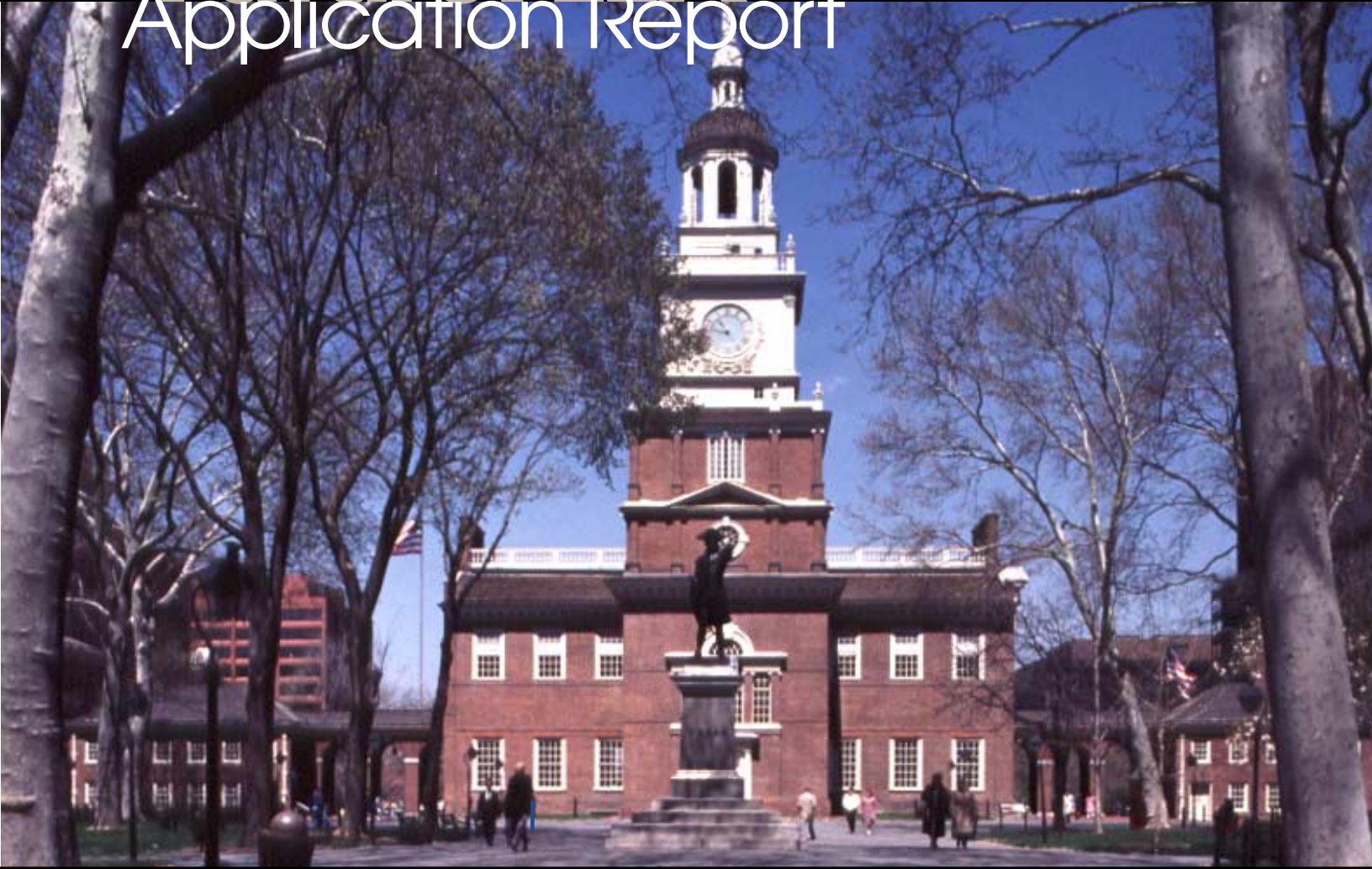


# FutureFLEX<sup>®</sup>

## Application Report



### **Air-Blown Fiber Links Past, Present and Future At Independence National Historical Park**

### National Park Service's Environmental and Process Control Network Achieves Maximum Flexibility with FutureFLEX<sup>®</sup> ABF Cabling.

