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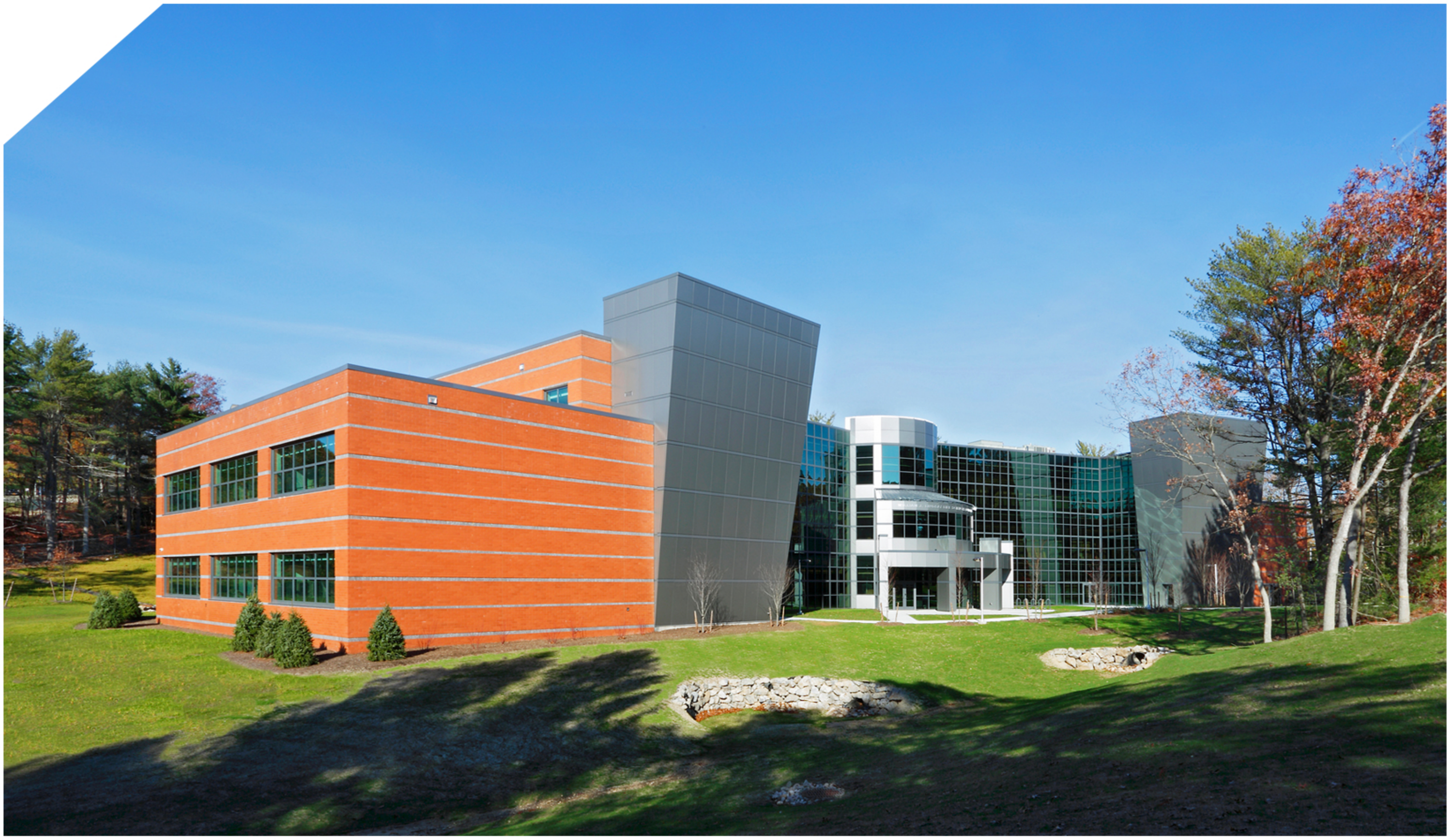


The Life Sciences Building features aluminum composite and glass curtain wall, and concrete masonry walls with a brick veneer. *Photo: Tom Sibley/Wilk Marketing Communications*

AN EDUCATION IN SUSTAINABILITY

SUFFOLK COUNTY COMMUNITY COLLEGE'S LIFE SCIENCES BUILDING PROVIDES A LEARNING TOOL FOR GREEN DESIGN.

