

Canton's sewer uses *new technology* and serves as catalyst for trail system

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Concrete pipe has been the material of choice for gravity sanitary sewers for more than a century.

Its established track record provides confidence that the pipe will continue to operate for decades to come once it is buried and out of sight. Technological advances during the last three decades have brought alternative pipe materials for engineers to consider when designing new sewers. As engineers learn and test these new materials, their available options are broadening. Many engineers are discovering that just as concrete provided benefits over brick, polyvinyl chloride (PVC) is offering benefits over concrete in some applications.

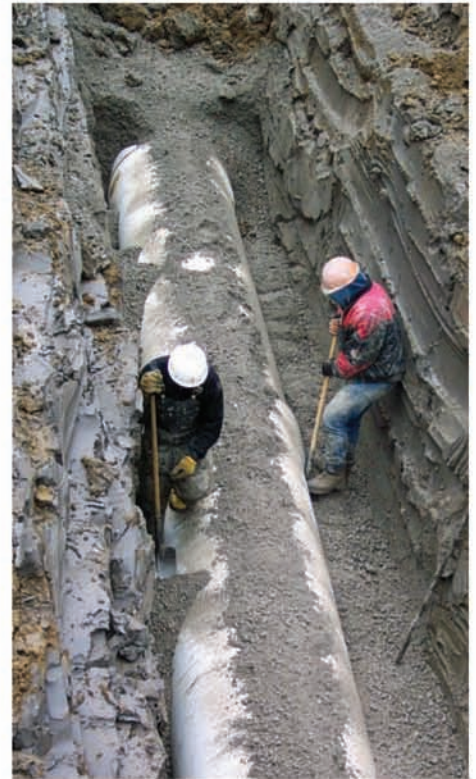
The 2006 Water Environment Federation Collection Systems Conference in Detroit provided opportunities to learn more about different materials from representatives who attended the conference. Lamson Vylon Pipe peaked the interest of Canton Township during the conference with their large diameter double-walled, I-beam, PVC pipe. Canton was designing the first phase of a four-phase program to expand its sewage collection system to accommodate ultimate development identified in Canton's master plan. The program requires constructing 6.5 miles of 24- to 42-inch sewer to provide system transport capacity for a peak total sewer flow of 120 million gallons per day. The use of an alternative material for some or all of this sewer was intriguing if benefits and cost aligned.

Tight site in environmentally-sensitive area and resident concerns create challenges

The route selected for the Phase 1 relief sewer parallels a sewer constructed in 1964 along the Lower Rouge River. The property is owned by Wayne County and is part of a 267-acre undeveloped tract

of land that serves as parkland and a floodplain. The route was overgrown with vegetation, making access to the existing sewer difficult. Constructing the new sewer as a parallel sewer provided the opportunity to improve access to this vital sewer that serves the southern section of Canton. The idea to create an access road that also serves as a nature trail came in response to the need to demonstrate a benefit to Wayne County in using the parkland for the sewer and to provide a benefit to Township residents.

Resident concerns were high—80 people turned out for the first informational meeting on the project. Residents did not want trees to be cleared from the area that had remained undisturbed for more than 40 years. They were also concerned that a trail would bring in too many people to the area and drive away wildlife. Canton listened to residents and worked with Wade Trim engineers to realign the dual purpose access road/trail to address specific concerns where possible. Three weeks later another meeting was held,



