Lee Goodwin

Retrofitting an Advanced Fire Protection System

An effective cultural resource management program must include protection of the resource against a variety of hazards. Often, however, protective measures conflict with the inherent conditions of historic or artistic properties. In these circumstances, considerable thought must be given to finding the best means of protection without compromising the integrity of the resource. Smoke detection and fire suppression systems in particular pose such conflicts, yet they can provide the most important protection against catastrophic loss. With careful planning, such systems can be installed with minimal alteration to the facility's historic fabric and the least visible intrusion of its aesthetic design. A recent project at the School of American Research, Santa Fe, New Mexico, shows how a risk management program can be implemented in this context.

The School of American Research is a private nonprofit center for advanced studies that contributes to the understanding of the human condition by supporting the study and practice of anthropology and Southwest Indian arts. The School holds a preeminent collection of traditional Southwest Native American art and artifacts, covering the 450-year period from Spanish contact to the present. This collection is housed at the Indian Arts Research Center, an open storage facility designed to show the objects in an aesthetically pleasing setting while maintaining the highest level of control over environmental conditions and security. Unlike a museum, the IARC does not exhibit its own collection, but rather curates it for study by Native Americans and by scholars, and for public education through guided tours, publications, and loans of objects to other institutions for interpretive exhibitions.

Installation of FM-200 fire suppression system. Temporary barriers have been constructed around collection shelving. The discharge piping is installed along existing vigas, and later enclosed with finish carpentry so the viga appears wider than it was originally. Each storage container weighs approximately 850 pounds. The two vaults required a total of six containers, which were later enclosed in cabinets.

Several years ago, as part of its comprehensive security and risk management program, the School initiated a phased plan to upgrade the IARC facility's environmental and security systems and to re-arrange collection storage to maximize the use of space. Since the building's construction in 1977, the collections have nearly tripled in size from approximately 4,000 objects to nearly 12,000. Under this project, funding from an anonymous source was used to install an early-warning high-sensitivity smoke detection system and FM-200 fire suppression system. Although the concept seemed straightforward, the School faced numerous challenges in selecting and installing a sophisticated system in a space that simply had not been designed for it.

The IARC's two storage vaults accommodate multiple activities of the various programs through which the collection is used. The Native American Heritage Program, which provides outreach to tribal communities and facilitates their use of the collection, serves individuals and groups ranging from elementary school children to elders. Native American artist convocations annually bring groups of artists together to discuss their work, the collection, and broader issues in a given medium. Research appointments allow scholars to work closely with the collection for studies ranging from art historical to technical scientific analyses. The Native American artist residency program offers a selected artist studio space and unrestricted access to the collection each summer. Public tours of the collection are

A portion of the main storage vault. The discharge nozzles are the only visible part of the fire detection and suppression system. Three are visible in this photo, at the base of the corbels.

conducted weekly, and quarterly membership lectures highlight different collection areas. In order to permit instantaneous visual and physical access to objects during these activities, the facility was specifically designed for open storage.

Conceptually, the design complements the beauty of the collection. Pueblo-style architecture and decor provide a setting conducive to understanding the works within. The subdued design neither detracts from nor intrudes upon the visual presentation of the objects. Together, the collection and setting are about aesthetics, and enhance the activities that take place there. Given these parameters, it was important to select a system that could quickly detect and extinguish a fire without damage to invaluable, often fragile objects on open shelves, while at the same time blending in with the building fabric and aesthetic design as inconspicuously as possible.

After soliciting and reviewing project proposals, the School selected E and M International (EMI), of Albuquerque, New Mexico, as its contractor. EMI understood that the practical realities of funding nonprofit operations can make it difficult to justify major capital expenses for risk management. They proposed a system designed to eliminate false alarms or an accidental discharge of the suppression agent, to provide the earliest possible detection of fire, and to rapidly extinguish any class of fire. This type of system is increasingly being used in museum and archival settings.

The system selected combines a Fenwal AnaLASER high-sensitivity smoke detector (HSSD) system with a Fenwal FM-200 fire suppression system. Component functions are controlled by a system monitored by a third-party service provider. The HSSD system actively samples air on a continuous basis. The air is passed through a laser beam in the detection chamber, where a photon sensor can distinguish between smoke particles and room dust or other airborne contaminants. The products of combustion can be detected in the incipient stage of a fire, even when smoke concentrations are at extremely low levels. The system can also detect precombustion emission from overheated electrical components.

