

Cooper Union's Green Roof Catches Rain Water

NYC's first LEED Platinum academic building, 41 Cooper Square, has a green roof. However, this roof was not created as a garden or for recreation purposes. Instead, the eighth floor expanse is planted with long-stemmed, hearty prairie grasses and watered with city rainwater. The private college developed the green roof as part of its sustainability program.

Founded by inventor, industrialist and philanthropist Peter Cooper in 1859, the Cooper Union for the Advancement of Science and Art offers education in art, architecture, engineering, humanities and social sciences.

Cooper Union has two academic buildings: the City Landmark Foundation Building, built in 1859, which has gone through a renovation to include an energy efficient plant; and the East Village facility, 41 Cooper Square, opened in 2009.

41 Cooper Square is a wildly imaginative artistic structure surrounded by a free-form "second skin" — stainless steel perforated panels — that are positioned in front of six-to-seven-foot-high windows. However, the "second skin" isn't just sculptural. Using an intricate computer system, the panels open and close to make use of natural sunlight. In the summer, the panels stay shut to cut out 50 percent of the light and keep the building cool; in the winter, they stay open longer to allow the building to absorb sunlight and stay warm. The result is significantly reduced energy costs.

Take it up another level, and the roof plays a significant role in the greening of New York City.

"The theme of the roof was to create a sky prairie," explains Jody Grapes, Director of Facilities Management at The Cooper Union. Underneath that prairie is a vast technical system that both irrigates the plants and services the building's plumbing. Two super-sized tanks capture storm water after each rainfall and repurpose what would otherwise be wastewater. The estimated water conservation data is impressive. It saves the college approximately 200,000 gallons of water every year and helps prevent run-off from NYC's aging sewer system.

"The roof serves multiple purposes," explains Grape, who runs the maintenance, construction and security of the 175,000 square foot facility.

For starters, the green roof alleviates the strain on the storm water system in NYC. "A good portion of rain water that hits the roof will be absorbed by the plants," says Grape. Secondly, about 25 percent of the college's toilets and urinals utilize that harvested rainwater.

The green roof also helps to negate the heat island effect. "As we know, NYC is commonly referred to as a concrete jungle. For example, on summer evenings, the city stays hot because the concrete absorbs the heat. If NYC took 10 percent of its rooftops and planted a green roof, it would lower the heat island effect."

And then there's the human effect. "It's a comforting feeling to see green, whether you are looking out the window from this building or another building, green has a positive

psychological influence," adds Grape.

The roof was planted in the spring of 2009, the same year as the LEED certified building was completed. Grape says, "Lab buildings are usually pretty energy dependent, so it was a challenge." Obviously, one that is inspiring.

The Director of the Cooper Union Institute for Sustainable Design, Prof. Kevin Bone explains, "If people realized that their water is coming out of streams from the Catskill Mountains, maybe they could understand the importance of this. If we use less water from those streams, the water-based ecology (including fishing) of the Catskills is better. It was that big picture that in part motivated some of these design decisions."

NYC brings in about one billion gallons of fresh water a day from our watersheds (streams and rivers) in the Catskill Mountains.

"If we could reduce our water usage by five percent a day, we would be reducing our cities usage by 50 million gallons a day," he says. "If each and every one of us could take a five percent shorter shower or spend five percent less time brushing our teeth or washing our dishes, we would have a huge impact on the structure of NYC. That's a lot of water." There have been water shortages in NYC in the past, and Bone maintains that there will be more in the future. Truth is, we all need to reeducate ourselves.

"All of this green infrastructure doesn't have to be seen as some sort of utopian fantasy. In the end, it will make NYC a more economical place. Besides improving the water quality in the harbor and estuaries and improving urban aesthetics, it will also help to reduce the amount of energy and equipment required to treat water," Bone explains. The end result will also be tax savings to NYC citizens.

"Our environment doesn't absorb much water," he explains. "In NYC there's not a lot of ground left. A lot of the rain that falls has to be disposed of in the sewer system through grates on the streets. In event of storm, water is discharged into the harbor because it's too much for the waste treatment plants."

There are two approaches to solving this problem.

"The old school is you build more facilities with gigantic underground tunnels," he observes. "Or you can try and limit the amount of water going into the system, to make the city more absorbent. It's called soft path engineering which is building a green infrastructure that helps to absorb the water."

For example, 30 years ago, the average NYC tree well was nine square feet (three feet by three feet). These days the pits are built bigger (5 feet by 10 feet), or 50 square feet. "They absorb more water, the trees do better, less concrete is used and trees are happier. Patches of green like this can retain the water that falls on the sidewalk and streets," says Bone.

"In conclusion, that's what green roofs are for, and that's what the rain water harvesting system at Cooper Union is all about."

Cooper Union's Continuing Education Department offers courses in green building design, water management and other aspects of sustainable development.

For more information about Cooper Union, call (212) 353-4195 or visit www.cooper.edu.

— Holly Reich



The green roof of 41 Cooper Square, Cooper Union's LEED Platinum building, is adorned with an original eagle from PENN station. The green roof has a water system that irrigates plants and services the building's plumbing.

About Big Town **Going Green**

Big Town Going Green is a series of articles showcasing local companies and initiatives that support the environment through innovative "green" programs or services.