MOMENTUM

Mueller

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ELECTRICAL UPGRADES ENHANCE NATIONAL AIR AND SPACE MUSEUM

Museum Modernizes Building's Original Power and Lighting Control Systems

In addition to the NASM electrical upgrade, Mueller's recent work for the Smithsonian Institution has included projects for:

- **National Museum of Natural History**
- **National Museum of American History**
- **Hirshhorn Museum**
- **Arthur M. Sackler Gallery**

The Smithsonian Institution has recently completed an extensive modernization of the electrical systems in the National Air and Space Museum on the National Mall in Washington, D.C. The new systems, which have upgraded both power and lighting controls within the 630,000-square-foot building, replace original systems installed when the museum opened for the U.S. Bicentennial in 1976.

Mueller Associates, which has completed numerous projects for the Smithsonian, engineered the upgrades, including the replacement of the building's original medium-voltage service entrance equipment as well as the original diesel engine generator with a larger unit and new fuel storage system. Mueller also designed a new, flexible lighting control system for the museum's galleries and public spaces.

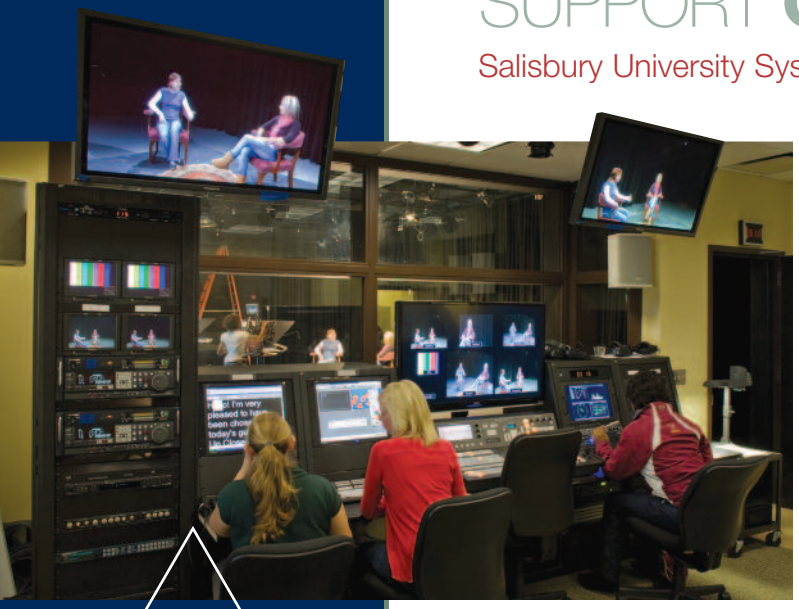
Adam Fry, PE, Mueller's project manager, notes that locating the new 500kW diesel-fueled generator was a particular challenge for the design team. "We would typically want to locate the generator adjacent to an outside wall, but the Smithsonian had security concerns that prevented that," Fry says. "We were able to position the generator at the subsurface parking level within the middle of the building footprint, and run the combustion exhaust straight up through the building to the roof. It was complicated but it has worked well."

Both Fry and Kenneth Rock, PE, who served as project principal, point out that the museum's new lighting control system is much more efficient and flexible. "They can control individual circuits now rather than an entire bank of lights, and they are able to work remotely from a laptop," Rock says. "There is also a current transformer on each circuit now. By monitoring the load current on each circuit, the maintenance staff can quickly be alerted to the need for lamp replacement."

Fry points out that the most significant challenge was minimizing impact to the museum operations. "The museum is open 364 days a year," he says. "We phased the construction to ensure that we impacted as little of the daily use as possible. Given the sheer size of the building, it was a detailed process, but effective. We never closed more than one gallery at a time, and as with past Smithsonian projects, the museum was able to remain open for visitors without any difficulty."

ELECTRICAL UPGRADES SUPPORT **CAMPUS GROWTH**

Salisbury University System Offers Greater Capacity and Reliability



The state-of-the-art new Teacher Education & Technology Complex is part of Salisbury University's recent expansion, requiring a major upgrade to the campus electrical system.

A comprehensive upgrade to the campus electrical distribution system at Salisbury University in Maryland is proving successful in supporting the university's ambitious plans for long-term growth. Mueller Associates, which has engineered several projects on the campus, provided study and design services for the system expansion to increase capacity and reliability.

Ranked as one of the nation's top public universities, Salisbury University has been recognized for its high-caliber facilities, including the new 170,000-square-foot LEED®-Silver Teacher Education and Technology Center (TETC) and the 115,000-square-foot Perdue School of Business now under construction. MEP systems for both were designed by Mueller.

The university maintains a medium-voltage distribution system with two feeders from Delmarva Power. Prior to the upgrade, the university had one normal feeder and one emergency feeder that was not fully rated, with conductors that could carry the electrical load for a shorter period of time. The system operated on one distribution loop. University officials, recognizing that campus development would soon exceed capacity, asked Mueller to study options to improve the system, with a goal of reusing as much of the existing infrastructure as possible.

"We needed to minimize disruption in terms of both service and the impact to the campus grounds," says Kenneth Rock, PE, project principal. "We wanted to make use of much of what they had in place with the existing system."

Carl Canatella, PE, Mueller's project manager and chief electrical engineer, describes the two major components of the upgrade: "We broke the single loop into two, equally rated loops in order to carry a greater load and provide more reliability," he says. "Delmarva Power upgraded the emergency feeder to a fully rated feeder, so there is not a time constraint on the second feeder."

Canatella points out that the 25kV underground distribution system includes cables in concrete-encased duct banks, with manholes added at junction points. "They can change the direction of the cables, splice cables, and run multiple cables together as needed," he says. "This gives them flexibility in working with the system."

"We had reached maximum capacity with the existing 25kV loop and we needed to bring the TETC on line, which is our largest building on campus," says Jeff Downes, facilities planning director for Salisbury University. "With the additional development proposed in our master plan, we knew we had to expand the system. We chose Mueller because of their experience in high-voltage systems and it was a good choice—they did an excellent job. The redesign of the existing loop and the addition of the second loop have nearly doubled our capacity on the main campus."

Georgetown University Optimizes Space on its Urban Campus

To support Georgetown University's capital plan, which has included a new performing arts center and a new business school, Mueller Associates is currently preparing an electrical utility master plan that will ensure adequate capacity for long-term load projections on the campus.

"Georgetown's campus building master plan will require increasing the capacity of the existing electrical distribution system and improving its reliability," says Kenneth Rock, PE, project principal for Mueller.

"We are exploring the use of underground switching stations installed in vaults to enable them to switch loads remotely among five feeders."

The electrical master utility plan will develop load projections over the next ten years, present options for maximizing capacity of the existing service and campus distribution systems to accommodate growth, and identify deficiencies. "Our goal is to develop a distribution system that can be maintained and controlled from a single computer workstation," says Adam Fry, PE, Mueller's project manager. "They will be able to look at loads in real time, with remotely operated, underground, vault-mounted switchgear to allow them to select any of the five feeders. We will also recommend upgrades to the duct bank conduits and medium voltage cabling, and the replacement of some manholes. We are trying to shore up the physical backbone of the system, working within a dense urban campus."

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