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Challenge



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Serving Our Clients and Communities

Our clients often include individuals and organizations that not only focus on the business objectives of their projects, but also on how those projects may impact the environment and positively contribute to their communities. In this issue, you will find CEC collaborating with nationally recognized experts on a high-performing sustainable site for a cultural institution, working with educators to develop an outdoor curriculum for high school students, and remediating a legacy industrial site to safe standards for future use. When consistent with our clients' project objectives, CEC is able to incorporate solutions and designs that enhance the economic and environmental health of the communities in which we reside.

Kenneth R. Miller, P.E.
President and CEO

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On the Cover:

The new Center for Sustainable Landscapes at Phipps Conservatory and Botanical Gardens has emerged as one of the greenest buildings on Earth.



Civil & Environmental Consultants, Inc.

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Up for the Challenge

*Phipps Conservatory and Botanical Gardens
Zeros In on Sustainability*

The lagoon captures and filters surface and roof runoff as part of a stormwater treatment system integral to achieving net-zero water performance.

The new Center for Sustainable Landscapes

at Phipps Conservatory and Botanical Gardens in Pittsburgh, Pennsylvania, opened in January 2013, more than six years after conceptual discussions began.

For a historic non-profit institution and cultural gem like Phipps, whose primary inhabitants are some of nature's finest botanical specimens, waiting for things to grow and bloom is not unusual. This project, however, will soon set a precedent in high-performance design both locally and internationally, and everyone, it seems, is eager to see the fruits come to bear.

In 1999, the groundwork was laid for a three-phased master plan for renovation and expansion at Phipps. Phase I, the new Welcome Center, was the first LEED®-certified visitor center in a public garden. Phase II's Tropical Forest Conservatory is now known as "the most energy-efficient

"When we think about the type of world we would want our children and grandchildren to inherit, it is easy to see why the Living Building Challenge is so important. And when we look at how a dedicated team of professionals came together to create the CSL, we know that we have the technology and capacity to create that future now."

*—Richard V. Piacentini, Executive Director
Phipps Conservatory and Botanical Gardens*



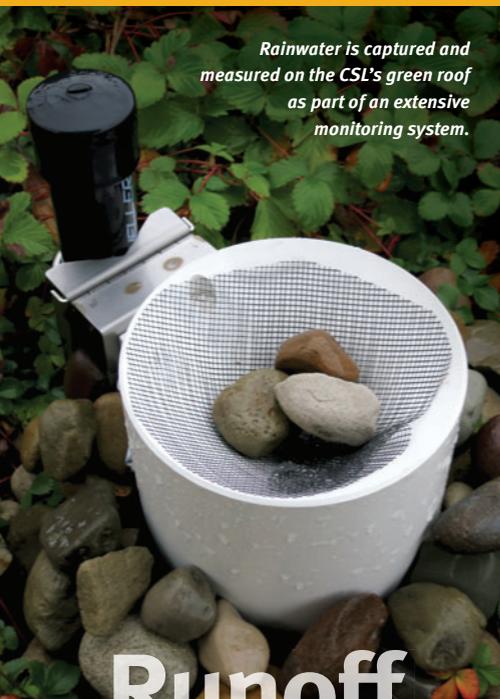
This 1,700-gallon underground cistern stores runoff water from the CSL roof for reuse as flush water.

conservatory in the world," and the production greenhouses were recently certified Platinum under the LEED EBOM program. Phase III was slated to be a new center for education, research and administrative operations.

And so began the life of the Center for Sustainable Landscapes (CSL). In late 2006, Phipps' Executive Director Richard V. Piacentini championed a sustainable design for Phase III that aligned with the International Living Future Institute's groundbreaking green building process, the Living Building Challenge.

The Challenge states: "Imagine a building designed and constructed to function as elegantly and efficiently as a flower." Version 1.3 of the Challenge (which is updated periodically) included sixteen imperatives that a project must fulfill. These imperatives are distributed among six performance areas, also known as Petals: Site, Energy, Materials, Water, Indoor Quality, and Beauty & Inspiration.

Rainwater is captured and measured on the CSL's green roof as part of an extensive monitoring system.



