



Green Infrastructure & Stormwater Management CASE STUDY

Mt. Tabor Middle School Rain Garden

Location: 5800 SE Ash St. Portland, OR

Client: Portland Public School

Design Firm(s): City of Portland

Landscape architect/Project contact: Henry Stevens

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ASLA Chapter: None



Photo: Kevin Robert Perry

Project Specifications

Project Description: A retrofit of a school property with multiple sustainable stormwater management features including a rain garden, parking lot swales, stormwater planters, and a green street. The project showcases a variety of stormwater management approaches that create a greener, healthier environment for the students and staff at the school. This project

also demonstrates a cost effective alternative to address pipe capacity issues and protect nearby residents from basement sewer backups.

Project Type:

Institutional/education

A retrofit of an existing property

Design features: Bioretention facility, rain garden, bioswale, and downspout removal (downspout disconnection).

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

Capital Improvement Program

Impervious area managed: 1 acre to 5 acres

Amount of existing green space/open space conserved or preserved for managing stormwater on site: All existing on-site greenspace was conserved. Impervious surface was removed to construct stormwater management facilities.

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? As a capital improvement project for our combined sewer system, the main consideration was managing as much stormwater on site as possible. Second consideration was aesthetics and property enhancement while providing summer cooling for adjacent indoor classrooms. Providing wildlife habitat and helping to offset the temperatures from the impervious surfaces was also considered.

Cost & Jobs Analysis

Estimated Cost of Stormwater Project: \$500,000-\$1,000,000 (Public funding: Local, Capital Improvement dollars to alleviate basement sewer backups and increase combined sewer capacity)

Related Information: Total cost of construction for green features was approx \$822,000. Fully loaded construction costs were \$504,000 This cost includes approximately \$117,000 in charges by the City for associated construction-phase tasks: contract management, project management and engineering, construction management and inspection, survey, utility locates, materials testing, and public involvement. The total cost for pre-design and design activities was \$257,000, or 49% of construction costs. Activities included initial site survey, soil and infiltration tests, an environmental assessment, location of utilities, evaluation of site alternatives, development of conceptual plans and construction plans, coordination with the school district, and obtaining permits. Planting facilities totaled \$38,000 by Portland Parks and Recreation staff.

Was a green vs. grey cost analysis performed? Yes, the alternative to retrofitting the school with green stormwater management features was to replace six sections of combined sewer pipe at a cost of more than \$1,300,000 (savings of approximately \$500,000).

Cost impact of conserving green/open space to the overall costs of the site

design/development project: Preserving existing green space did not impact the overall costs. Impervious surface was removed to construct the stormwater facilities resulting in added green space for the school. The facilities help to reduce outside temperatures as well as indoor building temperatures. The rain garden facility also serves as an outdoor classroom for science, math, etc. curriculum.

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: There is not an accurate record of jobs created for this project completed in 2007. Current City estimates for # of engineering and construction jobs for green infrastructure, public works projects is \$14 per \$1M spent on construction

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:

The facilities capture runoff from about two acres of roof, parking lot, play area, and street. They infiltrate most of the captured flow, helping reduce combined sewer overflows (CSOs). The primary goal was to protect nearby residents from sewer backups by managing enough runoff to reduce and delay the peak of the city's design storm for sewer backups. It was a major secondary goal to test and demonstrate how vegetated facilities can be integrated into school sites. BES staff conducted hydraulic flow tests of the rain garden. Data indicates 68% volume detention of a CSO design storm event. Infiltration rate averaged about 2 in/hr.

Community & economic benefits that have resulted from the project: The multiple stormwater facilities on the school certainly enhances the school property. Studies show that having access and views to green space has important health benefits, which is particularly important to our nature-deficit children. The vegetated stormwater facilities have also saved Portland rate-payer dollars of approximately \$500,000 by avoiding pipe upsizing. The nearby residents are protected from basement sewer backups. Additionally, being that this project was conceived and implemented in the city's early development of green infrastructure projects, it

provided private contractors with new skills in the area of green infrastructure.

Project Recognition

ASLA General Design Honor Award 2007

Additional Information

Links to images: http://www.asla.org/awards/2007/07winners/517_nna.html
<http://www.portlandonline.com/bes/index.cfm?c=45388&a=217429>

The green infrastructure approaches integrated into the Mt. Tabor School campus benefits not only stormwater management and watershed health, but demonstrates to an important and diverse young audience, the direct benefits of green infrastructure. And, to ensure this educational component, city staff from the Bureau of Environmental Services work with the teachers to develop curriculum around the rain garden and multiple on site facilities.