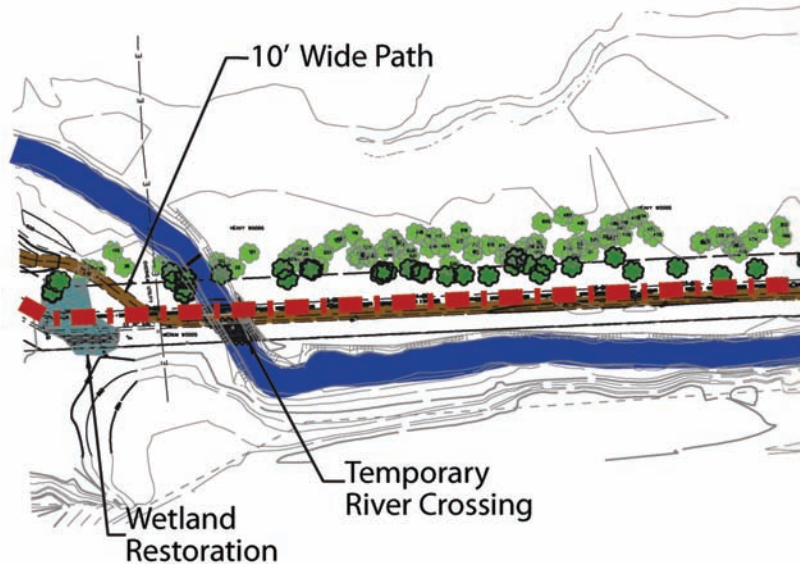
Pipe bedding material consisted of 21AA crushed angular limestone.



Vylon pipes being connected and inserted into casing pipe for river crossing.

just prior to the Michigan Department of Environmental Quality's (MDEQ) public hearing on the project, and the modified access road/trail route was explained. Later, during the MDEQ's public hearing, about 30 people spoke out against the project. The need to access the existing sewer and provide additional capacity with the new sewer was reinforced at this meeting. In general, the residents understood the project's benefits, but were concerned with perceived negative impacts to their adjoining properties. To further address concerns, the proposed sewer alignment was staked for the residents to view and individual follow-up meetings were held to further explain and address specific resident concerns. At the December 2006 Township Board meeting, only a handful of people attended and more people supported than opposed the project.

The final alignment included traveling through wetlands, four river crossings and a road crossing. At the narrowest point, the work area was only 50 feet wide. The area was heavily wooded and contained many ash trees destroyed by the Emerald Ash Borer. A detailed tree survey was conducted by Wade Trim and



A worker prepares the Vylon pipe for insertion into the steel casing pipe for the river crossing. Six skids were strapped to each Vylon pipe before insertion in the casing pipe per the manufacturer's recommendation. Once in place, the annular space between the Vylon and casing pipe was grouted to prevent flotation.

their subconsultant DLZ. The survey was then used by Canton's Landscape Architect to identify which trees to save based on the Township's Tree Ordinance. Trees to be saved were tagged and protected with snow fencing prior to clearing and grubbing. Black Walnut trees were tagged for removal and sold. Plans were also drawn up to plant more than 400 native trees and shrubs once construction was complete.

The final project included 4,400 feet of 42-inch sewer, 5,100 feet of a gravel access road/nature trail, rehabilitation of manholes on the existing sewer, and tree and shrub plantings to stabilize the stream bank and re-establish native species. The plans and specifications were put out to bid for both concrete and Vylon pipe.

Benefits of Vylon pipe

Additional research was conducted on the Vylon pipe. The Vylon pipe sounded great in the literature but Canton had not used large diameter PVC sewer pipe for the collector sewers and was seeking reassurance the product would perform as well or better than concrete. Benefits were easy to identify:

- Vylon pipe could be installed at a faster rate than concrete

because it is available in longer lengths (19-foot segments instead of 8-foot segments).

- Triple gaskets create a tighter seal reducing infiltration. There are also fewer seals since the segments are longer.
- Because installation is easier and the pipe is lighter, the work can typically be done with fewer crews making it ideal for environmentally-sensitive areas.
- The material is more tolerable to chemicals reducing the risk of corrosion in the pipe.
- The inside of the pipe is smooth minimizing fluid friction and flow resistance.
- Because the interior of the pipe is white, it is easier to identify defects during video inspections.

