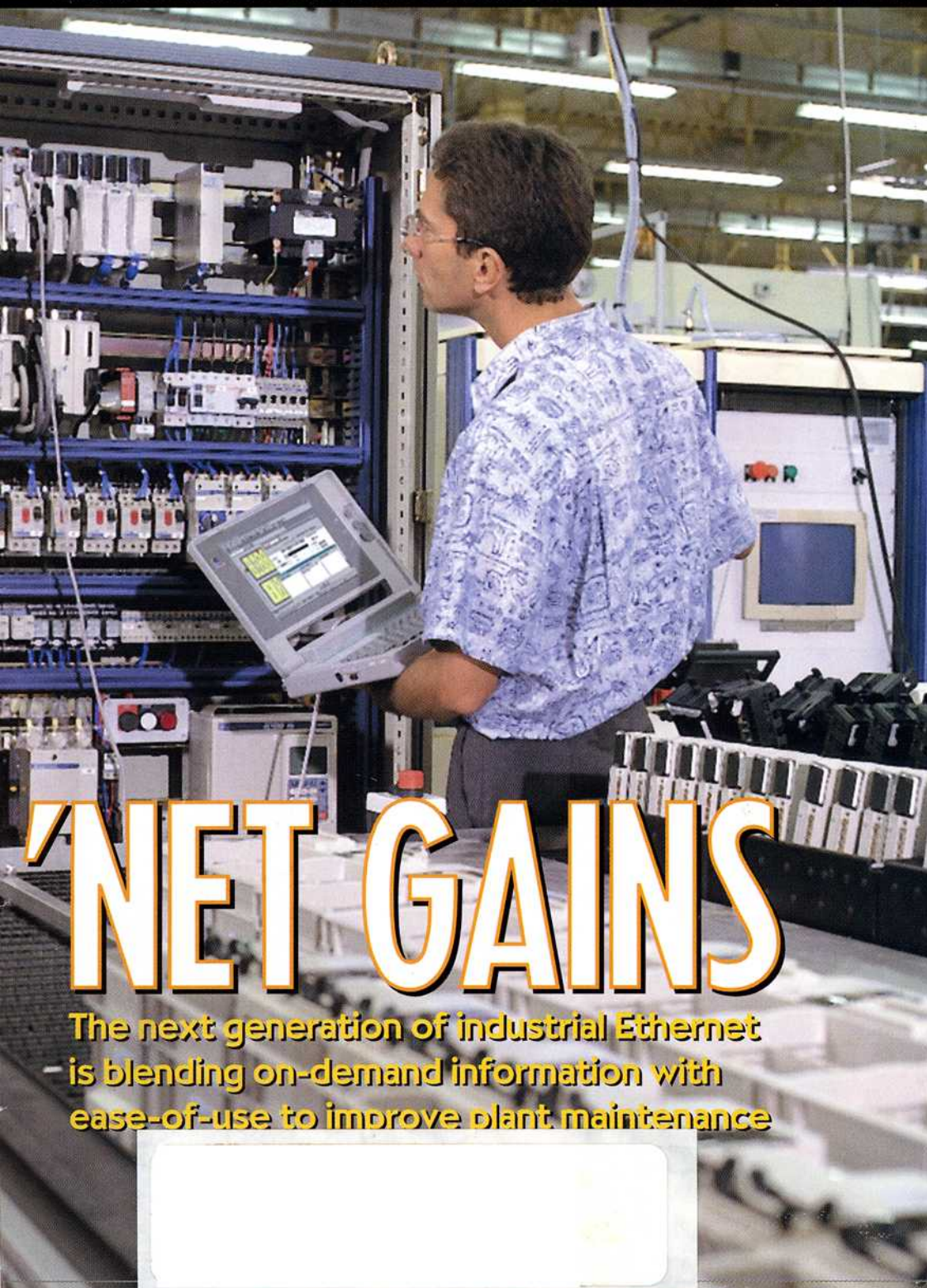


# EC&M

THE MAGAZINE OF ELECTRICAL DESIGN, CONSTRUCTION &amp; MAINTENANCE



## 'NET GAINS

The next generation of industrial Ethernet is blending on-demand information with ease-of-use to improve plant maintenance

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# Preserving the Past

Construction and design firms restore historical landmarks to their original grandeur



Photo courtesy of Monticello/Thomas Jefferson Foundation, Inc.

President Thomas Jefferson spent 40 years building his estate in Charlottesville, Va. When installing a new lighting system, electricians worked carefully to preserve the landmark.

