

# PROJECT SPOTLIGHT:

## LAKE LENEXA DAM AND SPILLWAY

LENEXA, KANSAS

City of Lenexa, Kansas



For years, the city of Lenexa has been undergoing development pressure and resulting in loss of water quality by urban runoff. Also the Coon Creek Watershed had undergone flooding in the past. Rejecting the common mindset that stormwater is a fundamental problem to be dealt with pragmatically, the Lake Lenexa “rain to recreation” approach flips this perspective around treating stormwater as an asset on which to capitalize. This progressive thinking delivered a four-way success at Lake Lenexa: flood control, improved water quality, natural stream preservation, stormwater management and recreation/education opportunities. The entire project was developed from the concept of rain to recreation; using stormwater to provide recreational opportunities. Upland wetland treatment cells are used to improve water quality. The project components also included stream restoration of several stream segments upstream of the reservoir.

### THE COMMUNITY CONNECTION:

Public education and active dialogue wins strong support. Community involvement was required at every step of planning and design, and Black & Veatch engineers took active roles in public outreach and education. Public input was encouraged through events, workshops, meetings, newsletters, a website and interactive email. Productive communications swung 100% strong public opposition at the first meeting to a phenomenal 100% support and standing ovation at the final public meeting.

### ENVIRONMENTAL:

A broad approach protects and respects the environment. Reflecting Lenexa’s total water management approach and long-range “Vision 2020” plan, the project maintains balance between natural resources and man-made environments. Stormwater wetlands enable surface water treatment by natural, eco-friendly processes while simultaneously providing green space and wildlife habitat. Inclusion of wetland treatment cells resulted in a 70% reduction in suspended solids overall. Preservation of upland forest areas filter, transform, bind-up or neutralize pollutants in stormwater. Stream restorations produced higher-quality streams than those that existed preconstruction. An environmentally-sensitive approach spurred the creation of fish habitats and spawning beds and the protection of native wildlife species.

### INNOVATIVE DESIGN AND CONSTRUCTION:

Dam engineering and construction takes vision, expertise, and perhaps most of all, fortitude. This work can be among the riskiest undertakings in heavy civil construction. Effective partnerships with contractors and city officials enabled a complex design to be completed that was both affordable and constructible. Innovative use of materials improved the cost-complexity ratio and reserved the bold architectural vision. To meet the challenge, new definitions for “what works” in dam construction were established. The original design incorporated cast-in-place concrete retaining walls to form the spillway structure. A value engineering study led to the innovative use of mechanically stabilized earth (MSE) for retaining walls—a material seen often in transportation projects, but a “first” for dam construction at Lake Lenexa. The use of MSE walls realized a \$2 million cost savings over cast-in-place concrete with an additional benefit—a more flexible system that withstands minor settlement. The study identified another innovation for support of spillway structural slabs. Cement-kiln dust (CKD) mixed with on-site clay soils produced a stabilized material with low compressibility, high strength, and low permeability. These attributes reduced seepage and uplift pressures under the spillway slabs at half

### PAINTING A VIVID PUBLIC PICTURE:

“Bringing home” the promise and possibilities in engineering. While the public enjoys—even takes for granted—countless benefits from good engineering, the works that make it possible are often hidden from public view. Lake Lenexa dramatically showcases high-level engineering practiced with creativity, vision and drive. The emphasis on education led to the installation of accessible signage promoting awareness of stormwater, dams and watersheds. Visitors will take home increased insight on the practice and profession, including the youngest minds that are destined to become the next generation of designers and engineers.

