Green Infrastructure & Stormwater Management CASE STUDY

Student Rain Garden

Location: University of Kansas, Lawrence, KS
Client: University of Kansas
Design Firm(s): Grob Engineering
Landscape architect/Project contact: Marion Paulette, ASLA
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ASLA Chapter: Prairie Gateway

Project Specifications

Project Description: The KU Student Rain Garden is a 5,200 sq/ft garden that is home to approximately 18 different native plant species. Water from the rooftop of the addition to the Ambler Student Recreation Fitness Center is distributed along the garden, reducing the flow rate and allowing for increased infiltration. Although there is little overland flow into the garden, it is designed to help reduce pollutant loads by slowing stormwater runoff and the resulting stream bank erosion downstream from the site. This project was one of the first examples of native landscaping used on the KU Lawrence campus, and certainly the first at this scale. Plant species were carefully selected to ensure color throughout the year, and the beds were lined with limestone to create a more formal appearance. Through selection of native plants, the garden was designed to be self-sustaining with no fertilizers or pesticides and limited maintenance once the garden is established.

Project Type:
Institutional/education
A retrofit of an existing property

Design features Rain garden - the rain garden captures water from the roof of the Ambler Student Recreation Fitness Center. Runoff from the roof flows through 8-inch drain pipes into manhole structures that are level spreaders that disperse the water to 11 outlet point throughout the rain garden. To help reduce erosion large stones and splash blocks were places at each outlet pipe to dissipate the energy of the water. The water was evenly dispersed across the rain garden, increasing the opportunity for infiltration.

This project was designed to meet the following specific requirements or mandates: To meet funding criteria, developer/client preference

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. 5,200 sq/ft of an existing lawn and detention basin was converted into the rain gardens.

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? A secondary goal was to demonstrate the use of native landscaping. Plant species were carefully selected for their function as well as to ensure color throughout the year. This project was one of the first examples of native landscaping used on the KU Lawrence campus, and certainly the first at this scale. Plant species were carefully selected to ensure color throughout the year, and the beds were lined with limestone to create a more formal appearance. Through selection of native plants, the garden was designed to be self-sustaining with no fertilizers or pesticides and limited maintenance once the garden is established.

Cost & Jobs Analysis

Estimated Cost of Stormwater Project: $50,000-$100,000 (Public funding: State)

Related Information: KU Student Senate and KU Recreation Services provided funding for this project, and the Kansas Department of Health and Environment provided financial assistance through an EPA Section 319 Nonpoint Source Pollution Control Grant and Kansas Water Plan Fund.

- $51,000 site work, construction of the garden beds, rock walls, piping to divert roof drains to garden
- $12,500 plants

Was a green vs. grey cost analysis performed? No

Cost impact of conserving green/open space to the overall costs of the site design/development project: The rain garden project modified an existing detention basin in conjunction with construction of a 100,000 sq/ft addition to the Ambler Student Recreation Fitness Center. The rain garden added approximately $63,500 to the total construction project.

Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)? Slightly

increased. Because the rain garden was not part of the original design some additonal costs were incurred with its development.

Number of jobs created: No new jobs were created

Job hours devoted to project:

Planning and Design: The initial concept for this project originated with students, who then collaborated with campus departments and advanced this project far beyond what similar student efforts had achieved.

Construction: 1,200 hours

Annual Maintenance: 400 hours

Performance Measures

Stormwater reduction performance analysis:

Monitoring of the rain garden was done over a 12-month period. The infiltration rate was about 0.40 inches per hour when the rain garden started out dry. The lag time between the start of rainfall and the time water was discharged from the rain garden was one hour and twenty minutes. When an inch or more of rain had fallen the previous day and the site soils were wet the time of runoff was 50 to 70% shorter. Travel times over a similar distance through pipes would have taken minutes rather than over an hour.

Community & economic benefits that have resulted from the project: The initial concept for this project originated with students, and their ability to collaborate with campus departments advanced this project far beyond what similar student efforts had achieved. Their success resulted in a new resource for campus and the community that provides a site for education and recreation while improving site conditions, creating habitat, and reducing stormwater runoff to the surrounding neighborhoods and downstream. The location of the garden is on the edge of campus adjacent to a residential neighborhood. Stormwater runoff had been an issue in the past. This project has addressed the problem and engaged the neighborhood in the process.

Lessons learned include the importance of educating all parties involved to overcome concerns about new approaches to landscaping and to build trust and support among partners. The team also learned the importance of coordinating surrounding plantings and source specification to reduce unwanted plant migration. Related to this, one of the greatest lessons learned is the need to develop a strategic plan for ongoing maintenance that addresses future developments on the site, costs associated with maintenance and how decisions for future direction when will be made.

Additional Information

Education about urban stormwater management was another key component, including development of a website and rain garden workshop. Students involved in the project hoped to encourage student involvement on campus. This is a pilot project for sustainable landscaping and stormwater management, and a strong example of what students can achieve when they work in collaboration with design and operations staff.