

Center for Sustainable Landscapes

Inspired by Nature



LIVING
BUILDING
CHALLENGESM

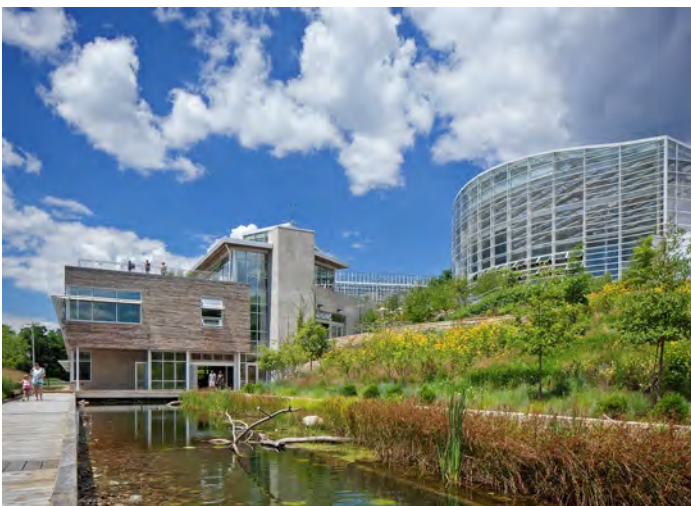


2013 **SITES**
CERTIFIED
SUSTAINABLE SITES INITIATIVETM

Top left: Native flowers bloom in the environs of the Center for Sustainable Landscapes (CSL). © Denmark Photography, Inc. **Top right:** The CSL's permaculture-inspired green roof showcases native plants known for their edible and medicinal uses. © Denmark Photography, Inc. **Bottom:** Natural daylight fills the CSL atrium where artwork highlights biophilic principles. © Denmark Photography, Inc.



Top: Flowers bloom in a rain garden in front of the Center for Sustainable Landscapes. © Paul g. Wiegman **Middle left:** A worker installs photovoltaic panels. © Denmarsh Photography, Inc. **Middle right:** A vertical-axis wind turbine contributes to the CSL's net-positive energy performance. © Denmarsh Photography, Inc. **Bottom left:** Geothermal wells help keep the CSL comfortable in all seasons. © Denmarsh Photography, Inc. **Bottom right:** A view of the CSL office and break room. © Denmarsh Photography, Inc.



One of the Greenest Buildings in the World

The Center for Sustainable Landscapes (CSL) at Phipps Conservatory and Botanical Gardens generates more energy than it uses each year and treats all storm and sanitary water captured on-site. It is the first and only building to meet four of the highest green certifications:

- **Living Building Challenge**
- **LEED® Platinum**
- **First Four Stars Sustainable SITES™ project**
- **First WELL Building Platinum project**

By pursuing all four of these certifications within a single project, Phipps and its partners set new standards for design efficiency, construction transparency, performance assessment and operational refinement, with benefits that extend beyond the building itself to the landscape that contains it and the occupants who use it every day.

As Phipps' education, research and administration facility, the CSL focuses attention on the important intersection between the built and natural environments, demonstrating that human and environmental health are inextricably connected. The CSL's prominent role within a public garden that attracts nearly half a million annual visitors uniquely positions it to foster a broader public understanding of sustainable design, technology and strategy through interpretation, docent-led tours and other educational programming.

The following pages highlight key features of the four different rating systems as seen in the CSL.

Top: An aerial view shows the CSL, lagoon, landscape and Tropical Forest Conservatory behind the original Phipps Conservatory glasshouse. © Lofty Views **Middle:** A wide view shows the CSL, lagoon, landscape and Tropical Forest Conservatory. © Denmark Photography, Inc. **Bottom:** A young visitor wanders amid flowers blooming on the CSL's Green Roof. © Cory Doman



**LIVING
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The Living Building Challenge is the world's most rigorous proven performance standard for buildings.

The Living Building Challenge requires that buildings operate net-zero energy and net-zero water — including capture and treatment of all storm and sanitary water — and comply with a materials “red list” which identifies the toxic chemicals most commonly used in building products. From the very earliest stages of the CSL’s facilitated integrated design process, Living Building Challenge standards were at the forefront of all considerations.

The Living Building Challenge requires that each building goes through a one year performance period to prove that it met all the requirements. The CSL was fully certified in 2015.

KEY FEATURES

Net Zero Energy

By taking an outside-in, passive-first approach, Phipps and its partners used modeling to minimize the energy usage of the CSL through optimizing the building’s orientation, envelope, window placement and footprint for maximum energy efficiency. 125 kW of onsite solar panels and a 10 kW vertical axis turbine provide electricity and power for an efficient HVAC system and 14 geothermal wells. A sophisticated building management system helps to optimize conditions based on sensors installed throughout the facility. In practice, the CSL’s performance exceeded the models; it is now

generating more energy than it uses annually while operating at 70% less energy than a typical office building, with an energy use intensity (EUI) of 18.