By Roger P. Smith, AIA, LEED AP

SUFFOLK COUNTY COMMUNITY COLLEGE (SCCC) leadership, local and state elected officials, community leaders, and representatives of BBS Architects, Landscape Architects and Engineers and J. Petrocelli Contracting officially opened the new, $29.8 million William J. Lindsay Life Sciences Building. The cutting-edge educational and research facility is named in honor of a Suffolk County legislator, a former presiding officer of the Suffolk County legislature, and long-time supporter of SCCC, who passed away in 2013. BBS served as architect, interior designer, and mechanical and electrical engineer for the new building. The project is aiming at LEED Gold certification, indicating a high level of sustainability in design and construction.

With more than 25,000 students enrolled at three campuses, SCCC is the largest community college in New York State. The 156-acre Ammerman Campus in Selden, which opened in 1961, is the oldest and largest of the college's three campuses and enrolls more than 14,000 students.

The Life Sciences Building is the first new academic structure completed on the Ammerman Campus in nearly 50 years. It will house programs for students pursuing biology, marine biology, chemistry, environmental science, and nursing degrees. A rapidly growing enrollment in life sciences disciplines necessitated the construction of the new facility. Approximately 5,000 students will attend classes in the building throughout the spring semester, which began in January 2015. The building will also allow for expansion of science classes to include an additional 100 students in the spring and 300 students next fall.

"The college's enrollment in life science disciplines has risen exponentially in recent years, outgrowing the former building," said Rosa M. Gambier,

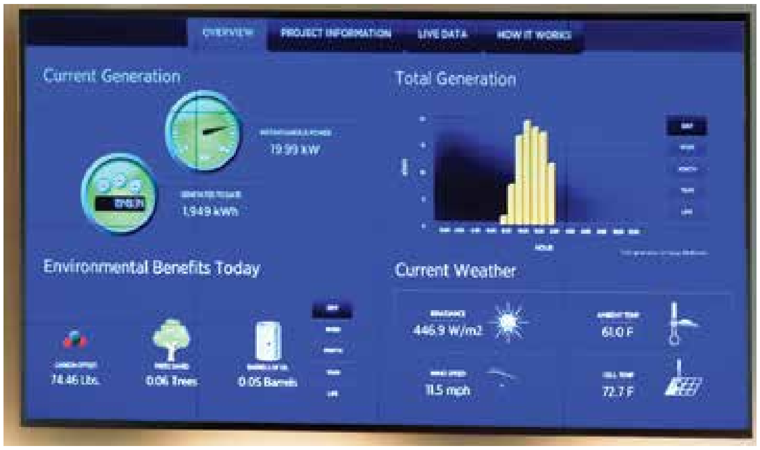
The lobby is designed as an indoor amphitheater cut into the slope of the building's site. The elevator shaft features interactive kiosks on each of the three building levels. The atrium video wall is 13.43 feet wide by 7.6 feet high. *Photo: Tom Sibley/Wilk Marketing Communications*

Ph.D., Biology Department chair. "The old life sciences building served approximately 4,700 students in the 2013-14 academic year, up from 2,700 in 2004-05. In the last three years, we could not meet demand because we didn't have the space. This innovative edifice will allow us to increase the number of students taught and, along with our newly revised and cutting-edge curriculum, gives us the ability to greatly enhance the quality of education Suffolk County Community College provides. It is a superior facility for student research and both collaborative and hands-on learning. It will bring our department into the 21st century and prepare our students for the 22nd."

The 63,000-square-foot structure is designed to serve as a learning tool by itself. It incorporates pioneering sustainability and educational features, such as interactive boards displaying — in real time — the building's sustainability data and power performance. The building's design won the 2011 School Planning & Management magazine Sustainability and Innovation Award in the Building as a Teaching Tool category.

"The construction team collaborated closely with the college and the designers to ensure that the school's daily operations were not impacted by the construction work," said Joseph Petrocelli, treasurer at general contractor J. Petrocelli Contracting. "Our site management team has closely coordinated noisy construction activities and deliveries with the campus leadership and ensured that roads and walkways adjacent to the building site remained safe and open to traffic. In addition, our team employed sustainable construction and recycling practices to protect the site's environmental integrity, to ensure healthy indoor environment for students and faculty, and to support the project's LEED certification procedures."

Other team members include science lab design consultant Tsoi/Kobus & Associates, site designer and civil engineer Greenman-Pedersen, structural engineer Ysrael A. Seinuk, and plumbing engineer Bladykas Engineering.



