

CASE STUDY

An Affordable Wastewater Collection and Treatment Solution for Municipalities and Communities

LORE CITY, OHIO

Problem Failing on-lot septic systems were causing bad odors around the village of Lore City, Ohio. With no existing city sewer, village leaders needed an effective wastewater treatment option that residents could afford.

Solution After much research – plus a tour of a nearby village's effluent sewer and treatment facility – the project engineer recommended an Orenco Sewer™ for conveying primary-treated effluent to a two-stage AdvanTex® AX-Max™ secondary treatment facility. The facility also features an Orenco Composites™ DuraFiber™ building to house the Orenco Controls™ panel that monitors the treatment system.

Gravity Sewer Proves Too Expensive

About 90 miles east of Columbus, Ohio, lies the village of Lore City, incorporated in 1906. Sewage collection and treatment in the village was historically handled by onsite septic tanks and drainfields. Unfortunately, as those systems aged and began to fail, the village was increasingly plagued with unpleasant odors.

In 2011, the village council hired URS Corporation, an engineering and construction firm, to provide them with a sewer solution for their community of just over 300 people. The village had secured a loan from the Ohio Water Development Authority (OWDA) for the design work. Because loan payments were scheduled to begin shortly after the funding was distributed, residents began paying a monthly sewer bill during the design phase of the sewer.



An Orenco Sewer™ collection system, followed by these AdvanTex® AX-Max™ treatment units, was estimated to cost Lore City approximately \$1.1 million less than a gravity sewer with a package treatment plant.

Municipal and Community Market

Project Overview

LORE CITY, OHIO



Design Parameters

- 160 homes and businesses at full build-out
- 32,500 gpd (123 m³/day) average flow
- 60,000 gpd (227 m³/day) maximum flow

Permit Limits

- 10 mg/L cBOD₅
- 12 mg/L TSS
- 1 mg/L ammonia (summer)
- 3 mg/L ammonia (winter)
- > 6 mg/L DO

Average Effluent Quality*

- 2.5 mg/L cBOD₅
- 1.8 mg/L TSS
- 0.1 mg/L ammonia
- 8.8 mg/L DO

Project Cost

- ~ \$3.8 million

Start-Up Date

- March, 2018

Funding Sources

- U.S. Army Corps of Engineers
- Ohio EPA
- U.S. Department of Housing and Urban Development

