



Green Infrastructure & Stormwater Management CASE STUDY

Kansas State University International Student Center Rain Garden

Location: Manhattan, KS

Client: Kansas State University

Design Firm(s): KSU Landscape
Architecture program faculty and students

Landscape architect/Project contact:

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Coordinator and Co-Designer

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ASLA Chapter: Prairie Gateway



Project Specifications

Project Description: This rain garden helps restore and reveal the natural hydrologic cycle by collecting rooftop runoff in an aesthetically pleasing manner between the Taiwan Wing of the Kansas State University International Student Center (ISC) and Campus Creek (a tributary of the Kansas River). It demonstrates (to KSU administrators, campus facilities/grounds personnel, KSU faculty and students, and a wide range of visitors) how rooftop water can be readily collected and re-used to nourish a perennial garden consisting of plants native to the Flint Hills eco-region and central United States while responding to the unique characteristics of the site and adjacent architecture. It also re-uses leftover (salvaged and donated) limestone from a local stone company and demonstrates the creative use of permeable pavers (using salvaged cut stone and native flagstone) and a level-spreader – to slow, temporarily hold, and infiltrate stormwater runoff falling on or entering the rain-garden. Finally, it addresses important aesthetic desires by the client (KSU Facilities) and visitors, connecting the garden to the eight-foot grid of the adjacent ISC buildings and courtyard.

Project Type:

Institutional/education

A retrofit of an existing property

Design features: Rain garden, and porous pavers. A level spreader was created at the low end of two-cell rain-garden with porous pathways on each side. Dry-wells were covered up by reclaimed concrete splash-pads and rain-bowls added to collect and slow rooftop runoff.

This project was designed to meet the following specific requirements or mandates:

None - it was a demonstration design-build project by KSU faculty and students.

Impervious area managed: 5,000 sq/ft to 1 acre

Amount of existing green space/open space conserved or preserved for managing stormwater on site: 5,000 sq/ft to 1 acre

The regulatory environment and regulator was supportive of the project.

Did the client request that other factors be considered, such as energy savings, usable green space, or property value enhancements? No.

Cost & Jobs Analysis

Estimated Cost of Stormwater Project: \$10,000-\$50,000 (Public funding: Federal, state, USEPA, KDHE and KSU funds helped cover costs for time, materials, tools, and equipment.)

Related Information: The rain garden was constructed employing all volunteer labor (more than 60 KSU faculty, staff, and students assisted) and rented or donated tools and equipment. Local contractors and businesses donated time and equipment to haul and stone to the site. Most plants were purchased; some were donated. Other materials were purchased or donated as needed to meet design intentions and reduce costs. ISC staff and KSU students have helped water and weed the rain-garden.

Spring and Summer 2007 construction related expenditures for the project were \$4,982.86, and were covered by a Campus Compact WaterLINK grant. Not including volunteer time by KSU faculty and students, total donations from external partners and non-academic departments during Spring and Summer 2007 were estimated to be approximately \$7,800. Hundreds of hours of donated time were also provided. Financial support for a small portion of the time provided by the two co-designers came from a USEPA/KDHE grant, noted below. KDHE provided financial assistance (\$10,000) to the KSU ISC Rain-Garden Project through EPA Section 319 Nonpoint Source Pollution Control Grant #C9007405-12. Three WaterLINK (Water Quality Restoration and Protection Service Learning Mini-Grants awarded to KSU by KDHE utilizing EPA funds) provided financial assistance for the Fall 2006 KSU Campus Creek Planning/Design Charrette, Spring & Summer 2007 ISC Rain-Garden construction for the KSU ISC Rain-Garden, and the design and creation of three rain-bowls in Fall 2007 and Spring 2008. Each of the three WaterLINK grants was \$5,000, however, less than \$8,000 was expended for construction.

More details on construction expenditures and donations are available upon request.

Was a green vs. grey cost analysis performed? No, there was no need; we were abandoning a largely non-functioning dry-well-to-pipe-to-stream system.

Cost impact of conserving green/open space to the overall costs of the site design/development project: No costs associated with conservation since the site is on university property and is not slated for development.

Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)? Did not influence costs.

Number of jobs created: Not applicable.

Job hours devoted to project:

Planning and Design: approx. 200 hours (some of this was paid time)

Construction: approx. 500 hours (nearly all of this was donated time)

Annual Maintenance: 30-50 hours (including time offered by student volunteers)

Other: monitoring and educational tours - approx. 10 hours per year

Performance Measures

Stormwater reduction performance analysis:

Visual observations indicate that most storm events less than 1-1/2 to 2 inches collect and infiltrate all rainwater and other precipitation falling on the ISC's Taiwan Wing, associated ISC rooftops, the rain garden itself, and the garden's "watershed."

Community & economic benefits that have resulted from the project: The project is part of a larger vision for creating a more sustainable campus at Kansas State University – with water conservation, stormwater management, and energy efficiency as primary drivers of proposed activities. In October 2006, over 125 students, faculty, staff, and professionals participated in a stormwater management planning/design charrette that helped kick-start this design-build demonstration project.

The KSU ISC Rain Garden (the first rain garden in the community) has created tremendous excitement on campus about the prospect for retrofitting poorly designed and water-and-energy-intensive buildings and landscapes, and creating a more sustainable campus environment. The rain garden is a vehicle to educate KSU staff and students about the importance of ongoing site maintenance and monitoring. Staff from KSU Facilities & Grounds staff are assisting with maintenance and weed control and desire to see additional water-sensitive design projects implemented on campus.

This project helped lead to the creation of at least two other public rain gardens in the region (one in Rossville, Kansas and one at Sunset Zoo in Manhattan, Kansas) and spurred faculty and students to create a prairie-based living roof on campus for demonstration and green roof research.

For more information on the Sunset Zoo and KSU Green Roof projects refer to:

<http://www.ci.manhattan.ks.us/index.aspx?NID=1357>

<http://www.greenroofs.com/projects/pview.php?id=1142>

Project Recognition

ASLA Student Honor Award, Community Service Category (2009); PGASLA Award of Excellence (2008); Central States ASLA Conference Merit Award (2008)

Additional Information

Links to images: <http://www.asla.org/2009studentawards/264.html>

<http://faculty.capd.ksu.edu/lskab/raingarden.html>

Persistence is required to create initial demonstration projects on a campus or in a community. Interest in energy and water savings opens the door for creative, multi-benefit projects that create more sustainable landscape structure and functions. Deep-rooted prairie plants and small-scale rain-gardens can make an immediate impact on stormwater runoff. When carried out in an integrated and holistic manner – especially as usable garden spaces – even very small scale projects can make a very important and positive impact.

Any garden requires dedicated maintenance. Weeding is essential. Fertilizing is not needed if native plants adapted to the location are used. Pruning is rarely needed, though clipping back perennials before spring is important. Watering during the first growing season is vital.

Building institutional interest and capacity for ongoing maintenance is essential. Universities, colleges, and other educational institutions can play an important role in assisting local communities monitor sites, helping them and others build increased understanding about the sustainability of specific planning, design, and construction practices.