PVC PIPE news

AVON LAKE MUNICIPAL UTILITIES COMBINED SEWER SEPARATION PROJECT

Avon Lake's unique solution for separating a combined sewer.

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Every so often, we at the Uni-Bell PVC Pipe Association come across a PVC pipe application that we haven't seen before. We recently found such a project in Avon Lake, Ohio - a community on lake Erie and just west of Cleveland. The project was unique in both its engineering design and its installation challenges. The concept has the potential of helping many sewer departments all over the US and Canada reduce the cost of separating their combined sanitary and storm sewers.

Before we get into the engineering and installation details, let's review some background information.

The Avon Lake Municipal Utilities was founded in 1925 and serves water customers in a 600 square mile area with a capacity of 40 MGD. On the wastewater side, it has a design capability of 6.5 MGD of average daily flow and 12.5 MGD during wet weather. Avon Lake is governed by an independent Board of Municipal Utilities elected by residents. The Board oversees the department's business. Avon Lake has been using PVC sewer pipe since the 1970s and recently began using PVC for water mains.

Before Congress passed the Clean Water Act, combined sewers were a common method used by municipalities to convey a combination of rain water and sanitary sewage to the wastewater treatment plant (WWTP). The capacity of the WWTPs were more than adequate for the dry weather sanitary sewer flows; but, during storms, the plants or the collection system often became overwhelmed by the combined flows of the storm water and sewage. When overloaded, the resulting overflows polluted the environment. With the passage of the Clean Water Act, communities throughout the US face the possibility of adverse actions if they do not eliminate these overflows.

Avon Lake began working on their combined sewer overflows (CSOs) prior to federal requirements. They have completed eleven of the eighteen projects identified in their comprehensive Master Sewer Plan. One of these projects caught our interest.

BEFORE CONGRESS PASSED THE CLEAN WATER ACT, COMBINED SEWERS WERE A COMMON METHOD USED BY MUNICIPALITIES TO CONVEY A COMBINATION OF RAIN WATER AND SANITARY SEWAGE TO THE WASTEWATER TREATMENT PLANT (WWTP).

That project is located along Route 83. There, a 16-inch PVC sanitary sewer pipe was installed inside of an 84-inch concrete combined sewer. The PVC pipe was DR18 and manufactured in accordance to AWWA C900. Route 83 is a heavily traveled corridor with high school traffic and bus service. An open-cut alternative was considered, but it would have required a deep excavation in order to connect the long side laterals. This option

Bolts, rods, and brackets were made of reinforced nylon to keep the entire system non-metallic and corrosion free.

was determined to be prohibitively expensive. The overflows from the 84-inch combined sewer were polluting a nearby park and beach area. Avon Lake preferred the option of separating the storm water and sanitary sewage rather than the option of building a retention basin or some other means of temporarily storing the effluent while the WWTP dealt with the increased flows from the storm event.

Working collaboratively with David Connelly, an Ohio engineering design consultant, the Avon Lake staff designed the project and plans were complete in 2003. The construction plans included details for junction chambers for main sewer line connections and access, specifications for a corrosion free system of pipes and supports, establishment of grades, and the particulars for residential connections to the sanitary line.

THE PROJECT WAS SUCCESSFULLY INSTALLED IN 2003-2004. SINCE THEN, IT HAS BEEN INSPECTED ANNUALLY AND FOUND TO BE LEAK FREE, TO HAVE NO SEDIMENT BUILDUP, AND TO BE FUNCTIONING AS DESIGNED.

This project lent itself to installing PVC pipe inside the concrete host pipe because the combined sewer line had excess capacity due to the reduction in storm water flows and grades that allowed connections to adjacent separated sewers along the route. During construction, residential connections were bypassed around the work area. These laterals were re-connected later as the work progressed. During heavy storm events, high capacity bypassing was used or work was curtailed.

PVC was the preferred pipe material for several reasons.

- *Beam Strength.* PVC had the longitudinal rigidity to minimize the sag between the supports.
- *Lightweight.* Two workers could lift, handle, and maneuver the pipe into place even though the space available was limited.
- *Versatile.* PVC was easy to cut, so plans could be modified as needed. PVC bends were used for changes in direction and at chamber connections.
- *Joint Integrity.* Once the laterals were installed and connected, the connections were leak free. Moreover, the deep socketed, gasketed joints also accommodated thermal expansion and contraction.
- *Corrosion Free.* PVC is resistant to H2S gas that is often generated by sanitary sewage. Also, its inertness made PVC well suited for the aggressive internal and external environment of this project. The non-PVC components were also non-metallic. The bolts, rods, hangers, and brackets were made of reinforced nylon.
- *Hydraulics.* PVC's low coefficient of friction assured that the engineering design would work with the given grade constraints.

The project was successfully installed in 2003-2004. Since then, it has been inspected annually and found to be leak free, to have no sediment buildup, and to be functioning as designed.

Author's Note: The Uni-Bell PVC Pipe Association wishes to thank Rick Eberle and Jack Gaydar of Avon Lake Utilities and David Connelly, consulting engineer, for taking the time out of their busy schedules to share information on this project with our readers. We hope that this will allow utilities across the US and Canada to look to PVC as part of the solution for fulfilling the requirements mandated by the Clean Water Act.

Sanitary sewer Laterals were reconnected as the work progressed.