

CASE STUDY

Smart Stormwater Components Address Multiple Needs With One Solution

Like many older cities, Kansas City, Missouri has combined sewers which overflow during rain events. To mitigate overflows and meet a federal consent decree, KC Water needed solutions that provided multiple benefits. Green infrastructure now captures rainfall before it enters the combined system.



Challenge

According to the United States Environmental Protection Agency (EPA), combined sewer overflows and inadequately controlled stormwater discharges can produce a variety of harmful pollutants that threaten communities' water quality. An average of 6.4 billion gallons of wastewater overflow is produced each year from rainfall in Kansas City, Missouri.

In response to this massive amount of overflow, the city entered into a federally mandated agreement with EPA, resulting in the \$4.7 billion Smart Sewer program (originally dubbed the Overflow Control Program), which aims to capture and treat 88% of combined sewer system wet weather flows, while also eliminating sanitary

Project Stats

Client

City of Kansas City, Missouri

Location

Kansas City, Missouri

TOTAL VOLUME OF
GSI CONSTRUCTED

500K

GALLONS

\$12M

IN OVERALL IMPROVEMENTS

DECREASED TO
FEWER THAN

7

OVERFLOW EVENTS IN A YEAR

sewer overflows within a 25-year period. Spanning 320 square miles and serving more than 65,000 customers, Kansas City has invested \$1 billion to improve its sewer systems and reduce wet weather overflows, while protecting public health and the environment.

Because the city chose to use a combination of gray and green infrastructure to meet EPA's requirements, KC Water sought out a team with experience designing and building such infrastructure.

Solution

The team was secured to provide design services that would reduce the volume of overflows within a portion of the Middle Blue River combined sewer watershed. The resilient design included green stormwater infrastructure (GSI) in combination with more traditional gray stormwater infrastructure to provide a stormwater solution for the project area.

The consent decree, negotiated between Kansas City and EPA, led the city to incorporate green infrastructure as a design solution for combined sewer overflows. The project also incorporated other overflow control technologies, including sewer rehabilitation, relief sewers, in-line storage, combined sewer separation, pumping and conveyance, and wet weather treatment facilities. This innovative approach aligned with the community's preference toward sustainable and green infrastructure, earning the city an additional five years toward regulatory compliance and reducing program costs by \$350 million. Building on this progress, Burns & McDonnell led development and project delivery for green infrastructure installations at Arleta Park and Rachel Morado Park in the Marlborough neighborhood, which became the city's first Institute for Sustainable Infrastructure Envision Platinum Certified project.

One phase of the project focused on a large-scale storage facility with conveyance methods that transport runoff to existing Arleta Park. Improvements to the park included cascading rain gardens, precast treatment chambers and a series of bioretention basins. The GSI improvements enhance the existing park aesthetics and function. New walking trails offer better connectivity and access to other park amenities for residents in the community while providing necessary access for routine maintenance.

A second phase of the project addressed a GSI opportunity area at Hickman Mills Drive and The Paseo. The site, now known as Rachel Morado Gardens, was formerly a large undeveloped and wooded tract of land within an urban neighborhood. It had been used as an illegal dumping site and was an eyesore to the community. GSI updates within the

site included stormwater runoff pretreatment, level spreaders, multiple bioretention basins, and extended detention facilities to capture, detain and filter stormwater before entering the combined sewer system. The green infrastructure captures stormwater runoff from streets and lawns before moving it to dense native vegetation, encouraging pollutants to settle and flow to infiltrate the engineered soils, reducing the volume of water flowing into the downstream system.

During the first 10 years of this project, Kansas City and EPA successfully negotiated multiple modifications to the consent decree allowing for new sequencing and completion dates for overflow projects that encountered implementation challenges. These changes allowed the city to use an adaptive management approach, while increasing the duration of the program to 30 years and reducing program costs to \$2.4 billion.

The Smart Sewer program has helped Kansas City improve its processes, procedures and tools to effectively deliver capital projects and execute utility operations. Specifically, the city enhanced public outreach and stakeholder engagement, as well as project and program status reporting. Noteworthy successful initiatives include an annual asset management program; a multi-year capital improvement plan; robust data and document management systems; a nine minimum controls (NMC) program that leverages technology to tackle sewer overflows; and a comprehensive capacity, management, operation and maintenance (CMOM) program.

Results

Previously, the overflow frequency of the combined sewer system exceeded 35 times per year. With the new design, the system shouldn't experience more than six overflow events per year, while capturing greater than 96% of wet weather flows within the basin. These updates will help the city meet federal requirements.

The new GSI features at Rachel Morado Gardens and Arleta Park have also allowed for increased pedestrian traffic and more visually appealing community amenities and educational opportunities.

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