

Columbia is Falling for Waterfalls

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Photographs of some of the most beautiful places on the earth and even artists' renditions of earthly paradise usually include a body of water in some fashion. And, no wonder, according to Wikipedia over 70% of the earth's surface is water, and even humans are made up of 55-60% water. Perhaps that's why water gives us such a sense of well-being, whether we drink it, bathe in it, or just listen to its flow. Its therapeutic value has been widely marketed, ranging from the promotion of hydrotherapy as a health treatment to the selling of ocean sounds on compact disc for relaxation.

The Concept

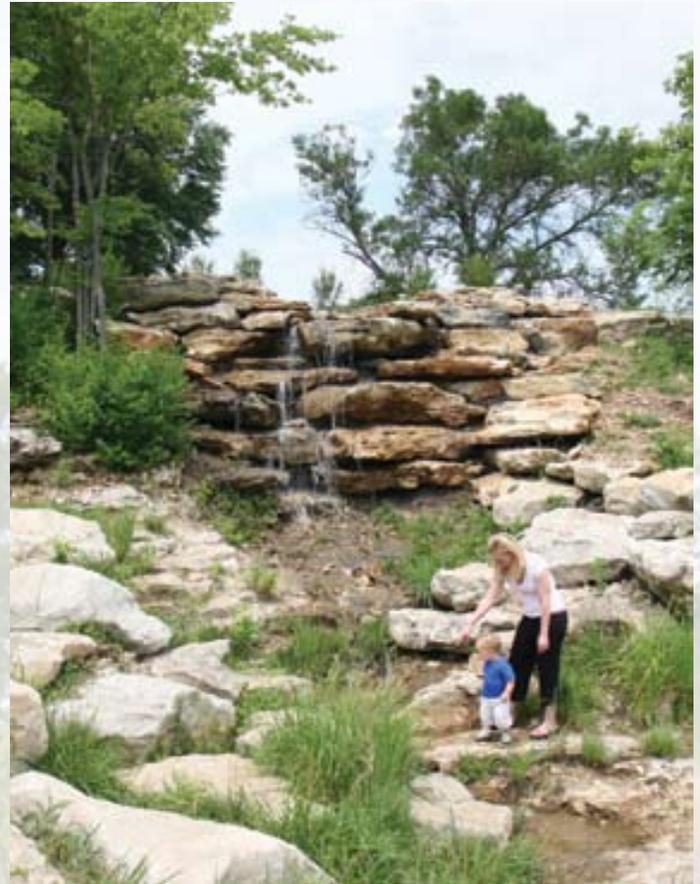
Park planners in Columbia, Missouri wanted to incorporate the serene and appealing qualities of flowing water in a park setting. Stephens Lake Park was deemed the ideal location, as planners envisioned transforming the natural valley that sloped down the north hill to the lake into a waterfall. "The existing valley is a perfect site where a creek cascading down to the lake would appear natural," noted Mike Snyder, Sr. Park Planner for the Parks and Recreation Department. A little further east was a steeper hill above the lake that would readily accommodate a smaller waterfall.

Waterfalls were included as an arboretum feature in two of the four master plan options presented to the public during the design process for Stephens Lake Park. The "traditional park and arboretum" master plan theme proved to be the most popular option among the citizens who participated in the extensive public input process and became the final master plan adopted by the City Council in 2002.



The Construction

Even though the waterfalls were approved as part of the park master plan, they were not among the amenities funded in the \$2.5 million first phase of the park development. Determined



to find funding for these water features, park planners put the waterfalls up for adoption and proceeded with the preliminary work that would be needed for the proposed falls while the park was under development. When the lake was drained for the island and boardwalk construction, an 8' x 8' x 12' concrete vault and two 12-inch lines leading to the lake were installed. Eight-inch pipes leading from the vault to the base of the hill were set in place before the concrete trail was constructed, completing the preliminary work for the future waterfalls. Happily, by the time the lake trail construction began, a \$50,000 donation was secured for the large waterfall.

Construction of the large waterfall began in 2007. Park planners intended to make use of presumed existing bedrock on the north hill as the base for the water flow. Unfortunately, excavation revealed no bedrock, only a mixture of rock and clay. Plans were adjusted to utilize a PVC liner system to support the water flow and prevent erosion. For this type of system, special care had to be taken to protect the liner from puncture or abrasion from years of rock rubbing against the liner during typical Missouri freeze and thaw cycles. To protect the liner, the water path was lined with 6-12" of rock-free clay, followed by non-woven geotextile fabric, then PVC liner. Another layer of geotextile fabric was laid so that both sides of the liner were protected, followed by rounded Missouri River rock to cover and shield the liner as the large boulders were maneuvered into place. The falls were designed to look as if Mother Nature herself

was the architect, incorporating Missouri River rock and native limestone boulders for a natural look. A bridge at the base of the hill was installed to connect the trail while allowing the water to flow underneath to the lake.

Fortunately, while the first waterfall was under construction, the Parks and Recreation Department was able to solicit a \$10,000 donation to fund the second waterfall. This facilitated the completion of both falls during phase one of the park development.

Design work was handled in house by Parks and Recreation staff. The construction was also accomplished by staff along with a talented excavation contractor, Rick Richardson, whose work included precisely placing each boulder. Over 400 tons of Missouri River rock, 800 tons of limestone boulders, 22,500 square feet of geofabric, and 16,500 square feet of rubber liner were used in the construction. The concrete vault at the bottom of the hill houses a single 7.5 horsepower pump, another concrete vault at the top of the hill houses the valves and controllers, and there is a source vault at the base of the top pool of the large waterfall. The construction was completed in 2009.

The Outcome

About 500 gallons of water per minute is pumped from the deep part of the lake to the top of the hill where the controller vault routes it to both waterfalls, cascading the water through a series of pools and boulders. The process oxygenates the water, as well as filters it through native plants, improving the water quality of the lake while providing a beautiful feature for park users to enjoy.

The large waterfall is a whopping 300 feet long and is comprised of a series of falls, flat sections, and four pools. Its size cannot be captured in a single photo, and is best experienced in person. It was designed to be interactive, where visitors can climb on the boulders and play in the pools. The smaller waterfall is about 35 feet long and falls directly down the hillside. Park guests taking the .6-mile scenic walk on the lake trail will pass by both waterfalls.

The addition of the two waterfalls in beautiful Stephens Lake Park seals it as the crown jewel of Columbia's park system. This 116-acre park already had it all, with its 11-acre fishing and swimming lake, mature trees, open green space, island and boardwalk, swimming beach, spraygrounds, picnic shelters, lake and perimeter trails, playgrounds, climbing wall, indoor pavilion, and even an art sculpture. The addition of the waterfalls was just icing on the cake, making this lovely park - well, even lovelier.

As park visitors dip their toes in the cool water pools, listen to the soothing sound of the water gurgling and splashing, and enjoy the scenic view of the water flowing down the hillside, it's easy to understand why Columbia is falling for waterfalls.

Construction Materials

- 400 tons - Missouri River Rock
- 800 tons - Limestone Boulders
- 22,500 sq. ft. - Geofabric
- 16,500 sq. ft. - Rubber Liner