Runoff Rundown

CEC is monitoring the efficiency and effectiveness of the CSL's green roof through the use of data loggers, which incorporate sensors that measure temperature, water discharge rate and quantity, and soil moisture.

The green roof has reduced runoff by more than 87% annually, while any water not absorbed by the roof has ended up in the site's stormwater recovery tanks or rain gardens (bioretention areas). No measured runoff went to the storm sewer, even during Hurricane Sandy in October 2012, when the CSL experienced a storm event with more than 2.8 inches over a 24-hour period.

The CSL is on target to meet the net-zero demands of the Living Building Challenge's Water Petal imperative. ■

continued from previous page

CEC led final development of the strategy that addressed the Water Petal and its two imperatives: net-zero water and sustainable water discharge. The strategy included on-site sanitary treatment, stormwater management, and water reuse systems. A closed-loop system for the biological treatment and filtration of sanitary water includes two constructed wetland cells, two sand filtration beds and an ultraviolet filter to disinfect water for reuse as greywater (or flush water) within the CSL. This system significantly reduces the CSL's need to draw potable water from the city's system, in addition to minimizing the impact on municipal sewage treatment.

The design also involved harvesting the Pittsburgh region's abundant rainwater. A 1,700-gallon underground cistern stores rainwater for irrigation at the CSL, as well as backup water for the sanitary reuse system. An 80,000-gallon underground modular rainwater harvesting tank captures additional site stormwater runoff. Harvesting some of the estimated 2.7 million gallons of rainwater that will fall on the CSL site annually will significantly reduce the burden on the city's stormwater management system and the entire Phipps campus's need to pull potable water.

A lagoon system manages runoff and serves as a biological stormwater treatment system, similar to the natural treatment that occurs in wetlands and marshes. With its reflecting pool-like quality, trickling water sounds, elegant landscaping and inviting boardwalk, the lagoon is one of several

connected landscape communities that continue the main conservatory experience throughout the CSL site.

"High-performing buildings don't just get switched on," said Michael Takacs, CEC Principal and head of the Landscape Architecture practice. "They require additional time to adjust and fine-tune their operational parameters. All of the circuitry and programming for these components are in place, but making them talk to one another the way they are intended must be adjusted manually over time."

Phipps has been conducting performance monitoring of all the different spaces for treatment on site. "As a conservatory and botanical garden, it's important to know exactly what is being put on the plants. A big part of what we're doing now is periodic water quality testing to examine what is going in versus what is coming out," said Jason Wirick, Phipps' Director of Facilities and Sustainability Management.

"Our hope is to showcase the performance of more passive and sustainable site water systems," Wirick said. "CEC cares about the project and about what we're doing at Phipps."

The CSL achieved LEED Platinum certification from the U.S. Green Building Council in September 2013, and received a Green Design Citation at the AIA Pittsburgh Design Awards in October 2013. Along with the Living Building Challenge, the CSL is currently pursuing the Sustainable Sites Initiative™ SITES™ certification for landscapes. ■

The lagoon's plants and their symbiotic root microbes absorb organic and mineral nutrients in a multi-step filtration process.



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An aerial photograph of the EaglePicher smelter facility and site taken in 1945.

A DRAMATIC DIFFERENCE

A REMEDIATION PLAN BREATHES NEW LIFE INTO A HISTORIC MINING SITE

Dale Oglesby leases ten acres of a former smelter site in Galena, Kansas, for his salvaged materials business; he also just so happens to be the town's mayor.

Galena was a mining boomtown named after its rich deposits of lead sulfide, an ore found in abundance in the area. To extract valuable metals such as lead or zinc from the ore, extreme heat and a chemical reducing agent decompose the ore in a process called smelting, releasing byproducts as gases or slag and leaving only the desired metals. In 1878, the EaglePicher Company built the only smelter in town. It was the largest lead and zinc smelter in the world.

EaglePicher was smelting in spades until 1980, after the mines were exhausted and Galena's mining companies abandoned ship. The smelter would soon be abandoned as well.

