



Green Infrastructure & Stormwater Management CASE STUDY

Carrington Lakes

Location: Norman, OK

Client: Landmark Homes

Design Firm(s): Geographica and University of Oklahoma

Landscape architect/Project contact: Reid Coffman, ASLA

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Project Specifications

Project Description: The extreme climatic conditions of the Central Plains have delayed adoption of national stormwater best management practices (BMPs) for water quality improvement as community concerns about cost, performance and appearance have hampered professional landscape architectural proposals using such practices. Therefore, this study investigated the experimental application and performance of expanded clay for stormwater filtration in the hopes of offering a suitable alternative for challenging or extreme sites. This investigation examined four types of 'rain gardens' using expanded clay aggregate in a new suburban residential community for construction and performance from 2007-2010. To accommodate these gardens the neighborhood adopted an green space site plan as opposed to the original development plan. The project intent is to provide results contributing to the broader practice knowledge for landscape architecture in the field of stormwater management, while creating a unique residential neighborhood.

Project Type:

Single family residential

Part of a new development

Design features: Rain garden.

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

Developer/client preference

Impervious area managed: less than 5,000 sq/ft

Amount of existing green space/open space conserved or preserved for managing stormwater on site: greater than 5 acres

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? Yes, aesthetics, recreational space, and trails.

Cost & Jobs Analysis

Estimated Cost of Stormwater Project: \$100,000 - \$500,000 (Public funding: None)

Related Information: Garden 1 with a 36" depth and decorative stone boarder showed the highest construction cost (\$49 sq/ft) while having the most plant survival. Garden 2 with 36" depth and concrete boarder showed mid-range cost (\$22 sq/ft) while having high plant survivability. Garden 3 with 32" depth and concrete boarder showed the lowest cost (\$18 sq/ft) while having lower survivability. Garden 4 with 32" depth and concrete boarder showed the lowest cost (\$18 sq/ft) while having lower survivability.

Was a green vs. grey cost analysis performed? No

Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)? Significantly reduced costs (10% or greater savings). Costs were not pre-calculated but were recorded as a part of the project. \$1.1 million saved in stormwater infrastructure in phase 1 by converting to on-grade conveyance, of which 55% was returned to the project in phase 2 and 3 as green infrastructure, including rain gardens and plant materials for a net savings of \$495,000.

Number of jobs created: Not available

Job hours devoted to project: Not available

Planning and Design: Not available

Construction: Not available

Annual Maintenance: Not available

Performance Measures

Stormwater reduction performance analysis:

Quantity not recorded, retention recorded in lab studies.

- 95% motor oils and lubricants
- 94% total solids

- 93% suspended solids
- 70% copper
- 55% zinc
- 59% iron
- 17% nitrogen
- 10% phosphorus

Additional Information

This study provides a design alternative for landscape architects practicing in extreme climatic or poor soil conditions. The information has been made available to landscape architects through papers, electronic resources and formal education. It has been shared with developers and municipal officials in order to continue landscape architectural leadership in this area of work.

In the region, increased activity of low impact development-oriented work is occurring as a result of landscape architectural involvement and leadership. With this information professionals can broaden services to deliver design solutions overcoming typical project and site constraints.