Independence National Historical Park in Philadelphia, home of Independence Hall and the Liberty Bell, is a renowned American landmark. Each year, millions of Americans and tourists from around the world visit Independence Park to learn about the events that led to the founding of the United States of America.

As part of a multi-year phased renovation and expansion, the U.S. National Park Service (NPS) — Denver Service Center

designed and engineered a centralized chilled water plant and process control network within the Park. The campus-wide data communications network is designed to provide centralized control of the heating, ventilating and air conditioning (HVAC) system so critical to the environmental maintenance of the park's historic buildings and documents. The Local Area Network (LAN) also controls the fire protection system for Independence Hall and other historic sites.



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NPS specified Sumitomo Electric Lightwave Corp.'s FutureFLEX® Air-Blown Fiber® (ABF) Optic Cabling System for the network's data communications backbone. According to Jack Dunleavy, on-site project manager for NPS, air-blown fiber optic technology was specified chiefly because of its flexibility and versatility. "With ABF® we were able to install the data highway once and it can be reconfigured over the years as the needs of the Park change and grow," he explains.

### FutureFLEX Process Control LAN

The first phase of the Park renovation project began with installation of the chilled water plant in 1997. Next came installation of the chilled water piping and FutureFLEX tube cable infrastructure, which was routed from the plant at the east side of the Park to Independence Hall on the west side.

FutureFLEX Tube Distribution Units were installed underground in manholes outside of each historical building along the route storing sufficient tube cable to provide for future network expansion. As additional buildings are added to the network, stored tube cable need only be extended from the local connection point into the building and fiber blown back to the central control point.

For the next phase of the project, the NPS retained the services of Canus Corporation, a California-based certified FutureFLEX designer/installer with offices in Philadelphia, to implement the system. Following the NPS plan, Canus installed FutureFLEX 19-cell tube cable, which would provide



***In a phased renovation plan, the NPS designed and engineered a centralized chilled water plant and FutureFLEX ABF data communications network for automated control of its HVAC and other systems.***

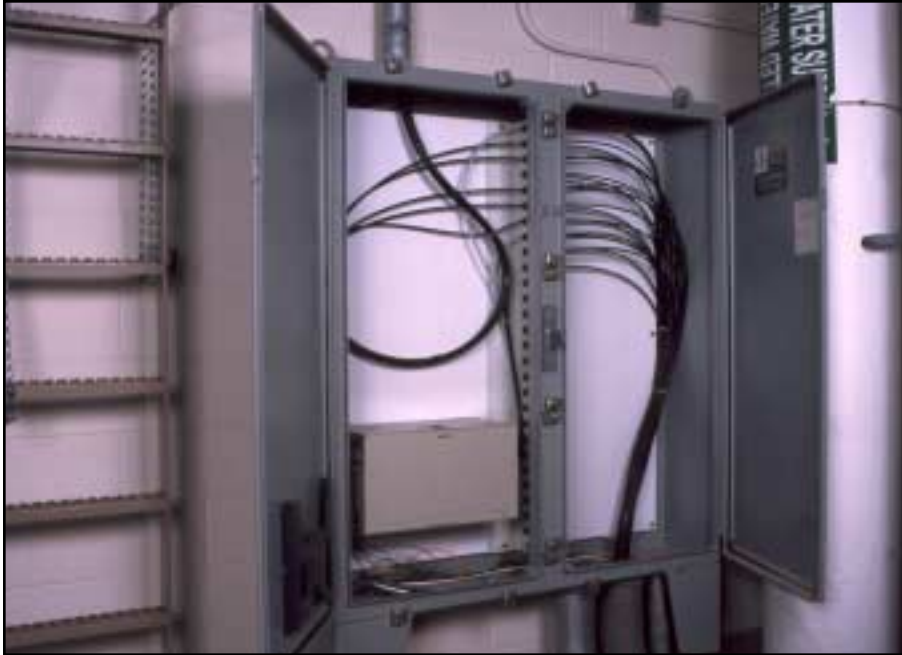
ample capacity to meet any future network demands. Canus Corp.'s project coordinator Reed Wiegler notes that there is more than enough spare tube cable and cell capacity to link into the new facilities now being planned for north of Independence Hall.

