

## Fire Detection Systems

All too often, a congregation will install a fire detection system after a disaster strikes.

If a fire started in a hidden space in your building, how soon would it be detected and reported to the fire department? Within a few minutes after smoke begins, or much later, when flames shooting through the roof are witnessed by passersby? Speedy detection and response to fires are critical in preventing major disasters, yet most older houses of worship lack any type of fire or smoke detectors.

There are three categories of fire protection, explains Ernest Conrad, P.E. of the Landmarks Facilities Group in Norwalk, CT:

1. Fireproof building design elements, such as fire-resistant walls between building spaces and materials such as masonry and slate;
2. early smoke and heat detection and response systems;
3. fire suppression systems (usually through water-based installations).

"At the minimum," Mr. Conrad recommends, "religious properties should have early detection systems." The most common system consists of spot-type smoke detectors mounted throughout the building and connected with electrical wires to a central station in the building.

"Each spot-type detector covers 900 square feet, or a 30-by-30-foot space," explains Ken Schneider, a partner in Ambrosino, DePinto & Schneider, a mechanical and electrical engineering firm in New York City. "I often specify both ionization and photo-electric spot-type detectors in a building. (Ionization detectors measure changes in electrical current related to the ionization of particulate matter in the air; photo-electric devices measure the density of particulate matter in the air.) New beam detectors are ideal for large spaces like sanctuaries and theaters, replacing ten to fifteen spot-type detectors with a light beam across the room that is interpreted by computerized receivers." Fire and burglar alarms are sometimes connected to a common system for off-site notification of a problem.

"Fire detection technology has advanced dramatically in the last five years," adds Mr. Conrad. "Addressable" detectors are designed to self-diagnose and electronically report service needs, such as head-cleaning or component failures. They are simple to install, have low voltage requirements, and avoid the labor expense and access problems encountered with detectors that require routine manual inspection.

If your building has no smoke detection system at all (and if local building codes permit) you can take immediate action by installing simple battery-powered detectors available at hardware and home supply stores. Their usefulness is limited since response depends on an occupant quickly hearing an alarm. Furthermore, since smoke from incense in sacristies, chancels, and sanctuaries may trigger alarms, these type of battery-powered detectors should be considered only as a temporary measure.

Although the most convenient time to install early detection systems is during a major renovation project, more urgent concern about fire risk is a good reason to proceed if no other major interior work is anticipated. Other compelling factors may include pending roof work or a change of use in the building complex that may require increased fire safety for occupancy permits (for example, day care centers or shelters). Preservation consultant and project administrator Ed Kamper strongly recommends installing smoke detectors in attics before roofing work begins due to the risk of construction-related fires. A typical hard-wired smoke detection system may cost from \$20,000 for a small religious property to \$100,000 or more for a large complex.

Your property insurer and local fire and building departments are important sources of guidance about ways to improve fire protection (also see related articles in Common Bond Vol. 12/Nos. 2 and 3). In New York City, fire alarms must be licensed by the Fire Department and the overall installation requires departmental approval. Says Mr. Schneider, "In some situations, the use of battery-powered detectors may not be permitted, or one improvement in fire safety may trigger requirements to undertake more extensive measures than anticipated, such as annunciation throughout the building." Always consult with your insurer and code enforcement officers early in the planning stages so that you understand requirements for insurance premium discounts and code compliance.

The next step is to hire a consulting engineer who can develop specifications and plans. The engineer will often begin by conducting a life safety survey of your building and preparing a report with prioritized recommendations, cost estimates, and contractor and product referrals. Other important elements such as emergency lighting, exit lighting, and fire suppression are normally addressed. Mechanical and electrical engineering firms are a good source for fire protection engineering services, especially when modernization of other building systems will be undertaken at the same time. These firms can be found in the Landmarks Conservancy's Restoration Directory and through referrals from architects and other institutions that have had fire protection systems installed.

The desired features of the system should be carefully considered, taking into account performance, budget, aesthetics, impact on historic building materials, anticipated life span of components, and maintenance frequency and expenses. Architects, preservation professionals, building committee members, and maintenance directors who are familiar with the building can provide valuable input to the engineer who designs the system.

"When a congregation is working with a limited budget," says Mr. Schneider, "the engineer can help them make the best choices for improving fire protection within their means." Often the attic space above a sanctuary has electrical wires, lighting fixtures, and mechanical equipment, and therefore would be a higher priority location for smoke detectors than in the sanctuary itself. "There are many complicating details involved in the proper choice of equipment and its maintenance, depending on access and environmental conditions," says Keith Bigger a representative of the Baptist Temple in Brooklyn where a smoke

detection system was installed last year. For example, servicing detectors located in crawl spaces above plaster ceilings can be difficult. Detectors located in dusty spaces will require more frequent maintenance. Equipment located in damp below-grade spaces subject to flooding must be carefully chosen to perform under adverse environmental conditions.

Once you have chosen the type of system, the engineer will prepare specifications and plans indicating the type and location of the equipment. The engineer should conduct a walk-through of the building with prospective contractors to clarify goals and details. Try to obtain at least three bids from qualified electrical contractors and equipment installers. New York State requires businesses engaged in installation, maintenance, or servicing of security and fire alarm systems to be licensed. To check a firm's status, call the New York State Department of Licensing Services at (518) 474-4429.

"Find an expert to oversee the installation and supervise the contractor," Mr. Bigger recommends. "It's important to identify problems during the installation and work out resolutions between the contractor, engineer, and owner." A building professional involved in planning the system can play this role. When the Church of the Holy Apostles in New York City installed a smoke detection and burglar alarm system after a major fire, Mr. Kamper advised engineers Mottola & Poet on aesthetic considerations in the design phase to minimize the visual and physical impact on significant interior spaces. Mr. Kamper also helped resolve problems that arose in the early use of the system when incense set off smoke detectors. In addition to the engineers and owner, the insurance company and fire department had to be consulted before modifications were approved. Some smoke detectors were replaced by heat detectors, and air intake was increased in mechanical ventilation systems to dilute incense smoke faster.

In straightforward situations, a building owner has the option of working directly with a major supplier. Richard Bonamo of Simplex, one of many suppliers, explained: "If an owner just needs an early detection and alarm system, we can act as a prime contractor providing professional engineering services and obtaining approvals from the fire and building departments, as well as supplying and installing the system. If the work is part of an overall electrical system upgrade, we'd bid on the engineering documents as a subcontractor." The Landmarks Conservancy recommends that building owners seek the advice of an independent professional engineer to specify fire protection installation and equipment, evaluate proposals from contractors, and oversee installation. In any case, the owner should seek bids for comparable package of services from several well-established firms.

The more difficult to install water-based fire suppression systems include: automatic sprinklers; standpipes and hoses; private fire service mains; fire pumps to power hoses from water mains; and new water-mist systems for enclosed spaces. "Unfortunately," says Mr. Conrad, "fire suppression systems are difficult and costly to install in existing buildings. It's best to consider them in plans for a major renovation."

Recent technological improvements in early fire detection systems have made these type of systems more effective and easier to maintain. As many congregations have learned too late, early detection can prevent devastating losses. Every congregation should think seriously about improving fire safety.