pipes led us to using 900-mm-diameter HDPE pipe, which enabled us to save a diameter or two by using it instead of concrete," Funke said. According to him, the HDPE pipe has a very favorable Manning's rating, which means a better friction loss.

"This was critical because we had some deep cuts of between 12 to 15 ft, and in some cases our slopes were 1% or less," Funke said. "When you are designing a sewer separation project to be installed in tight quarters, you have to look at the smallest-diameter pipe that can deliver the largest volume of water. If you can take a half size off that, 6 in. means a lot to the construction crew. We would have been unable to do this project without the HDPE pipe." Some 740 meters of pipe was used.

Contractor Dan Tupper of Tupper Excavating further explained the situation for the McLean Street project. "When you're 15 ft in the ground between sewers and water mains and underneath high voltage lines and all the fiber-optic conduits we have today, and digging in and around those areas in very tight real estate, you want the smallest pipe possible. The ability to thread this pipe through very difficult areas was key."

The McLean Street section of New Glasgow is in a tidal area, experiencing tides of 4 to 5 ft. For Tupper and his crew, this meant getting the pipe in the ground and buried as quickly as possible.

"For about 1,000 ft we were fighting tidal water," Tupper said, "and in a few situations we were down in 10 to 12 ft of water. We constructed a dam at the river, which helped. We pumped that down below the river level, but we could only hold back about 5 ft of water. Once the tide got over that level and the water started squirting around the ground, we had to abandon until the next tide, which was 12 hours later. Still, we were able to move safely and quickly getting in two or three lengths a day."

"Over the years we've become more confident in using plastic pipe," Funke said. "We had experience when it started coming on the market here in Nova Scotia as a culvert pipe, and it has become a standard replacement for metal culvert pipe. Concrete was also being used, but for some of our applications it was difficult. The stubby pipe lengths are heavy and are not exactly easy to install. The HDPE pipe has 20-ft lengths that go together easily. Plus the HDPE pipe enabled us to get the flow rate we needed in a smaller-diameter pipe."

The pipe used was a double-walled (smooth inside, ribbed outside) corrugated HDPE pipe from Soleno called Solflo Max and manufactured locally at the Soleno McAdam, New Brunswick, Canada plant. This pipe meets ASTM standards for F405 and F667 and complies with Canadian Standards Assn. CAN/CSA B182.6. Soleno is a member company of the PPI.

"When you dig up concrete pipe after a period of time, it has stress cracks on the top caused by the pressure exerted on the pipe and all over from acids in the rain and water, plus saltwater and chemicals—pH and acidity," Radoszewski said. "HDPE can withstand these attacks. Acids and salt in the water will eat concrete. This is a significant consideration for any project, and critical for the endurance and success of this project near the water." Radoszewski also pointed to fewer joins as an advantage of HDPE pipe, as it reduces the chance of leaks.

"The engineering department is very confident about the plastic pipe," MacMillan said. "We're very happy with the contractor installing it and, most importantly, the project is within budget. It's good all the way around."

New Glasgow recently has taken on a reduction in the CSO as one of the town's major green initiatives, according to MacMillan. "We've also constructed state-of-the-art water treatment facilities, and we have an excellent sewerage processing plant that has produced a high level of sewage treatment since 1972," MacMillan said. "Today, we continue to exceed the water quality standards in Canada. We want to lead the way environmentally, with a strong focus on the quality of our water. Being good stewards of the environment makes good sense from a number of perspectives. If you maintain the quality of the river, your residents will enjoy it and it helps to attract new residents and businesses."

"We have challenges with a declining population, so we must work hard to keep and attract people to our area," MacMillan continued. "By ensuring that our rivers are clean, our water is great, having the best facilities, being environmentally responsible, embracing wind energy and looking to renewable and sustainable products, we are providing the highest quality of life at the lowest possible cost for our residents and employers. For us, this is good long-term urban planning." WWD

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The city did a thorough investigation to determine storm sewer shed areas in order to yield the greatest reduction of CSO.

Using HDPE pipe solved a number of challenges associated with this project.