MOMENTUM

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SUPPORTING THE SCIENCES

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Expanding Scientific Discovery

Bowie State University Opens Center for Natural Sciences, Mathematics, and Nursing

With chilled beam technology and fully automated dynamic glazing among its many state-of-the-art building features, the new Center for Natural Sciences, Mathematics, and Nursing at Bowie State University in Maryland is a showcase for sustainable design and construction. The 149,000-square-foot building was designed by Perkins+Will with Mueller Associates providing HVAC and electrical engineering.

The center was designed to support interdisciplinary, interactive, and experiential learning within a number of undergraduate and graduate programs. Spaces include classrooms, laboratories, nursing simulation suites, offices, a lecture hall, informal learning and study spaces, and a greenhouse. The "Beacon," a three-story elliptical multipurpose space, anchors the building's south elevation and provides a distinctive focal point for the university's endeavors in scientific studies and research.

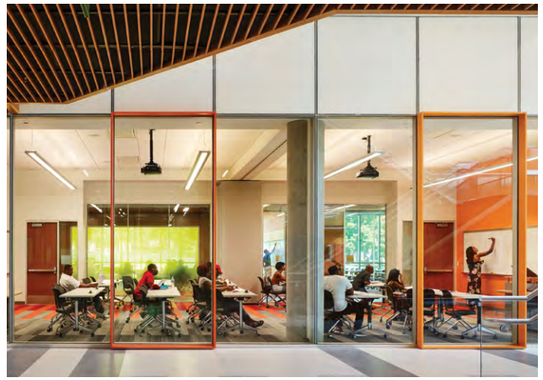
Chilled Beam Technology: A First on Campus

The LEED Gold® building features an active chilled beam system, which is still relatively new in the U.S. and a first for the Bowie State University campus. The technology uses conditioned air supplemented by ceiling-mounted chilled water heat exchangers rather than controlling space temperature by using only conditioned air.

"Laboratory spaces, which often house a lot of heat-generating equipment, are an ideal environment in which to use chilled beam technology," says Darren Anderson, PE, CPD, LEED AP BD+C, who served as Mueller's project manager. "Chilled beams assist in reducing the required airflow and amount of energy needed, because the air is delivered based on ventilation and laboratory needs and not by the need to remove the heat from the equipment." *(See sidebar: Chilled Beam Systems: Cost Benefits and Increased Flexibility)*

The use of the chilled beam system provided another key benefit in design: the ability to reduce the overall building height. As a result of the smaller ducts required for the system, the design team was able to reduce the height of the second and third floors by one foot each, netting an approximate savings of more than $300,000. This savings offset the higher first cost of the chilled beam system and lowered the overall life cycle cost for the building as a whole.

Mueller's team designed a Multiparameter Demand Controlled Ventilation System that samples the air in the laboratories, and only increases the airflow based on the direct measurement of the carbon dioxide, carbon monoxide, total volatile organic compounds, and airborne particulates. If the parameters are below the maximum levels, the airflow remains at the minimum safe quantity, realizing increased energy savings.



Smart Glass: Changing with the Weather

A second innovative feature of the building involves another state-of-the-art system: dynamic glazing. The center's façade is wrapped in 25,000 square feet of glass that changes from clear to tinted to nearly opaque depending upon weather conditions and the time of day. The system measures ambient light conditions and adjusts automatically, eliminating the need for shades or blinds and reducing energy costs. Mueller engineers factored in the range of shading coefficients when completing energy simulations during design.

"This is the most advanced project I've worked on, with the dynamic glazing and the chilled beam technology," says Anderson. "This was a great application for the chilled beams. It was the right choice."

The new Center for Natural Science, Mathematics, and Nursing at Bowie State University recently received an Award of Merit for Education Research in the ENR *Regional Best Projects Awards.*

Chilled Beam Systems:

Cost Benefits and Increased Flexibility

Chilled beam technology has been used extensively in Europe and Australia but is less common in the U.S. Depending on the local climate and the use of the building, the technology may present the best option for system performance and long-term life cycle costs. In an active chilled beam system, the beams receive both air ducted from a central air handling unit and water piped from a central chilled water system. The amount of air delivered to each space is reduced to a minimum—typically only the amount required for ventilation.

The amount of chilled water used by each beam is varied to maintain a comfortable temperature. Ducted air passing through each chilled beam induces room air to flow through its heat exchanger, cooling the room air as it circulates. As water can carry more energy than air, it is more efficient to use the water in the chilled beam heat exchanger to remove heat instead of using conditioned air.

While chilled beam systems may be more expensive than air-only systems with traditional air diffusers, the chilled beam systems typically require smaller ductwork and air-handler size. Mechanical room size and ceiling space may then be reduced, offsetting some of the chilled beam system costs.

School of Allied Health Professions Under Construction at VCU

A new School of Allied Health Professions building is now under construction on the Virginia Commonwealth University campus in Richmond. EYP, Inc., is the architect for the project, supported by Mueller Associates for mechanical, electrical, and plumbing engineering. The Whiting Turner Contracting Company is serving as construction manager.

The 154,000-square-foot building will house 13 university departments, including Gerontology, Health Administration, Nurse Anesthesia, Occupational Therapy, Physical Therapy, and Radiation Sciences, as well as the Virginia Center on Aging. Spaces include classrooms, conference rooms, laboratories, simulation suites, imaging suites, a state-of-the-art smart home apartment, a biomechanics research lab, and several maker labs. Targeted for LEED Gold, the building is scheduled for completion in 2018.

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Peterson Family Health Sciences Hall at George Mason University

Buildings for the Sciences: Project Milestones

- The LEED Gold® Engineering & Aviation Science Complex at the University of Maryland Eastern Shore has recently opened. Mueller Associates provided HVAC engineering, supporting the architectural team of Hord Coplan Macht with Perkins+Will.
- Construction is nearing completion on the Peterson Family Health Sciences Hall on George Mason University's Fairfax, Virginia, campus. Mueller Associates is teamed with architect Perkins Eastman on the design of the 165,000-square-foot building, which includes classrooms, medical simulation suites, research labs, clinical practice areas, and demonstration kitchens.
- Mueller Associates has been selected to provide HVAC and electrical engineering design for the new School of Pharmacy and Health Professions at the University of Maryland Eastern Shore. The project is being designed by the team of Ayers Saint Gross with Shepley Bulfinch.