EaglePicher declared Chapter 11 Bankruptcy in 2005, and assets of value were sold nationwide. However, there remained seventeen environmentally impaired sites, including the smelter in Galena. A trust fund was established to remediate the impaired sites to commercial and industrial standards, of which \$6.5 million was dedicated to the highly contaminated 148-acre Galena site.

Not wanting to lose the historical mining-era structures, Mayor Oglesby contacted

"The difference between back then and today cannot be overstated."

— Dale Oglesby, Mayor of Galena, Kansas



The site investigation identified the presence of up to 350,000 mg/kg of lead and more than 18,000 mg/kg of mercury, among other contaminants.

William West, the Custodial Trustee for the remediation fund. "My business encourages reutilization of old assets," said Oglesby. "I knew the EaglePicher facility would be a classic example of finding a way to make salvaged property useful again."

CEC was retained in 2006 as the environmental consulting firm for all of the impaired EaglePicher sites, with Vice President Marty Knuth serving as project manager. An environmental investigation program was prepared and implemented to evaluate the nature and extent of contamination in Galena. "Dealing with

nearly 150 acres is an awesome task," said West. "The key thing was CEC's approach for characterization of the site's environmental issues."

To delineate areas of contamination, CEC performed instant on-site screening of soil samples using an X-ray fluorescence (XRF) spectrometer, saving time and limited cleanup funds. CEC was instrumental in helping state agencies understand the efficacy of the XRF for accurate readings (versus conventional testing and lab characterization).

The prescribed remediation involved excavation of impacted soils and on-site encapsulation in a consolidation cell topped with a revegetated cover, which CEC designed. Short Creek, a stream running through the property, was dredged of lead-contaminated sediments, and upland areas along the stream were remediated, regraded and revegetated. In all, 191,000 cubic yards of soil were included in the earthwork plan.

"Environmental actions will be complete before the end of 2013," said Knuth. All of the buildings also were remediated and are now being utilized—nothing was wasted. Acres where smelter waste and heavy metal contamination prevented vegetation for 100 years are now reseeded and growing. "There has been a dramatic change in the landscape," said Oglesby. "If it hadn't been for the Custodial Trust and CEC, the site wouldn't be what it is today." ■

When “excited” by an external energy source, atoms emit X-ray photons that help determine what elements are present in a sample.



Beneath the Surface:

VISUALIZING THE EXTENT OF CONTAMINATION

More than 1,200 surface and 1,200 subsurface soil samples were collected to delineate areas of contamination at the former EaglePicher smelter site in Galena, Kansas. Each sample location provided scientists with concentration information for up to seven constituents: mercury, lead, chromium, copper, zinc, arsenic and cadmium.

It was clear that traditional methods of mapping would not be sufficient, considering the amount of data collected. Tom DiVittis, CEC’s Corporate CADD Program Development Manager, had an idea to employ 3D visualization using AutoCAD® Civil 3D® software, a program typically utilized for modeling of surface topography and above-ground data.

Once the data was entered, the graphic conveying the extent of contamination was produced rapidly. The modeling showed how much contaminated soil existed at each test location and at what depths, as well as how much would need to be excavated and encapsulated. ■

“CEC’s creative thinking helped us identify a completely new set of workflows and opened new avenues.”

—Chakri Gavini, Senior Product Manager Autodesk, Inc. (developer of Civil 3D software)

Spotlight

Bat Biologist Ryan Slack Sounds Off

Q What projects require threatened and endangered species surveys and why?

A Any project involving tree clearing or any kind of government permitting or funding, which is the big trigger.

There is huge demand for these surveys within the expanding natural gas industry, where connecting new well pads to midstream services and, in some cases, connecting multi-state pipelines is critical.

Q What would you say are some of the biggest challenges clients face with regard to these surveys?

A *There is a shortage of trained and certified people to perform the work. At CEC, we have different tiers of qualified bat biologists and a good mix of all the qualifications in house. Our U.S. Fish & Wildlife Service-approved bat surveyors are experienced in conducting habitat assessments and mist-net surveys for the federally endangered gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*). Indiana bats range across 29 states, and we have somebody in-house who is supremely qualified in most of those core states.*

Q Where are we in a typical survey life cycle?

