Conveniently located 25 miles south of the hustle and bustle of urban living, offering the quiet and relaxed atmosphere of a small town environment, sits the city of Peculiar. Founded in 1868, Peculiar was incorporated in 1953 to become a Fourth Class city that is governed by a mayor and board of aldermen. Bolstered by visionary leadership and a proactive operations and maintenance staff, the City recently undertook a comprehensive study of its sanitary sewer collection system in order to be poised to capitalize on the next development wave. With easy access from U.S. Highway 71 and with an abundance of undeveloped land, this valuable city resource will entice future generations of commercial and residential developers.

The conversation to better understand the City’s wastewater infrastructure assets, and to prepare for future population expansion began during a routine municipal sanitary sewer overflow (SSO) compliance inspection performed by the Missouri Department of Natural Resources (DNR). Although no major flaws were identified, Peculiar recognized the importance of promoting long-term planning and ongoing management of its sanitary sewer system to encourage optimal performance and to minimize the potential for SSO events making development more attractive.

In 2011, during the depths of the Great Recession and after years spent wrestling with the sewer issue, Peculiar increased each sewer customer's bill an additional $12 per month in order to fund the $3.125 million project improvements for the City’s sanitary sewer system and to provide continued maintenance.

The Midwestern engineering firm George Butler Associates, Inc., (GBA) was chosen through a qualifications-based selection process to assist the city of Peculiar with the design and implementation of capacity improvements to the sanitary sewer system and to conduct a more comprehensive sanitary sewer evaluation study (SSES).

About The City’s Collections System

Approximately 173,600 feet of gravity sewer, 856 manholes, and 22,951 linear feet of force main serve as the sanitary collection system. A total of 13 pump stations flow from their respective service areas to the City’s 1.5 millions of gallons a day (MGD) wastewater treatment plant (WWTP). The WWTP is located along U.S. 71 Highway and on the southeast corner of the City. The WWTP discharges to the east branch of the Grand River. Peculiar is in the Grand River’s watershed. This plant has a reported hydraulic capacity of 3.0 MGD and treats an average of 0.40 MGD. Interestingly, much of the system is less than 15 years old and was constructed using modern materials such as PVC pipe and precast manholes. However, according to City Engineer Carl Brooks, although the system is tight and the lines were designed to meet DNR’s minimum specifications, a small percentage of the lines were not designed large enough to handle the maximum flow, which could eventually cause problems when the City begins to grow again.

In order for GBA to fully understand the City’s project goals, a team met with city officials to kickoff the project. The City expressed that the goals of the study were to:

- Provide the City a map of the sanitary system with the structures numbered in a GIS ARC/view format.
- Gather and populate data for critical main interceptors in the City’s GIS system.
- Conduct rainfall and flow monitoring to identify areas in the sewer collection with excessive inflow and infiltration (I/I).
- Conduct a capacity analysis for the existing system’s interceptors, and provide recommendations for capacity improvements.
- Determine the ability of the existing main interceptors to carry future flows from growth and development, and make recommendations for capacity improvements.
- Develop a recommendation for repairs to the system that would reduce I/I from the public and private sectors, and renew the collection system’s overall condition.

Flow meter installation.
GBA determined the following strategies should be implemented to accomplish those goals:

**Flow And Rainfall Monitoring And Data Analysis**

A total of five monitoring sites and a single rain gauge site were positioned to capture flow rates from the main interceptors and the majority of flow to the WWTP during dry and wet weather conditions. The results of the flow monitoring revealed that only portions of the collection system had an excessive leakage rate.

**GIS Sewer Mapping**

An interesting outcome from the GIS mapping was the discovery that the City’s sanitary sewer system was significantly larger than the 500 manholes and 116,160 linear feet that was initially anticipated. It also was discovered that record drawings were not available for the entire sanitary system, and that only 23 percent of the gravity sewers were made of vitrified clay pipe. Due to the rapid system expansion, a large majority of the system is made with PVC pipe and precast concrete manholes. The GIS map shows 856 sanitary manholes; 173,000 linear feet of 8-inch diameter to 18-inch diameter gravity sewers; 22,951 linear feet of 4-inch diameter to 12-inch diameter force mains; and 13 sewage pumping stations.

**Field And Office Investigations**

In 2011, GBA performed numerous types of field investigations of the City’s sanitary sewer system, and analyzed the as-built sewer records to determine the hydraulic capacity of the main interceptors. The investigations identified actual and potential inflow and infiltration (I/I) sources in the public and the private sector’s sewer systems.

The field work included: surface manhole inspections, smoke testing, dyed-water testing, internal and external building inspections, and closed circuit television inspection. The work was well-publicized to those affected by the testing. The citizens received an informational door hanger that detailed the type of work with dates and times the GBA team would be in the neighborhood. Also, Mayor Ernie Jungmeyer promoted the work in the City’s newsletter. Emergency responders were notified daily during smoke testing. The most common source for I/I on the public system was a defective seal between the cast iron frame, cover and manhole. The most common source for I/I on the private system was uncapped cleanouts.

**Improvement Recommendations**

Based upon the flow and rain monitoring data, the GIS sewer mapping and field investigations and prioritization list of capacity improvements was developed. Those upgrades ranged from public and private sector system improvements to improving capacity in the interceptor sewer system. Other suggested improvements included: increasing maintenance staffing, development of a long-term cleaning and inspection program, and educating the citizens about the importance of keeping ground and rainwater out of the sanitary sewer system.

**Where We Are Today**

In early 2012, construction began on improvements to Peculiar’s two major pumping stations, and peak flow capacity enhancements to the wastewater treatment facility. Later this summer, 6,400 feet of 18-inch diameter force main will be added to the City’s east lift station, greatly enhancing its ability to handle peak flows. In addition, a mile of new gravity sewer will be built. This project will remove from service a small neighborhood lift station.

By being proactive in understanding and tackling phased upgrades to its sanitary sewer system, the city of peculiar has established itself as progressive and responsive to the needs of its current and future citizens, as well as good stewards of the taxpayers’ money.

With more than 20 years of professional experience, Dawn M. O’Malley is an accomplished marketing and communications professional with GBA. She works with the firm’s Water Environment group and is based in the Lenexa, Kansas corporate headquarters.