deeproot

DeepRoot Green Infrastructure, LLC
530 Washington Street
San Francisco, CA 94111

www.deeproot.com
t 415 781 9700
f 415 781 0191

MARQUETTE & 2ND DOWNTOWN STREETSCAPE

using Silva Cells for regulatory stormwater compliance

Like many older downtowns, Minneapolis utilizes a combined sewer overflow (CSO) system to handle large storm events, discharging contaminated water directly into the Mississippi River when it exceeds capacity. Today, to protect the river, Minneapolis requires landowners to disconnect all rain leaders (gutters that collect or funnel rainwater) from the sanitary sewer system and to explore every opportunity to slow the rate of runoff, reduce the total volume and improve water quality. To this effect, Minneapolis implemented a stormwater utility fee to both incentivize and add consequences to this policy.

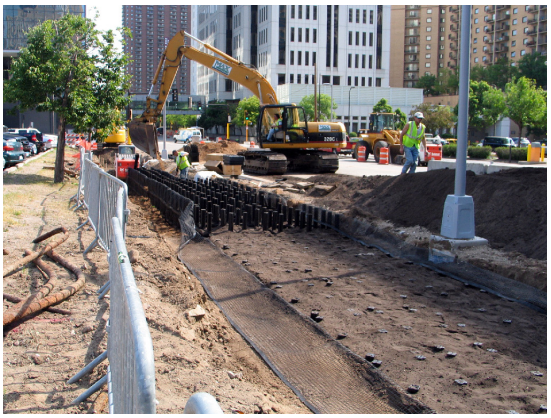
Mitigating stormwater runoff, therefore, is one major goal for the City. “We have long had capacity problems with stormwater management downtown,” said Lois Eberhart, the Water Resources Administrator for the City of Minneapolis. “We needed to find a new way of dealing with stormwater.” Seeking solutions that would prevent the system from overflowing, project designers at SEH and URS chose the Silva Cell integrated tree and stormwater management system as a natural fit to meet the City’s goals.

The Marquette and 2nd Avenue (MARQ2) busway project covers 48 blocks of downtown Minneapolis in a mixed-use stretch of town that is a transit-way streetscape renovation. A portion of the impervious sidewalks are being replaced with pervious pavement, which allow for infiltration and filtration of stormwater within the Silva Cell system. Currently the project is only collecting runoff from about 1.1 acres, but it has the potential to store the 1” rain fall event from a 5.7 acre watershed. Water enters the Silva Cell system through pervious pavers and tree pit openings.

Project engineers and landscape architects designed the streetscape to route stormwater to the soil in the Silva Cells to eliminate an irrigation system and reduce runoff. The Silva Cell groups have perforated piping to convey excess water out of the system. This water is first filtered through aggregate and 3’-4’ (.9 m - 1.2 m) of bioinfiltration media in the Silva Cells. Based upon data values from research done by Prince Georges County in Maryland, the filtration offered by the soil within the Silva Cells will remove over 80% of Phosphorous, 60% Total Kjeldahl Nitrogen, and over 90% of heavy metals such as Lead, Copper, Zinc and Iron.

“We were immediately attracted to Silva Cell because of its holistic nature of providing heavy-duty structural pavement support, stormwater treatment and the horticultural benefits of highly accessible soil volumes,” says Bob Kost, the

Silva Cells accommodate new and existing utilities.



A bioinfiltration soil mix is used to fill the system.

landscape architect director for SEH who worked in conjunction with the city on the project. “Unlike structural soil alternatives, Silva Cell makes large volumes of uncompacted soil available to soak up urban storm water run-off while making this resource available for uptake by the street trees, completing the hydrologic cycle. For the first time in my thirty years of design practice we finally have a product that allows street trees to function as a measurable, long-term component of civic infrastructure.”

All this was accomplished without compromising existing urban infrastructure, like utility lines. Lois Eberhart was pleased with the outcome as well, explaining “one of the beauties of the Silva Cell system is that existing utilities to a great degree could stay in place. It definitely gave us the best solution.”

The streetscape design places each of the 167 trees in a Silva Cell group. Each tree holds 588 ft^3 (16.6 m^3) of bioretention mix soil and can store 118 ft^3 (3.3 m^3) of stormwater. Over the entire project site, more than 19,000 cubic feet (0.45 acre feet, or 558 m^3) of stormwater can be treated within the Silva Cells. The Silva Cells are able to capture and treat well over the “P” storm, which is 90% of rain events (which in Minneapolis is less than or equal to 1.03”/2.62 cm in 24 hours) from their watershed.

The project was installed from May through November 2009. It utilized almost 5,000 Silva Cell decks and 10,000 Silva Cell frames to help the trees reach mature growth and to fulfill stormwater management goals.

Pervious pavers route stormwater into the Silva Cell system.

Installation Summary:
Total bioretention soil per tree: 588 ft^3 (16.6 m^3)
Number of Silva Cells: Over 9,800 frames
Installation date: Spring-Summer 2009
Installation type: Large trees and stormwater management
Bioretention soil stormwater treatment capacity: over 19,000 cf (0.45 acre feet, or 558 m^3 or 147,400 GAL)
Project designers: Short Elliott Hendrickson Inc. (SEH) and URS Corporation
Owner: City of Minneapolis and Metro Transit

For more information, contact:
Leda Marritz (leda@deeproot.com or 415-781-9700).