SUSTAINABLE DESIGN

Switched Sites Made Design of 'Green Infrastructure' College Building More Challenging

DURING THE DESIGN competition for the William J. Lindsay Life Sciences Building, to be built at Suffolk County Community College's Ammerman campus, in Selden, New York, the site proposed for the 63,000 sq ft structure was on a relatively flat piece of land, explains Roger P. Smith, AIA, LEED AP, the owner of BBS Architects & Engineers, of Patchogue, New York. BBS eventually won the competition and served as the principal architect, interior designer, and mechanical, electrical, and plumbing engineer for the nearly $30-million project; it also contributed to the site civil engineering design, which was primarily conducted by Greenman-Pedersen, Inc., of Babylon, New York. Ysrael A. Seinuk, P.C., based in New York City, was responsible for the structural engineering of the three-story building. The general contractor was J. Petrocelli Contracting, Inc., of Ronkonkoma, New York.

Before the competition concluded, however, the college changed the site of the proposed building to a different location to take advantage of an underutilized parking lot nearby. The new location created numerous new challenges for the winning design team, Smith says. First, instead of a flat, largely open parcel of land, the new site was wooded and featured a considerable slope, the elevation changing by 30 ft from the northern end of the site to the southern end. Furthermore, the new site seemed to have been part of a drainage system for the tuberculosis hospital that had been located on the property; at the lowest portion was a marshy land feature referred to as a wet meadow, to which all the water flowed, notes James P. Garrahan, LEED AP BD+C, an assistant vice president and senior landscape architect for Greenman-Pedersen.

During the excavation phase, more surprises were uncovered, especially the existence of numerous underground structures, including old pipes and concrete leaching pools that had been part of the hospital's drainage infrastructure but had not been evident in the initial surveys.

In the spirit of making lemonade when you've been given lemons, the design team decided to work with the site's features, challenges and all, and "try to make this a positive," Garrahan says. They already knew that the college wanted a building that would embody the principles of sustainable

The so-called green infrastructure of Suffolk County Community College's William J. Lindsay Life Sciences Building features a combination of large swales, retaining walls, and new and reused pipes that is designed to handle drainage in as sustainable, visible, and publicly accessible a way as possible.

TOM SIBLEY/WILK MARKETING COMMUNICATIONS, *BOTH* development, part of a push for so-called green infrastructure. And since the structure was going to be an educational facility, the team decided to deal with the drainage issues in as sustainable, visible, and publicly accessible a way as possible. Thus, instead of putting all of the drainage in underground pipes, hidden from view, the plan involved a combination of large swales, retaining walls, and pipes where necessary. In addition to new pipes, some of the old pipes would be reused.

Dubbed outdoor classrooms, the system involves the various exposed storm-water management features that "allow the students to see—let's call it applied science—while they're involved in studying the life sciences," Garrahan explains.

Some of the pipes were rerouted around the building as part of a "balancing act" between pipes and swales, both of which were used to direct water to the lowest areas, Garrahan explains. And while the new drainage system included the construction of concrete leaching pools and diffusion wells, it also incorporated some of the older pools as part of a backup system in the event of especially heavy storms. The elevation of the original pools was raised to conform to the new grading design, which helped "turn a potential issue or problem into something positive," Garrahan notes. As a result, the entire site "is functioning as part of the storm drainage system," he adds.

One swale was constructed around the north, or higher, side of the building, and the other goes around the south, or lower, side; both direct water to the wet meadow on the western side of the building. The swales feature moss-covered rock retaining walls utilizing geotextile fabric filters, the largest wall being 8 ft tall and 80 ft long. The bottoms of the swales are covered in gravel, fabric filters, and river rock roughly 6 in. in diameter. The diffusion wells and leaching pools, which are up to 10 ft in diameter and 10 ft deep, are located within the swales and in the wet meadow itself. As a pool fills with storm water during a heavy rain, the water first recharges into the underlying soil through holes in the concrete structure; if the water exceeds the recharge rate of the leaching pool, it eventually bubbles up through a grate in the swale, then flows toward the wet meadow, in some areas through pipes that pass beneath paved sidewalks.

As many trees as possible on the site were saved, Garrahan says, but obviously a large space had to be cleared for the life sciences building. Indigenous plants were used to revegetate the area, especially drought-resistant native grasses. The use of plants from the region was designed to help reduce the need for upkeep and care, given that these plants would be better adapted to the local climate, Garrahan says. New trees also were planted along the site perimeter and around the building, especially at the north and south entrances.

The combination of having the water flow through vegetated areas and the existence of often sandy subsurface conditions at the site was conducive to storm-water recharge and also contributed to water quality improvement, which "is the whole gist of green infrastructure: to use natural elements as much as you can," Garrahan says.

The new life sciences building itself also is designed for maximum sustainability and green infrastructure, notes Smith. A steel-framed structure clad in places with brick and having a curved, aluminum-framed curtain wall made of glass of low emissivity, the building is oriented to minimize solar heat gain in the summer. The roof also features vegetated spaces and a reflective membrane of white thermoplastic polyolefin to further reduce heat gain, Smith explains. A rooftop photovoltaic system has a generating capacity of 144 kW, enough to meet more

Interactive displays and kiosks provide data on the building's energy performance, including power usage and the operation of the heating, ventilation, and air-conditioning system.

than 60 percent of the building's electricity needs. Inside the building, much of the mechanical, electrical, and plumbing ductwork is exposed, and kiosks and interactive displays provide real-time data on the building's energy performance, including power usage and the performance of the heating, ventilation, and air-conditioning system.

Just as the storm-water management system that surrounds the building is in plain sight for the life sciences students to study, the interior of the building also is meant to promote "the building as a learning tool," Smith notes.

The building's numerous laboratories, designed as modular units to afford maximum flexibility by Tsoi/Kobus & Associates, of Cambridge, Massachusetts, feature energy-saving air exchange systems. Recycled and sustainable materials were used throughout the interior, including 1,200 sq ft of a bamboo-veneer wallpaper that was installed around the curved wall of the elevator shaft.

The building is founded on concrete footings and piers that extend as much as 15 ft into the ground in places. The soil over the entire footprint of the building was excavated and replaced with a controlled density fill designed to accommodate the required bearing capacity. Because of the extensive slope of the site, a 300 ft long shoring wall consisting of steel I-beam piles and timber walls was constructed on the northern and eastern sides of the excavation for the building.

Although the drainage system around the building is designed to accommodate 8 in. of rainfall over a 24-hour period, it had to cope with much more than that during a record-breaking storm last summer. The system was still under construction, approximately 80 percent complete, when the region experienced 14 in. of rainfall in seven hours, 9 in. of it falling during just a two-hour window. The track of the storm passed right over the site, Garrahan recalls, and although he was initially concerned about what might have happened there, the system performed exactly as planned.

"There was some standing water in the wet meadow," he says. Water also got within a few feet of the building, and the recently spread topsoil had for the most part been washed away. But because the system was designed to recharge the water on-site, the topsoil was simply funneled to the wet meadow area. Neither the water nor the topsoil went off-site. Thus, the contractor was able to reclaim the soil and respread it after the storm. And by the next day the water had receded significantly. "So in spite of all the siltation, it was still draining the way we had designed it," Garrahan says. —ROBERT L. REID