An interactive video wall displays — in real time — the building's sustainability data and power performance. *Photo: Tom Sibley/Wilk Marketing Communications*

Architecture

BBS won the commission in a competition that attracted numerous prominent design firms from across the nation. The winning architectural approach focused on five aspects of the new building. These were the concept of a "building as a learning tool," expressed through technology and site design; visualizing the vocabulary of biology through architecture and programming; encouraging interaction and exchange of ideas among students and faculty; incorporating the structure into the natural environment of the site; and implementing a high number of sustainable features into engineering and architecture of the facility.

"The design team sought to express the natural organization of organs and nerve systems in its approach to implementing the school's program through interior layouts, architectural organization, traffic patterns, and connections to the overall campus for the new building," said BBS Director of Architecture Joseph B. Rettig, AIA, LEED AP. "They were inspired by the concept of a plexus and connecting nodes, which is represented in the design of the structure's central rotunda and wings as well as in the organization of hallways and building systems in the new school."

The building creates a new identity for scientific education programs at the college by displaying the school's inner works to passersby and visitors. It is designed to integrate its teaching functions with the campus circulation by utilizing a major pedestrian path from the south, leading to the main quadrangle, to encourage transit through the building by students and faculty from all disciplines. The overall program also includes construction of a new 314-square-foot astronomical observatory at a separate location.

The Life Sciences Building's location and design reflect and enhance the existing pathways and spatial relationships already in place on campus. Taking advantage of the changing grade of the site, a north entrance will receive students and faculty coming from the Riverhead and Smithtown Science buildings at the second floor level. To the south, where the grade drops one full story, another entry serves students and faculty arriving from the parking area to the southeast and adjacent athletic facilities to the southwest at the first floor level.

"The architectural and planning concepts are fundamentally sustainable. The east-west orientation of the building minimizes summer solar heat gain. The integration into the land contours reduces the exterior surface area, and the overall space efficiency minimizes the material and construction resources. The high-efficiency mechanical and electrical systems are designed to provide safe and functional operation, while significantly minimizing the energy use," Rettig said. The BBS engineering team critically analyzed the air change rates required for each type of interior space and optimized the mechanical system to accommodate the findings.

Other sustainable features of the structure include the tight envelope and high levels of insulation reducing the thermal losses; a natural stormwater runoff management system; high recycled content and locally sourced materials; and high-efficiency lighting system with occupancy sensors.

In addition, a rooftop photovoltaic system will generate 144 kilowatts of electricity and provide more than 60 percent of the building's electric needs, saving approximately $48,000 per year.

The school's exterior brick veneer panels convey a sense of "earthen" physicality through the use of color, texture, and pattern. This material reflects the look of existing brick campus buildings. However, in order to engage the mind of the observer, the façade features changing patterns. Aluminum-and-glass curtain wall surfaces the voids of the building, thus allowing high amounts of light to enter the interior.

Both the interiors and the site feature learning tools related to the building's operations, design, and function. The interiors house kiosks and interactive boards displaying — in real time — the building's sustainability data, power use, and HVAC system's performance.

Site design

According to Greenman-Pedersen Assistant Vice President and Senior Landscape Architect James P. Garrahan, RLA, LEED AP BD+C, "The site design efforts focused on blending functional features with the building setting, sustainability, habitat restoration, and maintaining the natural look."

The sustainability in site design is visible along the pedestrian paths and around the outdoor classrooms. The site features a self-contained stormwater management system with rain gardens and wet meadows, leaching and diffusion pools, and large swales with native, drought-resistant vegetation. All storm flow from both the Life Sciences Building site and the surrounding sections of the campus recharges onsite. Student gathering areas are located near the most interesting sustainable elements and main landscaping features of the terrain. The ecosystem of the site encourages the study of nature.

The site design embraces the overall project concept in many ways. It provides a highly sustainable environment that employs native plant selections to minimize maintenance requirements and provide biodiversity and habitat for indigenous fauna. The storm drainage system, a combination of natural and artificial features, accommodates the Life Sciences Building site as well as portions of the main campus' rainwater flows that currently enter the site. While designed to be sustainable and functional, this treatment also provides opportunities for educational experiences as displays of applied science. The functional purpose of the

Stormwater swales vary in size and shape. They feature moss rock retaining walls and river round rock bottoms.
Photo: Tom Sibley/Wilk Marketing Communications

The preliminary site and landscaping design plan, submitted for the competition and implemented with several minor revisions, shows the path of both stormwater swales.
Image: Courtesy of Greenman-Pedersen, Inc.

site, the way it is shaped, and the use of native grasses, perennials, shrubs, and trees represents a reinvigorated appreciation of the natural aesthetic required for current and future sustainable and reasonable development.