FM-200 is a colorless, odorless gas that extinguishes fire by removing heat energy so that the combustion reaction cannot be sustained. It does not significantly reduce oxygen levels, nor is it toxic to humans or the environment. It is rapidly deployed, but does not overpressurize a closed space by displacing room air. It has no particulates or residues. It is, therefore, safe for use in occupied areas and where museum objects are stored. These characteristics enabled FM-200 to meet the parameters defined by the use of space in the IARC facility.

The staff at EMI and Fenwal Protection Systems faced several challenges in the system design in order to minimize potential risk to the collection in the event of a discharge. The two vaults encompass a variety of spaces, from large, two-story open expanses to small, partially enclosed areas. Since the shape and proportions of the space affect air flow, the placement of detectors was crucial to optimize their performance. Equally important was the placement of the FM-200 discharge nozzles. Not only did they need to be strategically configured for fire suppression, they could not be too close to open shelving where fragile kachinas or pottery were stored. Since FM-200 is released under pressure, staff at the School was concerned about the physical effects of discharge on items close to the nozzles. Finally, because it had been determined from the outset that the system would be concealed by finish carpentry to blend into the room, it was necessary to place all of the piping, conduits and storage canisters in such a way as to accomplish this.

Together, all of these requirements necessitated months of redesigning and revising the engineering of the discharge pipes, the number

and placement of the discharge nozzles, and the number of FM-200 storage containers. Final plans were reviewed by the building architect, the environmental engineer who designed the automated climate control system, and the local fire department. Structural analysis determined that the floor deck in one area would have to be reinforced due to the load of the storage containers. Before installation could begin, temporary barriers had to be constructed to protect the collection against dust or other physical damage.

The system was configured so that piping and conduits ran along existing vigas (exposed beams), and then were enclosed so that the viga simply appeared as a wider beam. The storage canisters were arranged near walls, and cabinets were built around them to match the existing storage furniture. Discharge nozzles were placed at a safe distance from objects on shelves while still providing maximum protection. Because the School's needs had been articulated from the outset, the contractor was able to successfully complete the project within both the aesthetic and technical requirements for the facility.

The School's experience demonstrates that it is possible to retrofit existing buildings with technical systems that seem incompatible with original design elements. The installation of bulky storage canisters and large-diameter pipes in areas that were not planned for such components can be achieved with careful attention to engineering and structural issues, as well as aesthetics. Preservation of cultural property and the safety of the people who use them are primary concerns of resource management. Given the potentially catastrophic effects of loss or damage from fire, the labor and expense involved in protecting against this hazard are easily justified.

Lee Goodwin is IARC Coordinator with the School of American Research.

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John L. Cotter

Dr. John L. Cotter died in Philadelphia on February 5. As Curator Emeritus of the University Museum at the University of Pennsylvania, John had kept working on numerous projects in his office at the Museum until shortly before his death. John Cotter's contributions to education, scholarship, and preservation are impressive indeed. For his numerous colleagues and friends in the National Park Service he is remembered as a semi-legendary figure whose achievements included archeological excavations and research at Jamestown,Virginia, the Natchez Trace Parkway, and Independence National Historical Park. He helped to co-found the Society for Historical Archaeology and served as its first president and first editor. He was the chief of the research team which investigated the Clovis Type site under the sponsorship of the Academy of Natural Sciences. His important publications ranged from Jamestown to his seminal (with Dan Roberts and Michael Parrington) study of Philadelphia's archeological legacy. This latter work has spawned a series on the Archaeology of Great North American Cities. He was an NPS manager at Tuzigoot National Monument (he completed almost four decades of service in the NPS). He served as the state supervisor of the archeological survey of Kentucky. He taught what was probably the first course in historical archeology at the University of Pennsylvania and was the young discipline's ardent champion. His interests in cultural history stretched from the "Paleo Indian to the ever arriving present." His bicentennial publication *Above Ground Archaeology* proclaimed our most recent past as grist for the archeological mill. His honors and awards include the J.C. Harrington award for contributions in the field of historical archeology, presented by the Society for Historical Archaeology, and the David E. Finley Award for outstanding achievement in historic preservation, presented by the National Trust for Historic Preservation.

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