KANSAS CITY’S LARGEST INFRASTRUCTURE PROJECT GOES GREEN

by Lara Isch

In January 2009, the city of Kansas City completed its Overflow Control Plan (OCP) and submitted it to the United States Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources. In September 2010, the federal courts approved the Consent Decree under which the plan would be implemented. This Consent Decree requires Kansas City to complete infrastructure improvements that will reduce combined sewer overflows by 88 percent and eliminate overflows in the separate sewer system. These improvements, when finalized, will mark the largest infrastructure project in city history and cost between $4.5 and $5 billion.

Kansas City did not approach the Consent Decree just as a regulatory mandate to reduce sewer overflows, but also as a chance to fix an aging sewer system and improve water quality and public health. Out-of-the-box thinking could maximize the value received from dollars that were now required to be spent, while creating additional benefits for citizens and the customers served by Water Services.

HISTORY

Kansas City began building basic sewer infrastructure more than 150 years ago when the City was young. In these early years, combined sewer systems that carried wastewater and stormwater in the same pipe were common practice. Kansas City, like more than 700 other cities across the nation, contains 58 square miles of combined sewer system located mostly south of the Missouri and west of the Little Blue Rivers. During dry weather and small rain events, the water entering the combined sewer systems is transported through a system of pipes to a wastewater treatment plant where it is treated and discharged. However, these sewers were not designed to carry water from large rain events and runoff from impervious surfaces such as parking lots, streets and rooftops that exceed the capacity of the system. To keep that excess water from backing up in pipes and flooding basements and businesses, overflow structures were created to release the excess flow directly into nearby rivers and streams without first being treated at a wastewater treatment plant. As a result, more than six billion gallons of stormwater containing diluted sewage overflows into Kansas City’s streams, lakes and rivers in a typical year.

THE PLAN

The Overflow Control Plan was a multi-year effort involving city officials, Water Services, and the Wet Weather Community Panel. The Community Panel was created in 2003 to build an informed group of external stakeholders, including: scientists, engineers, public health experts, developers, property owners and council district representatives, to provide constructive input and technical assistance to the OCP. The result of this input was a comprehensive plan that included neighborhood sewer rehabilitation, storage projects, sewer separation projects, system improvements, and for the first time in Kansas City history – a large-scale green infrastructure component for controlling sewer overflows and protecting water quality. The EPA took notice of the comprehensive plan, and for the first time, allowed a city a 25-year timeline instead of the traditional 20 years to fulfill the requirements of the Consent Decree.

THE PILOT PROJECT

Kansas City made a commitment to utilize green infrastructure as part of their arsenal to reduce combined sewer overflows; but, in order for it to be effective, the price tag had to be realistic. One of the primary goals defined early by the Wet Weather Community Panel was to “improve water quality while maximizing economic, social and environmental benefits,” and the green infrastructure component of the OCP was no exception. Water Services and program consultants weighed the cost and benefit of green and gray infrastructure for each watershed individually to make sure plan components were truly the best choice for Kansas City’s rate payers.

They agreed that a 744-acre area tributary to the Middle Blue River, located in part of Kansas City’s aging Marlborough neighborhood, would be the best place to test the first green infrastructure project. The original plan for this area was the construction of two large tanks designed to contain the 3.5 million gallons of anticipated overflows per storm event. Because of their small size, these tanks were going to be some the most expensive components in the OCP in dollars per gallon captured, with a combined cost of $50 million. And, with the residential backdrop, they wouldn’t be an easy sell. Based on cost analysis, it looked as
though a green infrastructure project in this area would be a lower cost option and could provide ancillary benefits to the neighborhood. Water Services separated the project area into five distinct zones and a control area, and then began work on the first 100 acres that would become the Middle Blue River Basin Green Solutions Pilot Project.

The initial step was to bring the appropriate stakeholders to the table. Neighborhood outreach efforts were extensive, including door-to-door outreach, two information-gathering meetings held in the front yards of designated block captains, five public meetings and two rain barrel how-to workshops. In addition, an Overlay Team was developed to ensure a coordinated effort between city departments, utility companies, researchers and neighborhood interest groups. The team worked diligently for more than a year to make sure all projects planned for the pilot area happened prior to or concurrent with the green infrastructure construction.

The final result was a large-scale stormwater management system consisting of 150 green solutions installed within the public right of way, including rain gardens, bioretention gardens, cascades for sloped areas, porous sidewalk and permeable paver systems. The project was designed to not only store up to 370,000 gallons of water per rain event, but to maximize the benefit to the neighborhood. Crumbling streets were repaved, sidewalks were repaired and damaged trees were replaced. New sections of porous sidewalk placed strategically throughout the area tested the technology’s ability to capture excess runoff from lawns and driveways, while creating a walkable area for residents. New curbs and gutters defined space for the rain gardens, and carry street runoff into the green infrastructure components. Curb extensions were built to create a larger space for bioretention gardens with the added benefit of slowing down traffic to make the neighborhood streets safer. Mixtures of native and ornamental plants lend color and variety to the landscape, and will help Water Services determine what types of plants work best for rain gardens in a residential setting.

The pilot project was completed in November 2012. Kansas City Water Services, along with a team of researchers including the EPA and students from the University of Missouri Kansas City continue to monitor the green infrastructure for flow, infiltration and water quality. But, as is typical when working with vegetation, the systems need time to mature to reach their full potential. Comprehensive data on system performance and stormwater capture will take several years to compile.

In the meantime, Kansas City is moving forward with the additional 644 acres comprising the next phases of the Middle Blue Green Infrastructure Project. In order to generate more creative solutions and benefits for the neighborhoods, four teams of engineering and design professionals were selected to participate in a design competition, and were given a stipend to create unique, integrated systems for the remaining project areas. These preliminary designs are currently under review by Water Services, and the final design teams will be chosen based on the results.

The Middle Blue Green Infrastructure Project is redefining the way projects are approached and paving the way for green components throughout the City. Looking forward, Kansas City will continue to monitor the effectiveness of going green to manage combined sewer overflows, but also will be examining the additional economic, environmental and social benefits received through integrating stormwater management solutions into the urban landscape.

Lara Isch is the education and outreach coordinator for the Overflow Control Program at the Kansas City Water Services Department. For more information on the OCP or Middle Blue River Basin Green Solutions Pilot Project, call 816-513-0582.