The approximately four-acre site featured existing drainage pools and pipes that originally served a nearby former hospital building. Some of these structures were not discovered until the excavation phase. The design team decided to take advantage of many of these existing features by incorporating them with some improvements and revisions into the overall stormwater management system. The pipes were re-routed around the building, directing water into the new western swale. A second swale was created on the southeastern corner of the site. Both swales feature exposed areas with stone beds and retaining walls, hidden culverts connecting the exposed sections, and below-grade concrete leaching pools for overflows. Both swales terminate in the large wet meadow on the western side of the site.

The site slopes significantly from north to south, with an elevation difference of 30 feet. The highest point, 184 feet above the sea level, is located at the northern entrance to the building. The lowest point of the site, at 154 feet above the see level, is located in the main wet meadow. The area soils are mainly sandy. However, as the site is located within the central glacial moraine of Long Island, soil conditions can exhibit silty, less-permeable characteristics in localized areas. A few of those pockets were discovered at the site but didn't significantly impact the design of the drainage system.

"The drainage system was designed to accommodate 8 inches of rainfall over a period of 24 hours," Garrahan said. The system was severely tested while construction was still ongoing. "In the late summer of 2014, the area was hit by a rain storm not recorded in the region's history," he said. "Weather reporters indicated 14 inches of rainfall in seven hours, with approximately 9 inches falling in two hours. The site's stormwater management system performed without a glitch, protecting the building from flooding."

The site construction team included excavation, earthwork, and concrete contractor Darr Construction and landscaper Greenfield Nursery. Darr executed the full grading of the site and excavated the areas where the swales were to be located. Greenfield performed the final grading, constructed stone retaining walls, and planted grass, shrubs, and trees.

"The stormwater swales vary in size and shape. They feature moss rock retaining walls and river round rock bottoms. The largest wall is 8 feet high and 80 feet long," said Greenfield Nursery owner, Ron Parkhurst. Greenfield crews installed Mirafi filter geotextile fabric and localized drainage behind walls constructed of 12- to 18-inch moss rocks. Swales' bottoms feature a layer of gravel, fabric, and a top layer of 6-inch river round rocks selected to match the color of the walls.

"The grass mixes include dry, wet, and lawn varieties planted using a hydro-seeding method," Parkhurst said. Greenfield selected grass mixes for particular areas of the site based on their elevation measurements. The site does not feature a permanent irrigation system, in compliance with LEED certification protocols for water conservation. However, during the germination period in the hot, late summer of 2014, Greenfield installed a temporary surface irrigation system that included approximately two miles of piping. The pipes were fastened to the surface with staples and removed once the grass germinated.

Interior design

According to BBS interior designer Tracy Hansen, RA, "The building is arranged with two wings around a central rotunda, which serves as both a transit and a gathering point for students. Each wing has a single laboratory corridor, which provides clear orientation as well as efficiency and visibility. The corridors feature active exhibits and serve as informal meeting places for students, activating the building as seen from the exterior," Hansen said.

The south-facing window wall has been designed to modulate and harvest natural light. Classroom spaces at the second and third floors feature internal glass walls to take advantage of light and views to the south. Seating opportunities in the corridors/public spaces provide settings for impromptu conversations or short breaks before entering classrooms.

The building's layout provides a high degree of space efficiency. The two wing corridors provide direct access to all laboratory and support spaces. Stairways for egress at the ends of the two wings, and the central open stair, designed for dramatic architectural impact, ensure safe and convenient access to all floors.

The simple circulation systems and central core rotunda, as well as the mixed locations of the several scientific disciplines housed within the structure, encourage meetings and interaction among students and faculty. Additional informal meeting spaces along the laboratory corridors promote a dialogue and an exchange of ideas among the building's occupants.

The building's first floor houses the main lobby; elevator shaft; three anatomy and physiology laboratories with prep rooms and 24 stations each, ranging in size from 1,214 to 1,331 square feet; four flexible lecture halls ranging in capacity from 48 to 72 seats; faculty office; 1,706-square-foot main lobby student gathering space; 221 square feet of corridor niche meeting spaces; and storage and utility rooms.

The lobby is designed as an indoor amphitheater cut into the slope of the building's site, where classes can be taught. The elevator shaft features interactive kiosks on each of the three building levels. The atrium video wall is 13.43 feet wide by 7.6 feet high and comprised of 16 NEC 46-inch LED ultra-narrow bezel monitors set up in a 4-foot by 4-foot grid.