Net Zero Water

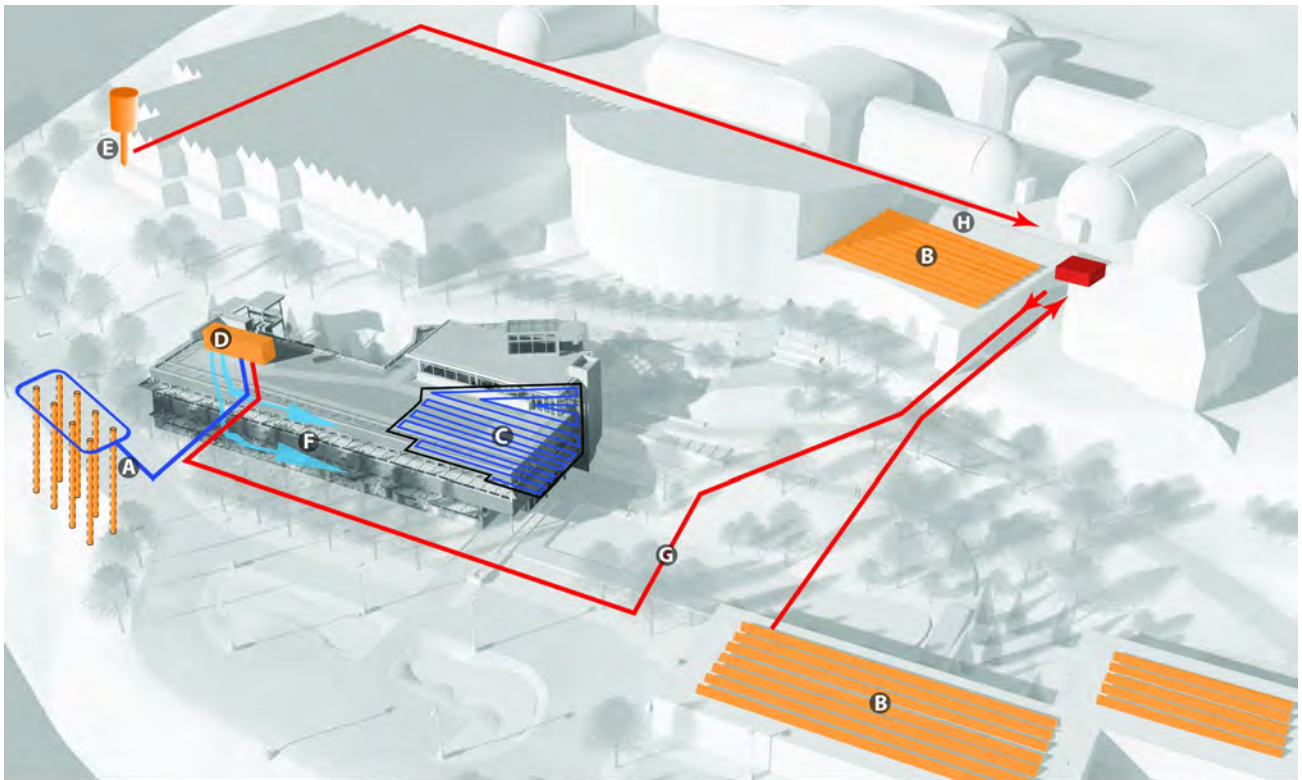
The 2.9-acre CSL site is net-zero water, managing all rainfall and treating all sanitary waste on-site. The CSL can manage a 10-year storm event within the site boundaries by utilizing a green roof, rain gardens, bioswales, lagoon, pervious asphalt and high performance native landscapes. Annually, approximately 500,000 gallons of rooftop runoff are harvested in an underground rain tank, significantly reducing demand on the local municipality’s combined storm-sewage system. All of the building’s sanitary wastewater is treated on-site using settling tanks, constructed wetlands, sand filters and UV filters prior to reuse as flush water for all of the building’s restrooms.

Red-List-Free

To satisfy the demands of the Living Building Challenge’s materials red list, the CSL project team had to contact the manufacturers of every building product to investigate their products for the presence of such toxic chemicals as formaldehyde, halogenated flame retardants, hydro chlorofluorocarbons (HCFCs), lead, mercury and many others. As a result of these efforts, manufacturers who were previously unaccustomed to such a level of disclosure returned to their suppliers for further information, creating new chains of custody that will help green builders more easily source safe materials in the future. Although it was not required by the Living Building Challenge at the time, Phipps also sourced all CSL furniture to be red-list-chemical-free.