By Amy Florence Fischbach, Staff Writer

**R**enovating a historical landmark can be like working through a set of puzzles, says George Siekkinen, senior architect of the National Trust for Historic Preservation. Original blueprints are often long gone, and a construction team must discover creative ways to fit modern systems and functions into a historic building. Rather than blindly tearing a hole through a wall or ripping out plaster, electricians need to carefully preserve a building's history.

"When you have something that has high intellect, good quality materials, and good craftsmanship, try to figure out a way to go around it," says Siekkinen, who has worked for the National Trust since 1987 and restored his own 1830s home in the Shenandoah Valley. "My motto is 'don't cut through it if you don't have to.'"

Construction crews built historical homes and landmark buildings to stand the test of time, but over the decades, the supporting systems can wear down and become antiquated. To breathe new life into these structures, electricians are removing the existing wiring and installing new electrical systems to bring the buildings up to Code while preserving their historical charm and integrity. As more Americans are starting to show a greater appreciation for historical places, building owners are hiring preservation teams to restore the landmarks.

"A lot of people like the quality of the materials, the craftsmanship, or the location of a historic property," Siekkinen says. "The new electrical systems that are put inside these buildings makes them viable for the next generation."

While thousands of historical renovations are currently underway throughout



Much of the lighting on the main floor of Monticello was provided by natural sunlight before 1993.



Solar shades were installed to block out the sunlight, but a year later, a firm designed a lighting system to increase lighting levels.

Photos courtesy of Monticello/Thomas Jefferson Foundation, Inc.

the United States, this article will profile two landmark projects—the preservation of Monticello, President Thomas Jefferson's home that was built in 1770 and the rehabilitation of '30s government buildings in the Federal Triangle in Washington, D.C. While a preservation project like Monticello focuses more on the ongoing maintenance and repair of historic materials, the term rehabilitation refers to the transformation of a historical structure into a usable building. In addition to highlighting these projects, this article will also offer eight tips that your company should keep in mind when working on a historic property.

### **Illuminating Thomas Jefferson's Monticello.**

President Thomas Jefferson designed Monticello, his mountaintop estate in Charlottesville, Va., with skylights and large windows so sunlight would flood into all of the interior rooms. Today this historic property, owned by the Thomas Jefferson Foundation, is furnished almost entirely with Jefferson's original possessions, including furniture, paintings, and other decorative arts. To protect these priceless artifacts from the damaging effects of UV and visible light, solar shades were installed in 1993. These shades, which are suspended in front of all the windows, block out 99% of UV light and 85% of all visible light. Because so much visible light was being screened, it became necessary for guides giving tours to use flashlights during the late afternoon or on cloudy days. This was especially true during the winter months, when daylight hours became shorter.

In order to better showcase this landmark, the restoration department hired George Sexton Associates, a Washington, D.C.-based lighting design firm, in 1994 to design a lighting scheme for Monticello. Working with the curatorial and restoration departments, the firm designed a system using a combination of 12V lighting and 120V fixtures. Up until this time, there had only been one electrical outlet on the entire main floor. A local electrical contracting firm, Design Electric, was hired to install additional wiring for the new system. Eric Hartwig, a master electrician, and Tom Phillips, a journeyman electrician, brought wiring down through the chimney flues that had been closed up in the mid '50s to serve as

returns for the HVAC system (Photo on C10). They also installed receptacles in the throats of the fireplaces. Not every room had a fireplace, however, so they brought wires up from below in some locations by taking advantage of holes that had been drilled through the floor in the late 19th century for a hot water radiator system.

"The main strategy was to avoid doing any damage at all to the original fabric of the building when running this new wiring," says Bob Self, architectural conservator for the restoration department. "When we wanted a power source where there wasn't a fireplace, we brought up wiring from below, choosing areas that had been patched or plugged previously."

## **Identifying a Historic Property**

Electrical construction firms can learn about historical landmarks in their area by reviewing the following resources. By formally listing a property, a commercial building may be eligible for grants or tax credits.

- The National Register of Historic Places lists more than 50,000 individual and historic properties that are of local, state, or national significance.
- The World Heritage List includes sites of worldwide significance. Only 18 sites in the United States, including Monticello in Charlottesville, Va., Independence Hall in Philadelphia, and Mesa Verde in Colorado, have been designated as world heritage sites.
- The U.S. Secretary of the Interior and the National Park Service list 5,000 properties of national significance on their National Historic Landmark list.
- State Historic Preservation Offices prepare lists of properties and districts that are designated as local landmarks.

Monticello features several formal rooms with 18-foot ceilings. As a result, the electricians were able to take advantage of the space in the attic to install a 12V lighting system. They mounted the transformers, ran the associated low-voltage wires, and installed strip lighting on the skylight ledges in the dining room and Jefferson's bedroom, above a door pediment in the parlor, and on a ledge in the Tea Room.