Rate Structure

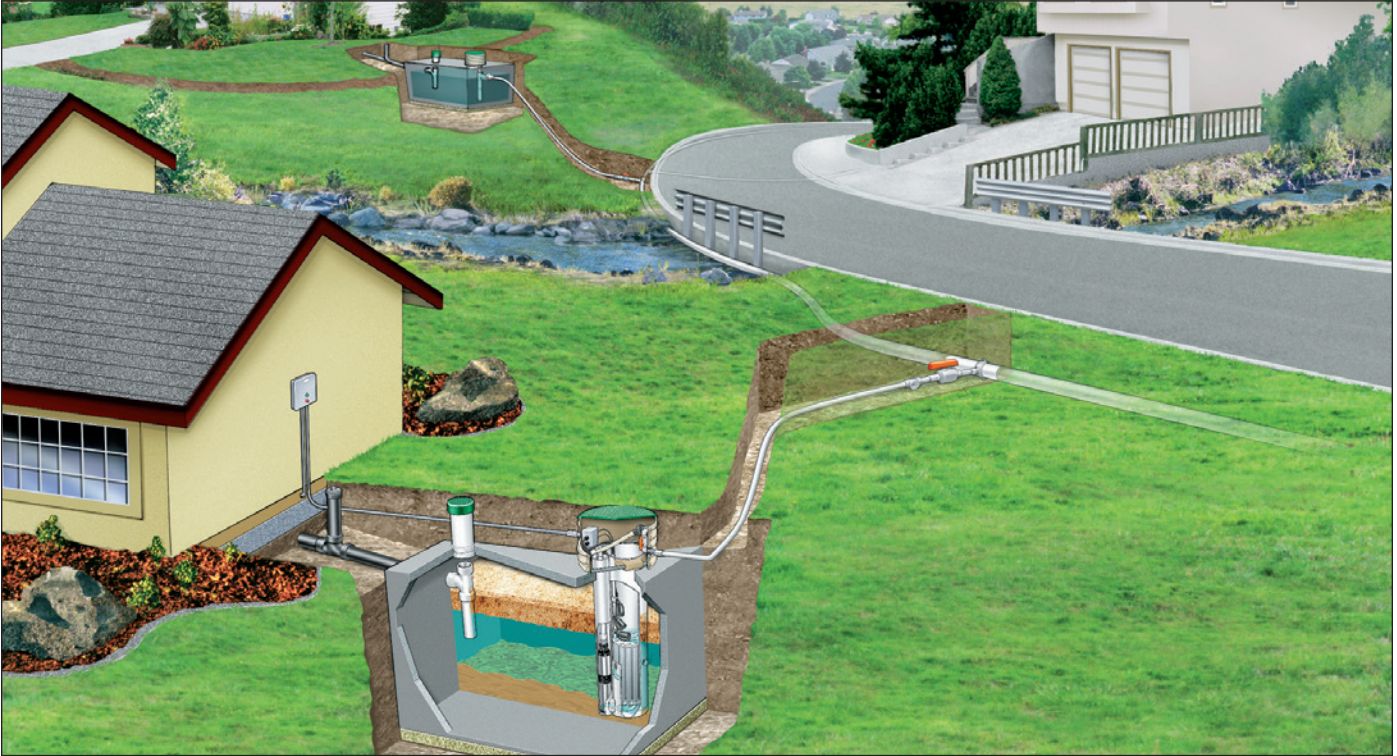
- Cost of onsite package: included in financing
- Monthly residential fee: ~ \$45/EDU

* Samples collected and analyzed by a third party between 11-1-18 and 1-31-19.

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LORE CITY, OHIO



In an Orenco Sewers™ collection system, watertight interceptor tanks provide primary treatment, so only liquids are conveyed through small-diameter main lines to the treatment facility. These lines are shallowly buried and follow the contour of the land, saving money on excavation costs.

In 2012, URS presented its design for a gravity sewer followed by a package treatment plant. Unfortunately, the engineer had greatly underestimated the construction costs, and during the first round of project bidding, no bids were received, because the engineer's cost estimate was too low.

Not Once, but Twice!

URS reintroduced the project with a higher engineer's estimate and received two bids that both exceeded the estimate by more than \$200,000. But that wasn't the only bad news: while the bids received were both higher than the engineering estimate, that estimate was also higher than the amount of funding available. The ramifications weren't good for anyone involved. Residents had been paying a monthly sewer bill for nearly two years, and yet the project was now at a complete standstill. The community was left with no sewer infrastructure and a monthly loan payment to OWDA for design work that had gotten them nowhere.

After the second attempt to bid the project failed, the URS project manager passed this information on