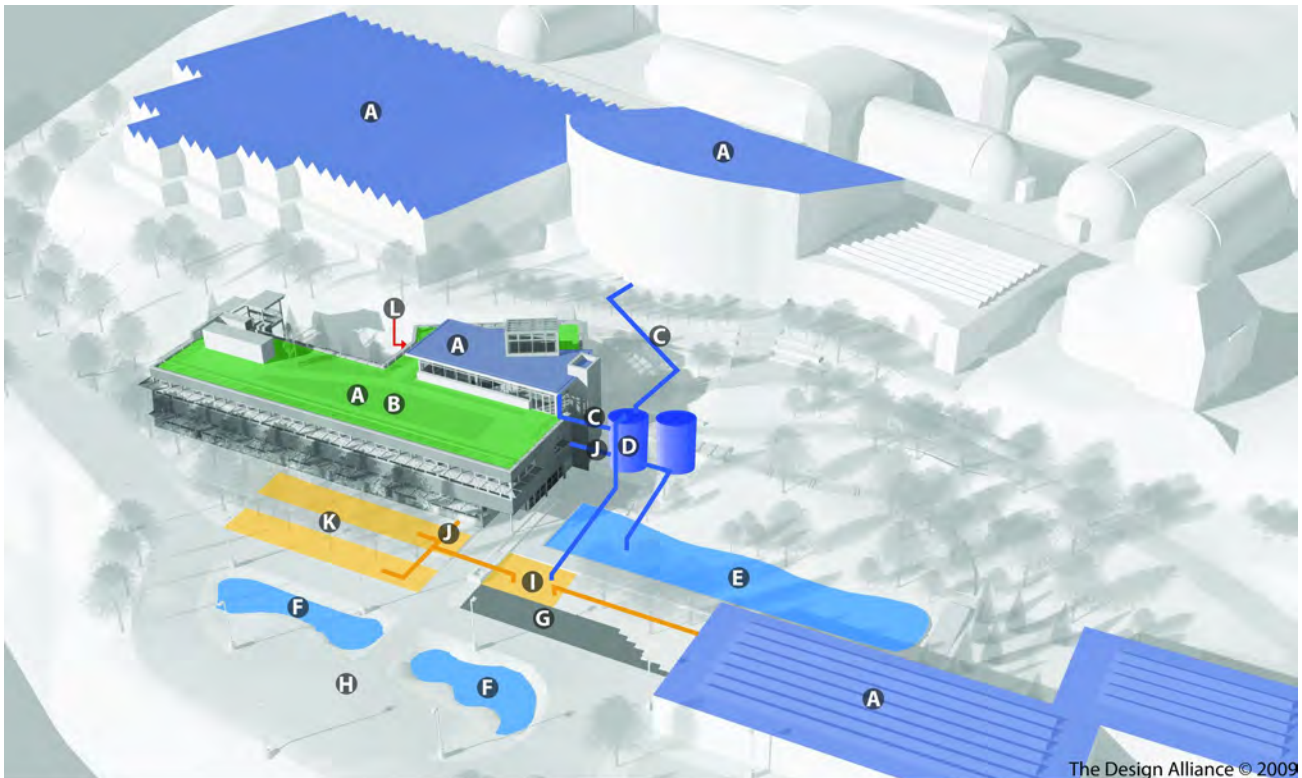
Above: Orchids bloom in the Center for Sustainable Landscapes office space. © Paul g. Wiegman



NET-ZERO ENERGY DIAGRAM

- A. Geothermal Wells
- B. Photovoltaic Array
- C. Hot Water Radiant Floor
- D. Tri-Coil Rooftop Mechanical Unit
- E. Wind Turbine
- F. Under Floor Air Distribution
- G. 100% CSL Electric Supply
- H. Excess Power to Campus

Top and Bottom: Individual components of the Center for Sustainable Landscapes' net-zero energy and net-zero water strategies are diagrammed.
 © The Design Alliance Architects.



The Design Alliance © 2009

NET-ZERO WATER DIAGRAM

- A. Storm Water Capture
- B. Green Roof System
- C. Divert Storm Water Capture
- D. Water Storage Cistern
- E. Lagoon: Storm Water Storage
- F. Rain Garden: Lagoon Overflow
- G. Subsurface Storm Water Storage
- H. Pervious Asphalt
- I. Constructed Wetlands
- J. Greywater Reuse
- K. Subsurface Sanitary Sand Filters
- L. UV Polishing - Greywater



LEED (Leadership in Energy and Environmental Design) is the world's most widely used green building rating system, with registered projects totaling more than 15 billion square feet.

KEY FEATURES

New Levels of Excellence

At the time of the CSL's Platinum certification, it tied for the most points ever awarded in LEED v. 2.2, earning 63 of 69.