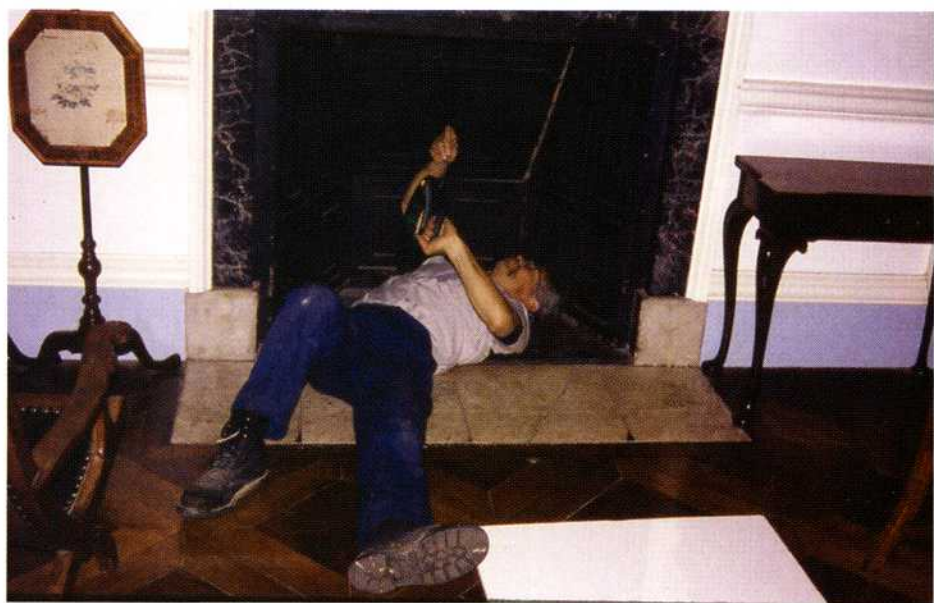
"We tried to introduce light without having fixtures that could actually be seen," Self says. "You have to look carefully to see where the light is coming from."

When it wasn't possible to conceal the fixtures, the electricians installed 120V circuits for plug-in fixtures. In Jefferson's time, natural sunlight, candles, and oil lamps were used rather than electric light fixtures to illuminate buildings. In some spaces, because of the amount of light needed, it was necessary to accept modern fixtures, such as torchieres. To solve the problem of providing light in an inventive manner, Susan Stein, the curator at Monticello, decided to experiment by using a type of lamp that was owned by Jefferson. The Argand oil lamp, invented in the 1780s, gave off more light than traditional oil lamps due to a cylindrical wick that allowed airflow around the flame. Monticello now displays these two lamps on the mantelpiece in the dining room, which also has additional lighting provided by the strip lighting on the skylight ledge.

"A pair of lamps of the right period was purchased and then wired externally without damaging them in any way," Self says. "The result is an original fixture, but with a modern electric bulb."

During the wiring project at Monticello, the electricians carefully avoided doing any damage to the original structure. They worked closely with Self to determine the best places to run wiring and install the fixtures. All of the wiring is completely reversible and could be easily removed, leaving little evidence that it has ever been in place, Self says.

**Rehabilitating '30s government buildings.** Renovating historic structures not only presents the opportunity to upgrade electrical and mechanical systems, but also to incorporate energy con-



Tom Phillips, an electrician for Design Electric, fishes wire down the fireplace flue at Monticello.

servation techniques. When providing the electrical design for the new Environmental Protection Agency (EPA) headquarters, RTKL Associates, Inc., a Baltimore-based architecture and engineering firm, came up with an approach that incorporated sustainable design concepts that matched well with the EPA's commitment to saving the natural resources of the environment.

The design firm was able to work with the General Services Administration (GSA), the landlord of federal government properties, to reduce the energy consumption of the lighting systems in these facilities. GSA generally requires 50 footcandles of light uniformly in an office space, but on the EPA project, RTKL provided light only where it was needed. The firm provided 30 footcandles of ambient lighting in the office space and 50 footcandles only on the work surfaces. The electricians also installed indirect and direct pendant fixtures with daylighting and occupancy sensors.

"Because of the tall floor-to-ceiling heights of the buildings, we were able to maximize the opportunities for daylighting," says Karl Stumpf, vice president of RTKL.