"This project is an ideal application for FutureFLEX ABF," says Wiegler. "Construction projects in Independence Park can be extremely difficult, since every trench dug must be painstakingly restored with authentic colonial brick sidewalks and cobblestone paving. By installing a flexible, space-efficient network infrastructure and assuring plenty of headroom, the NPS has virtually future-proofed its network for the foreseeable future."

### How Air-Blown Fiber Technology Works

The FutureFLEX ABF system infrastructure consists of flexible tube cables used in place of innerduct. Tube cables may contain up to 19 coded tube cells which can be joined in tube distribution units (TDUs) or junction boxes using simple push-fit connectors. TDUs replace conventional fiber splice hardware at tube cable transitions and branching locations to provide point-to-point connectivity between the computer room or network hub and the application. Fibers typically come in bundles ranging from two to 18 fibers each to deliver a maximum capacity of 342 fibers in a 19-cell tube cable.

Once the tube cable infrastructure is in place, lightweight bundles of single-mode



***In the FutureFLEX® System, once the compact tube cable infrastructure is in place, lightweight bundles of singlemode or multimode fiber are blown into its cells at speeds up to 150 feet per minute. The system's point-to-point connectivity eliminates splices, the most common site of network failure.***

or multimode fiber are blown at speeds up to 150 feet per minute through a predefined route on a stream of nitrogen, using specially designed equipment. Installation is fast and easy, requiring no more than two trained technicians. Cable

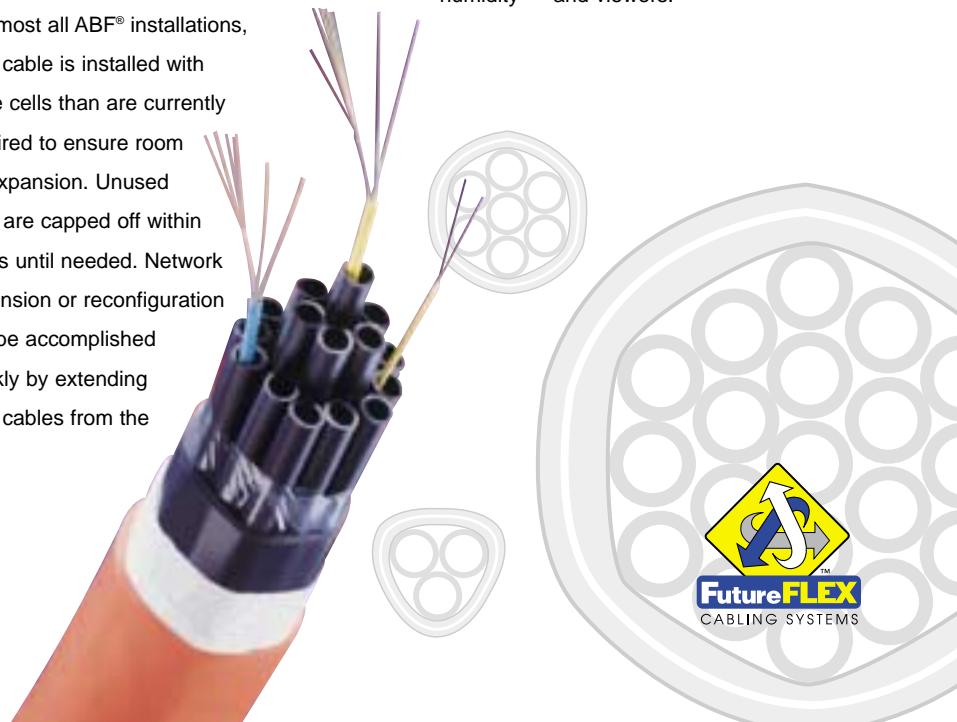
runs may exceed 6,000 feet and the fiber path may traverse outdoor, riser and plenum tubes in a single run. Since the fibers are not pulled, installation damage ceases to be an issue. Moreover, point-to-point connectivity eliminates splices — the most common site of network failure.