Efficiency and Innovation

LEED projects must employ sustainable strategies in five categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation. The certification's goal is to "inspire project teams to seek innovative solutions that are better for our environment and better for our communities." The CSL embodies this principle, and Phipps recognizes that public gardens are uniquely positioned to demonstrate the benefits of good design. The CSL blurs the line between built and natural environments, reinforcing the fact that human and environmental health are inextricably interconnected, and that sustainable actions are the key to ensuring that these critical interconnections are harmonious, mutually beneficial and healthy for future generations.



Top: The native plants of the CSL green roof and landscape offer four-season interest. © Paul g. Wiegman **Middle:** Two young guests spot a frog in the CSL's lagoon. **Bottom:** The Center for Sustainable Landscapes contains ample classroom facilities for children where they can discover and enhance their understanding of the natural world. © Denmarsh Photography, Inc.



The Sustainable Sites Initiative™ (SITES™) is based on the understanding that land is a crucial component of the built environment. Sustainable landscapes create ecologically resilient communities while benefitting the environment and local and regional economies.

The CSL was the first project to earn 4 Stars Sustainable SITES certification (now known as Platinum).

KEY FEATURES

A Native Landscape Is Reborn

This project integrates the building seamlessly into a landscape design that is nothing short of an ecological rebirth. Previously, the 2.9-acre project site was a City of Pittsburgh public works yard, entirely paved over with asphalt and with portions classified as a brownfield. There were no existing natural land covers or ecosystems to preserve or protect.

Today, on a once-steep terrain now made ADA-compliant by gently meandering paths, visitors may observe more than 100 species of native plants in an array of communities strategically placed to reflect environmental adaptations and provide food and habitat to wildlife. A 4,000-square-foot lagoon, fed by roof runoff, contains native fish and turtles and is bordered by an FSC-certified oak boardwalk. From open meadows to oak woodlands, wetland plantings and a “no-mow lawn,” a range of ecosystems are represented on-site that responds to the dramatic changes in topography. The space also hosts dynamic science education programs for a range of age groups.

Plants Help with Performance

In addition to creating new habitats for wildlife, plants on the slopes and green roof help to capture rainwater. Excess water is diverted to rain gardens where flood-tolerant plants can capture it. Plants in the lagoon help clean the water and plants in the constructed wetlands mimic nature in cleaning sanitary water from the building.

Performance Is Monitored

Data loggers in the landscape record 21,362 data points daily to ensure optimum performance. Variables such as volumetric water content and green roof runoff reveal the effectiveness of these elements. The monitoring program makes local data available to researchers, revealing important lessons on how to sustainably manage urban runoff. The project demonstrates that landscapes can be an integral component to the region’s water management plan to mitigate combined sewage overflows.



Top: A mother and child walk through the restorative CSL landscape. © Paul g. Wiegman **Middle:** A great blue heron perches on driftwood in the CSL lagoon. **Bottom:** A science education class uses the CSL lagoon and landscape as a living laboratory. © Paul g. Wiegman



Launched in October 2014 after six years of research and development, the WELL Building Standard is the premier standard for buildings, interior spaces and communities seeking to implement, validate and measure features that support and advance human health and wellness.

The CSL earned the distinction of becoming the first project to be certified at the Platinum Level, the International WELL Building Institute's highest standard, based on seven performance categories — air, water, light, nourishment, fitness, comfort and mind.

KEY FEATURES

A High Quality Occupant Experience

Project features that helped Phipps achieve WELL Platinum Pilot rating for the CSL include high indoor air quality, circadian lighting enhanced by natural daylight, ergonomic work stations featuring standing desks and high-quality chairs, and a chemical-free cleaning protocol. Enhanced ventilation and operable high-performance low-e windows provide fresh air, natural light and views of nature, and Phipps offers employees free nutrition workshops and counseling, yoga classes and other fitness incentives, daily access to organic fruit, and more.

The Role of Biophilia

Biophilia plays a key role in WELL. Biophilia is the innate desire that humans have to connect with nature and biophilic design creates spaces that improve those connections. Research has demonstrated that biophilic design can improve health, happiness and productivity in the places we live, work, learn and play. The CSL incorporates many biophilic features and a unique biophilic art program that seeks to improve occupant wellness through patterns of nature, from visual and audio art to a restorative landscape and views of nature.

THE BETA Project

An extension of the CSL's commitment to wellness through biophilic design, the BETA (Biophilia Enhanced Through Art) Project is an inspiring collection of art that includes paintings, sculptures, an audio installation and more. Showcasing the work of more than 20 local, national and international artists, it takes the CSL's biophilic experience to a new level of sensory immersion, enhancing and restoring bonds to the natural world for the building's occupants and daily visitors alike.



Top: A child observes biophilic artwork in the CSL atrium. **Middle:** A staff member engages with the "Skywatcher Loom," an interactive, biophilic art installation. © Denmark Photography, Inc. **Bottom:** Natural daylight illuminates the board room and its table, made from wood salvaged from a local park. © Michael Tessler