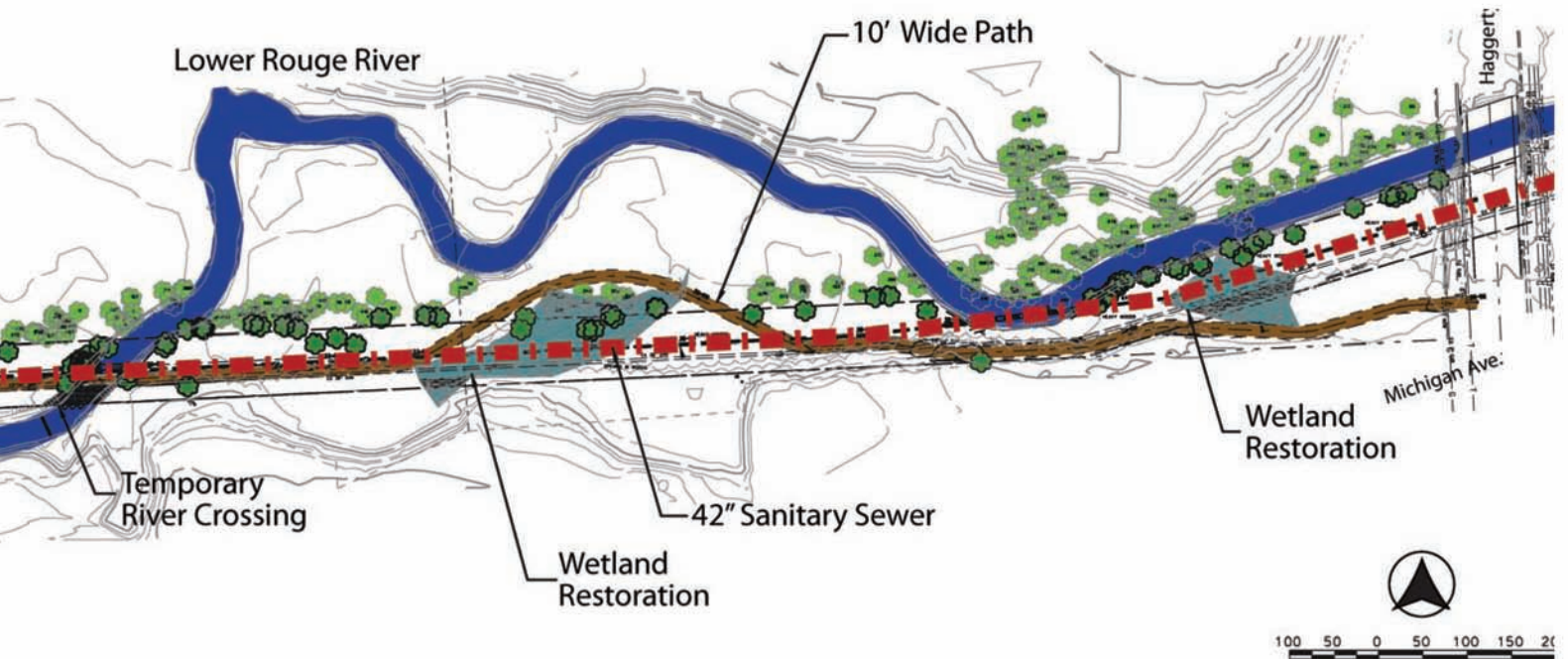
Several municipalities that were using Vylon pipe on the west side of the state were interviewed to see how they liked the product. After receiving favorable feedback, a factory tour was scheduled at the Bowling Green facility to see how the pipe was manufactured and quell concerns about durability.

Vylon pipe's two-phase manufacturing process was interesting. The first phase is the precise extrusion of the pipe's I-beam or closed profile. The profile is then thermally welded and wrapped on a rotating mandrel. Heat and pressure are used to create the thermal weld. After witnessing the extrusion process and destructive testing, durability concerns disappeared.

Similar prices but different construction requirements

Bids for the sewer pipes came in incredibly close as anticipated. The price for concrete was \$816,300 and the price for Vylon was \$785,690. Concrete pipe was actually \$0.10 cheaper per linear foot for the open cut segments but Vylon was \$59 cheaper per linear foot for the bored-in place river crossings. Construction cost of the entire project including manholes, site clearing, wetland and floodplain mitigation, access path and plantings was \$1,624,200. C.G. Myers of Milford, who had completed previous Vylon pipe installations, was awarded the contract.