In almost all ABF® installations, tube cable is installed with more cells than are currently required to ensure room for expansion. Unused cells are capped off within TDUs until needed. Network expansion or reconfiguration can be accomplished quickly by extending tube cables from the

nearest TDU. Fiber bundles can be upgrade or replaced by blowing cable through unused cells, or by blowing out old fiber (which can be reused) and blowing in new — all without disrupting the existing network. Space utilization is also improved, since ABF bundles do not require a strength member, so are significantly smaller than conventional fiber cables.

### **Expanding the Independence Park ABF Network**

Since the original FutureFLEX installation, the Independence National Historical Park network has undergone a series of expansions. In Summer 2000, the NPS opened a new display in the west wing of Independence Hall, which holds one of 25 known copies of the first printing of the Declaration of Independence, a copy of the Articles of Confederation, and a final draft of the U.S. Constitution. These rare documents are housed in an environmentally controlled case that provides protection from heat, humidity — and viewers.



# FutureFLEX®

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In the original basement of Independence Hall, certified installers from CANUS Corporation connected the existing FutureFLEX tube cables to the new west wing display. The new installation required over 2,200 feet of six-strand multimode fiber optic cabling. A team of two installers completed the installation in less than two days, ensuring that the exhibit would open on schedule. Since then, several more historic buildings have been linked into the network. Dunleavy notes that, to date, Franklin Court, Old City Hall, and an administrative building, have now been linked to the LAN server with point-to-point FutureFLEX ABF® cabling.

Wiegles asserts that the installation has not been without its challenges — most of them due to the age and space constraints of the historic structures. “Installing the tube cable across the 18th century basement of Independence Hall to link into the original-system involved some pretty tight spaces,” he recalls. “Also, extending the tube cable from tube distribution units means working in manholes. Fortunately, the compact size of the tube cable works to our advantage in space-constrained situations. Installation so far has been relatively fast and simple, especially as compared with traditional fiber installations.”

Equally challenging is the necessity for carrying on installation without disrupting tourist activity. Wiegles notes: “At one point, we had two technicians busily blowing fiber in the near-dark in the underground theatre in Franklin Square, while viewers watched a film about the life and times of Benjamin Franklin.”



**For many premise, campus and process control LANs, FutureFLEX ABF offers maximum flexibility plus all of the benefits of fiber optic connectivity — without the high infrastructure investment and ongoing maintenance and upgrade costs.**

### Future Expansion Plans

NPS’ plans to expand the FutureFLEX ABF environmental and process control network are already under way. “We are set to begin construction of a new Liberty Bell Pavilion and Independence Visitors’ Center across Market Street,” says Dunleavy. “In the upcoming year, air-blown fiber will also be used to link HVAC controls from 313 Walnut Street, the Merchant’s Exchange Building; and the Second Bank of the United States to the central chilled water plant.”

“By 2002, we expect to consolidate all Park offices into the Merchant’s Exchange building, with all computers and telephones centralized there and HVAC controls reporting back to the chilled water plant,” Dunleavy

continues. “With the cabling infrastructure now in place, we will be able to extend tube cable from the tube distribution units as needed, blow additional fiber bundles through the tube cable’s unused

cells, and even blow fiber out of a building and reuse it in another. These features make ABF both convenient and cost-effective.”

Citing Canus Corporation’s extensive experience in installing ABF networks, Wiegles agrees. “We believe that FutureFLEX ABF Cabling System should be considered for any historical building without cable chases. In some renovations, we have installed cable tube in abandoned chimneys and behind raised wood paneling. Once the tube cable infrastructure is installed, the fiber optic bundles can be blown in at any time without damaging the historic architecture or interfering with use of the facility,” he concludes.



For more information, please call: **1-877-356-FLEX** (3539) or visit our website at: [www.futureflex.com](http://www.futureflex.com)