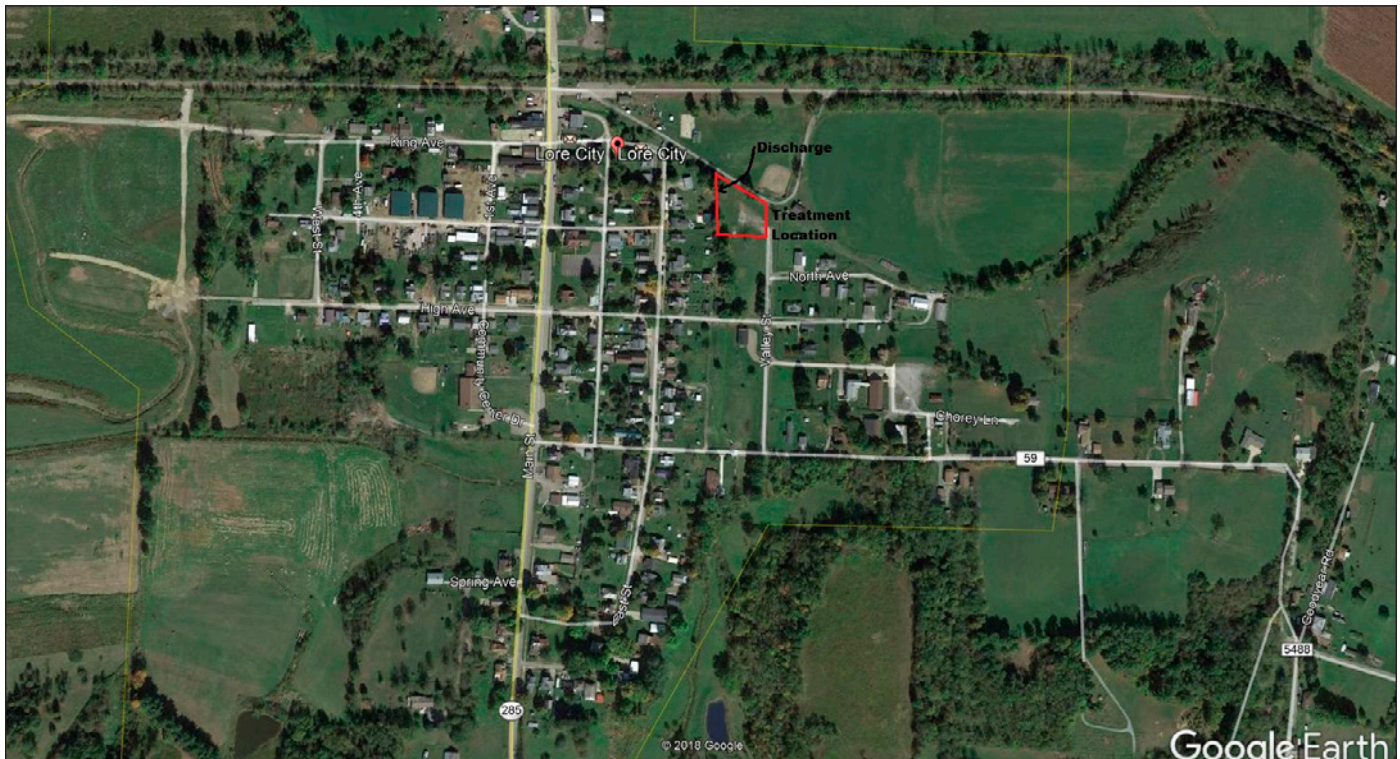
to personnel at OWDA and the Ohio Environmental Protection Agency (EPA), because both agencies had committed to funding the project. These personnel were familiar with Orenco's work in other parts of the state, and they recommended that URS contact Orenco for possible solutions.

STEP Collection + AdvanTex Treatment = Savings

Orenco offered a state-of-the-art sewer solution that would meet the city's budget: Orenco Sewer™ (an effluent sewer) for wastewater collection followed by an AdvanTex® AX-Max™ wastewater treatment facility. Because of the first two failed proposals, the URS engineer was hesitant to make a third, but her research revealed that the septic tank effluent pump (STEP) collection system used in an Orenco Sewer would provide a significant cost savings over the gravity sewer specified in the first two proposals.

Orenco Sewers can be installed with less-intrusive construction methods than gravity sewers, reducing a number of unfavorable by-products of the construction process, including adverse environmental impacts, permitting concerns, problems with handling

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Because the AdvanTex treatment facility minimizes odors, local ordinances allowed it to be located right in the village, while an extended aeration package plant would have had to be farther away. The village saved money by locating the treatment facility closer to the homes it would serve.

and disposing of excavated soils and groundwater, the number and cost of utility conflicts and resulting relocations, and the high cost of surface restoration. Also, effluent sewers experience minimal infiltration and inflow throughout the collection system because service laterals and mainlines are pressurized, mains are shallowly buried, and manholes aren't needed.

