Green Infrastructure & Stormwater Management CASE STUDY

Century College West Campus Parking Lot Reconstruction

Location: White Bear Lake, MN
Client: Century College
Design Firm(s): Bonestroo, Inc.
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ASLA Chapter: Minnesota

Photo: Boonestroo, Inc.

Project Specifications

Project Description: This project redefines 16-acres of existing parking lots as a larger-capacity, interconnected system of parking and pedestrian spaces featuring green infrastructure and environmental education opportunities. An interconnected network of pervious paving, underground stormwater storage, infiltration features, and structural soil systems make this a showcase for low-impact design. This was the second installation of Silva Cells in Minnesota – the first in a Minnesota parking lot. Designers exceeded stormwater requirements through

subsurface storage and a stormwater education island. The island includes access points for monitoring, providing an opportunity to evaluate the long-term effectiveness of various pervious pavements, infiltration, and evapotranspiration techniques. This unique project layers stormwater management techniques within an educational context – while accomplishing a major parking lot reconfiguration and reconstruction to improve function and safety.

Project Type:
Institutional/education
Part of a redevelopment project

Design features: Rain garden, porous pavers, subsurface storage and infiltration, Silva Cells, porous concrete, and porous asphalt.

This project was designed to meet the following specific requirements or mandates: County ordinance, local ordinance, developer/client preference, Valley Branch Watershed District, City of White Bear Lake

Impervious area managed: greater than 5 acres

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? Yes, low-impact development was required in the RFP process. Recycled pavment materials, energy efficient lighting, and water efficient irrigation were requested during design.

Cost & Jobs Analysis

Estimated Cost of Stormwater Project: $1,000,000-$5,000,000 (Public funding: State, local, state and watershed district)

Related Information: All costs are complete, installed costs.

- Total Project Cost $3,134,568
- Storm sewer pipe: $186,223
- Stormtech subsurface storage/infiltration: $271,625
- Silva Cells: $109,675
- Pervious Asphalt: $35,795
- Pervious Concrete: $30,741
- Pervious Pavers:$23,933
- Infiltration Planter: $17,425

Was a green vs. grey cost analysis performed? Yes, additional water quality features were bid as deduct alternates to allow the owner to incorporate them into the project if the budget allowed. This resulted in the ability to accurately define the costs of the additional features, and ultimately include them in the project.

Cost impact of conserving green/open space to the overall costs of the site design/development project: The required stormwater rate and volume controls were met through the Stormtech subsurface storage systems. The additional cost for subsurface storage was offest by the gain in usable parking area. Costs for exceeding the watershed's water quality treatment standards through the addtion of the pervious pavements and Silva Cells were partially offset by a $50,000 grant from the Valley Branch Watershed District.

Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)? Slightly increased,the infiltration garden increased project cost. Enhanced treatment to improve the quality of the runoff entering wetland complex south of the buildings also increased costs.

Number of jobs created: commensurate with a $3.2M construction project

Job hours devoted to project:

Planning and Design: 3000+ hours, including construction administration
Construction: commensurate with a $3.2M construction project
Annual Maintenance: 20 hours estimated

Performance Measures

Stormwater reduction performance analysis:

For the 2-year storm event, the inflow volume is 7.7 acre-feet. Of this inflow, 3 acre-feet is infiltrated, so 39% is retained on site.

As trees grow larger, they will also contribute more and more to stormwater capture through interception and evapotranspiration. It is estimated that a large (500 sq/ft canopy) tree in July in Minneapolis evapotranspires 8.5 cubic feet per day as long as transpirable soil moisture is at least at 1/3 of field capacity. There are ten trees within the Silva Cell system.

Community & economic benefits that have resulted from the project: Retaining additional stormwater on site may reduce seasonal flooding issues for adjacent residential properties. Green space used for screening along the site perimeter reduces impacts of the parking lot on adjacent residences, and improves the streetscape edge along Century Avenue.

The expanded parking capacity will assist the College in fulfilling its educational mission as one of the largest two-year colleges in Minnesota.

- Structural cells with trees provide stormwater treatment in the following ways:
- Stormwater storage in the soil
- Stormwater infiltration into the underlying soil
- Stormwater interception by the tree canopy
- Evapotranspiration
- Stormwater cleansing by the trees and bioretention soil

Project Recognition

MN ACEC Grand Award; MSPE Seven Wonders of Engineering Award; Silva Cells "Top 10 Green Building Product of 2009" Architectural Record and Building Green; Top 15 Green Building Product of 2009, Envinronmental Design + Construction; New & Noteworthy Product, Architectural Products

Additional Information

Links to images: http://finance-commerce.com/2011/03/feats-of-engineering-century-college-west-campus-parking-lot /

http://www.deeproot.com/products/silva-cell/case-studies.html
http://www.deeproot.com/products/silva-cell/silva-cell-overview.html

Century College is one of Minnesota's largest two-year community and technical colleges. In addition to increasing student enrollment, the College built a new library/science building on the site of another existing parking lot, reducing the amount of available parking on campus. The College needed to improve and expand its existing west parking lot and pedestrian spaces to increase parking, correct drainage issues, and enhance connections from parking areas to the academic building.

PROBLEM The College's aging west parking lot consisted of 14 acres of surface parking that drained toward the academic building. The lot's age and configuration contributed to the need for reconstruction. The College specifically requested environmentally friendly techniques for this project.

SOLUTION Increased parking with better connections and improved access enhance the experience of existing students and help further the College's growth. An interconnected network of pervious paving, underground stormwater storage, infiltration features, and structural soil systems make this a showcase for low-impact design.

The technology and systems used in this reconstruction allowed the expansion of parking while reducing the impact of stormwater on the adjacent wetland complex by improving the quality and reducing the quantity of campus stormwater runoff. The result is a well-functioning parking facility that revitalizes and enhances this area of the campus. Given its uniqueness, the project

has been the subject of a site tour by the MPCA to review the installation of the numerous alternative stormwater management techniques.

The project design team of civil, stormwater, and electrical engineers was led by a landscape architect, who provided overall project management and design direction for the team.