While pipe installation moves more rapidly with Vylon than concrete, bedding requirements are more restrictive and labor intensive since the pipe has a flexible wall that can deform if improperly bedded. Pipe bedding consisted of 21AA, crushed angular limestone to bed and provide uniform longitudinal support and control deflection. In-situ soils were used for backfill. The pipe



was constructed 15 to 16 feet below grade. Installation proceeded smoothly with only minor weather-related delays but no significant problems.

Four river crossings and one road crossing required the use of jack and bore techniques. A 54-inch steel casing pipe was bored under the river and the Vylon pipe inserted and grouted. Temporary river crossings were constructed using corrugated steel pipe covered in 1- to 3-inch crushed limestone. The river crossings were approved by the MDEQ and served as temporary bridges to allow construction of the sewer from east to west without having to restage construction equipment at each river crossing.

After all of the pipe was laid, a mandrel was pulled through the entire length of pipe to confirm deflection had not occurred in the pipe roundness. No corrections were necessary and work proceeded on restoration.

Manholes on the existing sewer that had been previously raised above the floodplain level were lowered to grade. New, bolted and gasketed covers were used to prevent infiltration. A geofabric liner was used under the gravel access road/trail due to unstable soils and nearby wetlands.

GPS stationing was used to recreate wetlands in the same spot that they had existed prior to construction. Plans called for restoring 2,300 square yards of wetlands and 2,781 square yards were restored. Redosier Dogwoods were planted along the banks of the Lower Rouge River to stabilize the stream bank. Remaining project funds enabled increasing the amount of trees and shrubs planted from the originally planned 441 to 1,091. Native trees were selected to restore diversity to the area. Safety was also improved through the removal of dead ash trees, many that toppled over on windy days during construction.

Wade Trim inspected sewer installation, manhole rehabilitation and the dual purpose access road/nature trail construction. Canton handled inspection for all tree plantings.

Sewers to Trails

While many trails follow rails, this project demonstrates that sewers can also be a catalyst for trails. Like rails, sewers travel through diverse areas providing easements that can serve a dual purpose. Canton's sewer location created an ideal connection

Not your typical sewer construction project, Canton's Phase 1 sewer included a dual purpose access road and natural trail for sewer access and the planting of more than 1,000 native trees and shrubs. The access road also serves as a vital trail link between an existing MDOT bike path and local township trails. The project demonstrates that sewers, like rails, travel through diverse areas providing easements that can serve a dual purpose.



The dual purpose sewer maintenance access road and natural trail is a new destination for area residents.



Bedding was critical to pipe placement. The triple gasket can be seen on this pipe segment.

point between an existing regional trail system and a planned local trail system. The Michigan Department of Transportation (MDOT) has a bike path that parallels I-275 with plans for improvements. Canton worked with MDOT to have a connector created that goes under I-275 and along Michigan Avenue to the beginning of the sewer project. The Township is undertaking crosswalk improvements at Haggerty Road and Michigan Avenue to provide a safe connection point between the two trail systems. The Township is also currently designing pedestrian bridges for five crossings over the Lower Rouge River. These will be located along the multi-use sewer access trail and a newly constructed trail segment to the west of this project. When funds are available in the future, the Township can pave the access road/trail to accommodate additional uses.

A Smooth Ride

While this project used a new product and was initially controversial to nearby residents, it was one of the smoothest running projects in Canton. Construction proceeded without delays, problems or a single resident complaint. Additional plantings were possible and quickly implemented by the Township. One resident, who was very apprehensive about the project initially, even made a point of letting Canton know how pleased he was with the final project and that it exceeded his expectations. The Township used a similar PVC pipe on Phase 2 of the program that required a much smaller pipe. Phase 3 is currently in design and will most likely be bid both as concrete and PVC. 🌊

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Vylon Pipe

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