To preserve the history of the buildings in Washington, D.C.'s Federal Triangle, RTKL also went back to the original 1932 construction documents, which included detailed, large-scale drawings of all of the light fixtures. Where the fixtures

were missing, the design firm was able to have them replicated. While the construction team tried to carefully preserve the buildings' public spaces, it adapted the layout of the office space to meet EPA's goal of sustainability. Back in the '30s when the U.S. Customs Service and Interstate Commerce Commission occupied the buildings, about 80% of the space was reserved for private offices. The construction team removed the partitions, gutted the offices, and transformed the area into open office space.

"It's a radical change in how the office space is used," Stumpf says. "One of our sustainable goals was to increase the density of people in the buildings in order to save a lot of resources and increase efficiency."

When renovating the buildings, the construction team also replaced all of the electrical, mechanical, and plumbing systems according to the Secretary of the Interior's Standards for Rehabilitation. Because the offices were occupied during the project, RTKL had to find a way to integrate new ducts, cable trays, and telecom closets into the buildings while keeping the existing systems online.

The team also had to come up with another creative way to run the wiring due to problems caused by historical vaulted ceilings in the public corridors. Because they couldn't cross the conduit over the corridor, the electricians ran dual systems on either side and opted for a ver-

tical, rather than a horizontal, distribution. When removing the existing wiring, they also encountered another challenge—the cloth on the wiring contained asbestos. For that reason, the construction team faced some abatement issues during the construction process and had to abandon the wiring in some areas in the walls or above the ceilings.

When wiring a new building, electricians work with a clean slate, but on historical renovation projects, they never know what they're going to find. Stumpf says a construction team needs to take an inside-out approach to renovation.

"In preservation projects, you need to understand the existing construction and configuration before you can start designing," he says. "It's a very different approach and mentality."

A renovation project may seem like a complex set of puzzles at first, but by understanding the challenges of working in an existing building, an electrician can give new life to a historic landmark and prepare it for future generations.

**EC&M**



Photo courtesy of RTKL Associates

A construction team rehabilitated a complex of 70-year-old office buildings in Washington, D.C., as the new home for the Environmental Protection Agency.

## Tips for Renovating a Historical Landmark

### 1. Evaluate the craftsmanship and quality of the materials.

Period structures are often embellished with colorful wall murals, marble floors, or chandeliers hanging from elaborate ceiling medallions. Whenever possible, determine what elements are the most important in a room, and then try to avoid disturbing them. Rather than cutting through detailed handiwork like crown molding, opt instead to break through flat plaster, which is easier to repair and not as historically significant.

### 2. Find a good detective if you can't find the original blueprints.

When working on a renovation project, work with a general contractor, architect, or preservation consultant who can help decipher what's behind the walls, under the floor, or above the ceiling. For example, if a ceiling goes up 9 feet but the floor above is at an elevation of 13 feet, there's a good chance you've just found a perfect space for a horizontal or vertical chase. "By doing good measurements, you can find out if there's a void in the walls that doesn't make sense," Siekkinen says.

**3. Do as much advanced planning as possible.** Before the groundbreaking or demolition even begins, a construction team should sit down to discuss a detailed plan of action and develop a precise construction schedule.

**4. Comply with historic tax credit guidelines.** Owners and developers often apply for federal or state historic tax credits on a commercial renovation project. A lot of the decisions to rehabilitate historic buildings depend on the availability of these credits, and the construction team must make sure they comply with the guidelines. "The savvy developers now understand the intangible benefits of keeping historic buildings because of their marketability and character," Stumpf says.

**5. Team up with the other trades.** You need to work closely with plumbers, historical architects, electrical engineers, and datacom installers on a large-scale historical renovation project. By working well with the other trades, you can successfully figure out suitable locations for horizontal and vertical chases and discover the best way to update the electrical systems without damaging existing walls or ceilings.

**6. Try to rewire original fixtures.** On both the EPA headquarters and Monticello projects, the team tried to incorporate historically accurate or original lighting fixtures into the buildings. When it isn't possible to rewire a fixture, install a circuit breaker on the circuit feeding the fixture to prevent overheating. Siekkinen says electricians have used this approach on several museum properties. "They wanted to keep several of these highly decorative chandeliers intact, and their desire was to not cut through the decorative plaster because the whole ceiling was decorated," he says.

**7. Beware of asbestos.** The construction crew encountered asbestos when removing wiring from the 70-year-old government buildings. When facing this danger on a jobsite, you should take extreme caution and follow all local, state, and federal abatement issues to the letter.

**8. Do no harm.** During the wiring project at Monticello, the electricians didn't have access to any of the original design documents. As a result, they worked closely with an architectural conservator to determine the best places to run wiring and install lighting fixtures. They carefully made note of where earlier repairs had been made in the flooring, and then installed the new receptacles in these locations.