

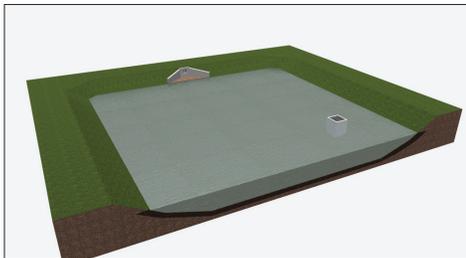
# The dollars & sense of Stormwater Management

By Jeff Chapman, AIA, LEED AP  
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As a response to the Clean Water Act of 1972, municipalities and counties enacted codes regulating the treatment and containment of stormwater runoff on both privately and publicly developed sites. The impact of these codes varies based on the size, location, and previous condition of the site. Due to the amount of stormwater detention these codes require, large ponds are often necessary in order to comply. Ponds are generally effective in terms of cost, added outdoor amenities, and efficient land use. In more urban environments, however, ponds can detract from the aesthetics of the neighborhood, lower property values, and inhibit dense developments and walkable communities. In recent years, architects, engineers, and landscape architects have developed alternatives for satisfying stormwater detention requirements, appealing to city and county officials to allow the use of Low Impact Development

(LID) techniques to minimize or even eliminate the need for detention ponds. For example, Kirksey has utilized water storage practices on several sites where large detention ponds were not feasible. We've found that implementing strategies to reduce impervious cover are often preferable to purchasing more land or reducing project scope, depending on the amount and cost of available land. When undertaking a new development, it is essential to consider alternative strategies that will provide long-term benefits and cost savings. Reducing the amount of land devoted to stormwater detention and maximizing the usable square footage of the site can result in significant savings. Below are various stormwater management techniques with their associated costs, followed by project examples of actual implementations.

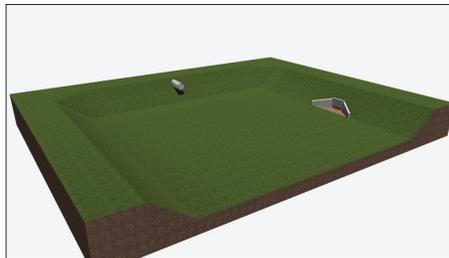
## Stormwater Management Systems & Impervious Cover-Reducing Techniques



**OPEN WET POND**

\$1 – \$2/CF

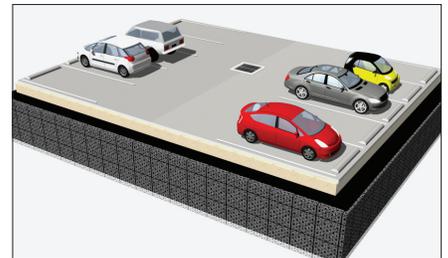
Maintenance includes mowing, cleaning out, and debris removal.



**OPEN DRY POND**

\$0.50 – \$2/CF

Maintenance includes mowing, cleaning out, and debris removal.



**UNDER PARKING STRUCTURED CONTAINMENT**

Approximately \$5 – \$7/CF

Maintenance typical unless harvesting the water for reuse. Annual maintenance required to remove silts.



**BIOSWALE WITH DETENTION**

\$3 – \$12/SF

Requires cleaning out after rain and regular landscaping maintenance. Also, no fertilizer so native plants only.



**RAIN GARDEN**

\$3 – \$8/SF

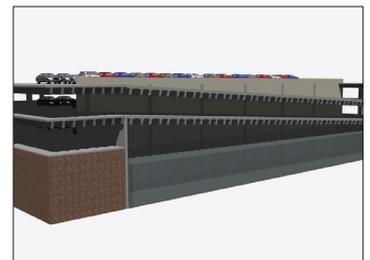
Requires cleaning out after rain and regular landscaping maintenance. Also, no fertilizer so native plants only.



**TREE FILTER**

\$8,000+

Semi-annual cleaning out required in addition to soil replacement.



**UNDER STRUCTURED GARAGE "HOLDING AREA"**

\$20 – \$40/CF, but no additional land cost

Maintenance includes annual cleaning out and pump testing if required.

## Stormwater Strategies in Action



### Walter P Moore's Top Questions to Ask Your Design Team During Due Diligence

- ▶ Under what code does my project fall?
- ▶ What are the Low Impact Development options for this site?
- ▶ If I must have a pond, is a dry or wet pond more appropriate?
- ▶ What is the outfall elevation of my site?

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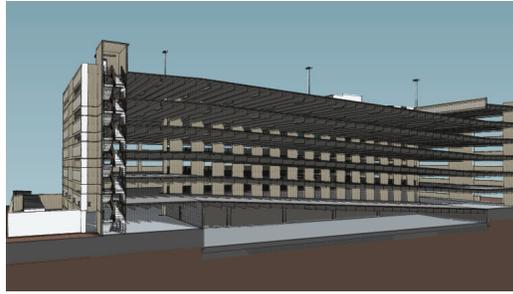
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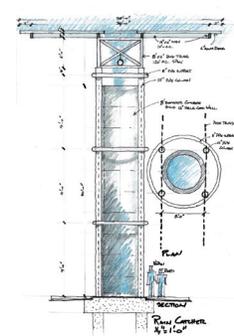
### Creative Storage — Granite Westchase, Kirksey

Standard practice for a small site like this would require the project to include a large pond on its street frontage. However, by utilizing the area under the parking garage ramps for storage, the team was able to create an amenity courtyard around the drive entrance. When land costs are at a premium, storage options like this are often preferable to devoting valuable real estate to stormwater detention.



### Rain Gardens — Bagby Street Greenroads® Project (Silver Certified), Walter P Moore

A reconstruction of a 10-block major throughway in Houston's urban Midtown District, the Bagby Street Greenroads Project features multiple rain gardens that effectively filter 33% of the corridor's stormwater. Using native plants and trees and a specially-selected mixture of soils for rapid filtration, the rain gardens remove 93% of oil and grease, 85% of total suspended solids, 75% of bacteria, and 73% of phosphorous before entering bayous and natural waterways. In addition to treating stormwater, the gardens reduce total runoff volume and decrease potable water demands for irrigation.



### Rainwater Harvesting & Sustainable Branding — Texas A&M University Agriculture & Life Sciences Complex, Kirksey

The state's rainwater collection requirements for new university facilities mandated that this project collect and reuse rainwater. Kirksey took this opportunity to not only design a functional rainwater collection system, but a striking visual feature that links the new Agricultural Department buildings to Texas A&M's West Campus. Organizations interested in a branding feature that demonstrates their commitment to sustainable design should consider rainwater collection and reuse.