The second floor houses general, marine, and microbiology facilities. These include six labs ranging in size from 1,214 to 1,331 square feet; prep rooms and assistants' offices; a 630-square-foot faculty office suite and three 80-square-foot faculty offices; a 160-square-foot biology walk-in cold storage room; student gathering niche; a 24-station student computer room; a 14-station student project room; and support facilities. Each of the six laboratories features 24 stations.

The building's third floor features two 1,214-square-foot chemistry labs; two 1,214-square-foot, 48-seat general classrooms; a 936-square-foot, 24-station computer room; a 529-square-foot conference room; a 613-square-foot faculty lounge with a 221-square-foot kitchenette; two faculty offices; a reception area for administrative offices; departmental management offices; student gathering areas; mechanical, electrical, and storage rooms; and an outdoor vegetated roof.

The building also houses four environmental rooms, manufactured by Darwin Chambers Company, ranging in size from 40 to 160 square feet.

The interiors feature numerous sustainable and recycled materials. These include 1,200 square feet of an unusual natural bamboo-veneer wallpaper, manufactured in Japan and installed on the curved outside wall of the elevator shaft.

Laboratory spaces are designed using modular planning principles. Each space is essentially the same size to allow flexibility in layout and lab furniture components. Fixed functions such as sinks and fume hoods are located at the perimeter. Laboratory workstations include gas, air, power, and water connections. The building's mechanical system is sized to provide appropriate air changes for biology labs throughout the several life science disciplines. This solution reduces energy use.

The exterior aluminum composite wall panels are also utilized inside the atrium for visual continuity of the structure's exterior and interior. The atrium features curved internal balconies with a 1/2-inch tempered glass, stainless steel, and aluminum handrail system by Osiyo Metals, with maple wood veneer rails. Curved steel members support the balconies.

Construction

"The project team faced several technical and logistical challenges during construction of the new Life Sciences Building," said Petrocelli Senior Site Superintendent Mark Evans. "These included a curved curtain wall and a complex steel structural frame that features curved members, the need to accommodate daily pedestrian traffic bordering the construction site, a significantly sloping site, and pre-existing site conditions that necessitated a high amount of new control fill material."

The building features concrete foundations and a steel structural frame. The foundation extends as much as 15 feet down on the north site of the building. During the excavation phase, crews replaced the soil within the entire footprint of the building with control fill to ensure the required bearing capacity of the soil. Because the site slopes from north to south, the team installed an extensive shoring wall on the north and east sides of the excavation site. The 300-foot-long shoring system consisted of steel I-beam piles driven as deep as 30 feet and connected by timber walls as high as 15 feet.

The structure features expansive curved exterior walls on its south and north sides. The steel fabricator manufactured and delivered structural elements in sections up to 20 feet long. Due to the curvature of the central section of the building and the unusual 5-inch mullions between glaze panels, the support system for the exterior glass curtain wall was custom designed and manufactured. It features connecting clips welded to the building's steel structure. Aluminum tubing, which supports the glass panels, is attached to the clips. On the south side of the building, the expansive glazed curtain wall is approximately 150 feet wide and 45 feet high. The glazing features energy efficient low-e glass. Thermoplastic Polyolefin (TPO) membrane roofing by Johns Manville completes the building envelope.

In addition to the glazed curtain wall, the building features contrasting aluminum panel sections and concrete masonry unit (CMU) and brick veneer exterior walls. In order to create a highly energy efficient building envelope, designers created a multi-layered wall that consists of an internal CMU wall, 3 inches of a spray-on thermal insulation, a 2-inch air barrier, and the exterior brick veneer.

The aluminum curtain wall consists of Alpolic aluminum-faced composite panels manufactured by Mitsubishi Plastics Composites America. The lightweight panels feature a core of thermoplastic material thermally bonded to face sheets fabricated of aluminum 3105 H14 alloy, 0.020 inch thick.

ROGER P. SMITH, AIA, LEED AP, is principal architect of BBS Architects, Landscape Architects and Engineers (www.bbsarch.com). Headquartered in Patchogue, N.Y., BBS serves Long Island and the New York/New Jersey/Connecticut Tristate area in design of sustainable educational, commercial, institutional, public, and athletic facilities. The firm designed the first LEED-certified public school in New York State, which received a LEED Silver certification as well as the 2012 Green Ribbon School designation from the White House and the U.S. Department of Education.