A *From November 15th to March 31st, clients can cut trees down free and clear if there are no known populations of Indiana bats around. USFWS evaluates every project and allows for an opportunity to cut the trees in the winter when the bats are in caves and not on the landscape where they could be harmed. However, if we don’t catch anything during our summer surveys, clients may cut trees any time of the year, not just during this short winter time frame.*

Q How can CEC help keep projects on track?

A *The original May 15th to August 15th survey window is shrinking in some states, like Ohio where it’s now June 15th to July 31st. We have to rethink how we do our surveys in different states. It’s good to have an army of people like we do. This started last summer and it’s only going to continue. We’re prepared for that.*

IN THE NEWS

NSF GRANT AWARDED

CEC Principal Timothy Nuttle, Ph.D., was awarded a National Science Foundation grant to investigate changes in stream conditions and how they affect the kinds of insects and other small invertebrates that are available as feedstock for birds – specifically the Louisiana Waterthrush, a species of bird that lives in forests along streams. The research is being conducted at Powdermill Nature Reserve, a field station of Pittsburgh’s Carnegie Museum of Natural History, and is a collaboration between CEC, Carnegie Museums of Pittsburgh, The National Aviary, Duquesne University, and the University of Guelph in Ontario. ■

LIFE IS BUT A STREAM

SCIENCE FOR THE REAL WORLD

The new Cardinal Wuerl North Catholic High School in Cranberry Township, Pennsylvania, has entered the final phases of construction and site development, during which time CEC completed two stream restoration projects within the watershed that were constructed to offset stream impacts.

Presented with a unique opportunity to expand the curriculum to include outdoor classroom experiences, school administrators engaged CEC in the development process, believing the stream restoration projects would provide excellent subject matter. Dan Maltese, head of CEC



Q What sets CEC apart from other companies?

A Our wildlife biologists maintain an excellent rapport and a solid relationship with all the federal agencies and the state agencies where we primarily do work. Our employees have the opportunity to develop their own relationships so these contacts don't just think of me when they think of CEC, and I think that makes us stronger.

Q What's new from a regulatory standpoint this year?

A On October 2nd, USFWS proposed to list the northern long-eared bat (*Myotis septentrionalis*) on the federal register. That is directly because of White-Nose Syndrome (a disease named for the white fungus that infects skin of the muzzle, ears, and wings of hibernating bats).

It is still unknown how White-Nose Syndrome is being spread. One possible solution to the problem might be to keep our hands off the bats. USFWS has released different protocols in an attempt to transition the surveys from netting to acoustic detection, which minimizes the amount of handling that the species must go through.

Q It sounds like you are truly interested in this work.

A I didn't grow up wanting to be a bat biologist, but when I actually got into it, I found bats interesting. People who did not necessarily intend to get into this type of work have helped change perceptions. There is a shift from fearing the bat as a creature of the night with rabies to caring about and not living in fear of the animal. Part of helping with bat recovery is giving people an understanding. I have a lot of clients who now say, "Tell me how I can help my kids experience this." ■

Pittsburgh's ecological services practice, and Mike Shema, an ecological project manager, helped administrators find ways to take advantage of the site's unique natural assets while incorporating such educational topics as biology, hydrology, hydraulics, math, and physics.

In October, 43 current high school juniors joined CEC to plant native trees

and shrubs along the newly restored channels, highlighting the importance of re-establishing native vegetation for the benefit of wildlife. Students also learned how natural channel design principles were implemented to create a stable stream channel using natural materials. CEC's restoration projects provide real-world examples of science and engineering in action. ■



Elements is published by Civil & Environmental Consultants, Inc. for clients, business partners and other associates.

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Special thanks to Amanda DiGregorio

For information, address changes, corrections or additions to the mailing list, contact 1.800.365.2324 or email elements@cecinc.com.

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Back Cover: CEC PHOTO CONTEST WINNER PHILLIP PRITCHARD NORTH CENTRAL PA

CEC sponsors a Photo-of-the-Month contest encouraging employees to submit pictures from their work sites. The winning photo is published on CEC's internal website and Facebook page.





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A CEC survey crew member captured this early morning scene while performing an as-built survey on a section of a natural gas pipeline in West Virginia.