As the project engineer continued her research, she also found that local rules requiring separation between the treatment plant and residences were such that a low-odor AdvanTex facility could be located right in the village, while an extended aeration package plant would have to be farther away. By locating the treatment facility closer to the homes it would serve, the village could save even more money.

In an Orenco Sewer system, the onsite primary tank-age at each residence captures and digests over two-thirds of gross solids, grease, and oils, producing effluent that is primary-clarified, treated, and fine-screened before it ends up at the treatment facility.² A smaller load to the facility means its size and cost can also be reduced. In addition, the AdvanTex treatment facility offered low energy consumption and

low maintenance requirements, as well as the ability to successfully treat highly variable flows.

To confirm that the Orenco solution was the best option, the engineer, the mayor of Lore City, and members of the village council visited Christiansburg,



AdvanTex systems use a fixed-film, attached-growth treatment process, an excellent solution for smaller communities like Lore City.

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LORE CITY, OHIO

Ohio, which has benefited from its own Orenco Sewer and AdvanTex treatment since 2014. After seeing the success at Christiansburg – another small village with limited resources – the Lore City council members were convinced that the Orenco plan would finally allow them to obtain the sewer system they'd needed for many years.



Manufactured by Orenco Composites™, this DuraFiber™ building houses an Orenco Controls™ TCOM™ panel that provides monitoring and control for the Lore City wastewater treatment facility.

The Third Time's the Charm

By 2017, the village had secured a new funding package through the U.S. Army Corps of Engineers and the Ohio EPA. When the project was opened for bidding, two bids were received, and all parties were relieved that both bids were lower than the engineering estimate. Construction on the treatment facility began in the spring and seven AdvanTex AX-Max units were installed in the fall.

AdvanTex systems use a fixed-film, attached-growth treatment process that is an excellent solution for small communities and small-flow applications. In an AdvanTex system, wastewater is uniformly distributed onto textile media in an unsaturated condition. The system uses low-horsepower fans to draw air through the media and provide sufficient oxygen for aerobic digestion. These low-horsepower, high-head turbine pumps operate intermittently with sophisticated controls that automatically adjust recirculation ratios and pump run-times based on daily flows.

In 2013, during the second unsuccessful attempt to bid the Lore City sewer project, the lowest bid received had been more than \$4.8 million. But in 2017, the low bid had dropped to less than \$3.7 million. Replacing a proposal for gravity sewer and a package treatment plant with the more cost-effective option of an Orenco Sewer followed by AdvanTex treatment has made all the difference for the people of Lore City.

¹ Paul Bizier, ed., *Gravity Sanitary Sewer Design and Construction* (Reston, Virginia: American Society of Civil Engineers, 2007), 395-396.

² Crites, Ronald and George Tchobanoglous. *Small and Decentralized Wastewater Management Systems* (Boston: McGraw-Hill, 1998), 183.

Data used by Orenco to derive the representations and conclusions contained within this Case Study were current as of May, 2019.

Municipal and Community Market

Collection System

- Orenco Sewer™
- 2.36 miles (3.8 km) of 2-4 in. (5-10 cm) collection line

Primary Treatment

- Orenco® Septic Tank Effluent Pump (STEP) packages

Two-Stage Secondary Treatment

- 30,000-gallon (114-m³) pre-anoxic tank
- 7 AdvanTex® AX-Max™ units

Discharge

- Surface water

Monitoring and Control

- TCOM™ panel by Orenco Controls™

Engineering Firm

- URS (purchased by AECOM in 2014)

For more information about effluent sewers, Orenco Sewers™ and AdvanTex® Treatment Systems, contact Orenco Systems®, Inc.



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