New York Landmarks Conservancy

Common Bond

Quaker Meetinghouse Architecture

Also in this Issue:

- Preventing Fire During Construction
- Maintaining Marble Floors
- Bird Deterrent Systems
- Vegetation on Masonry
- Fundraising Promotional Materials
- Resources
- Financial and Technical Assistance

Volume 12, No. 2/October, 1996

Project Planning: Preventing Fire During Construction

Advance planning for fire protection and vigilance in construction safety can greatly reduce the risk of disaster.

You've seen the front-page headline: "Landmark Building Destroyed -- House of Worship Burns." Sadly, it often happens during a restoration project undertaken by a congregation committed to preserving its house of worship. Why? And what can you do to minimize the chances of fire loss? The answers lie in recognizing probable causes, implementing adequate prevention measures, and preparing a plan for battling a fire should it strike.

Undertaking construction work increases the risk of fire: some are caused by tools and products used during the construction process, while others are due to carelessness on the job. Most fires can be prevented by taking routine safety precautions and eliminating the opportunities for a fire to start.

Probable Causes

The leading cause of construction-related fires is the use of **open-flame torches**. Torches are frequently used to adhere roofing materials and to solder, weld, or cut metal. In any case, the possibility of setting fire to decorative woodwork, structural wood, paint, building paper, or a nest or dry vegetation in a wall cavity, is extraordinarily high. Often a smoldering ember flares and ignites hours after workers have left the job site. The chances of discovering this type of fire early enough to prevent severe damage are slim.

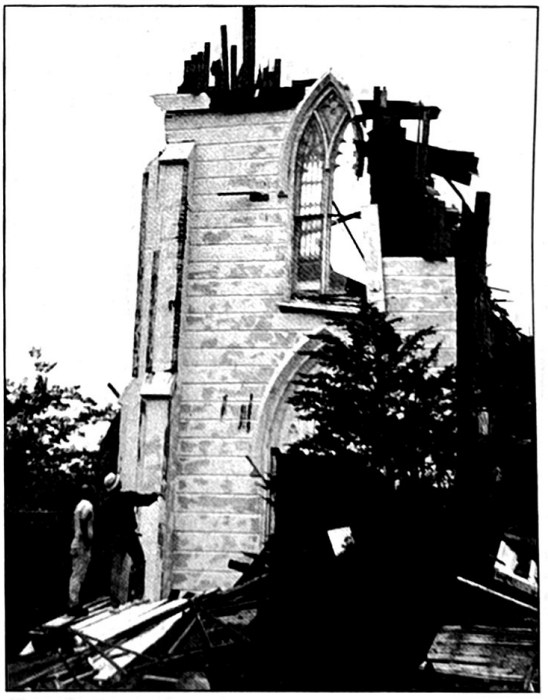
Paint removal with electric resistance coil units such as **heat guns or heat plates** is also very risky. Heat coils can ignite paint chips, building paper, or fibrous wood or debris. Careless use can result in the burning of drop cloths or other flammable objects. Fumes from **chemical solvents** often used in paint stripping and wood refinishing can also be easily ignited by an electric spark or a struck match.

The petroleum-fueled **space heater** is another potential hazard. It is often used for the comfort of construction crews and to increase temperatures to facilitate the use of certain building materials. If knocked over, the space heater not only ignites building materials, but adds fuel to the fire.

Materials subject to spontaneous combustion, like mops and rags soaked with roofing materials, oil, or solvents, are obvious hazards that require special handling. Furthermore, the storage of **flammable materials** on the job site can accelerate the spread of a small fire. Of particular concern are paints and solvents, roofing materials, paper, and fuels such as gas, propane, and kerosene.

Carelessness in disposing of **smoking material** can lead to fire, whether it is a match thrown in a garbage can or a partially extinguished cigarette dropped among wood shavings.

Vandalism and **arson** are potential threats since unprotected construction sites, scaffolding, and piles of flammable building materials may attract unwanted attention. Buildings that appear to be abandoned are frequently targets.



Ken M. Lustbader

Brighton Heights Reformed Church, Staten Island, New York (John Correja, 1863-64). This past June, the church was destroyed by a fire allegedly started by contractors repainting the exterior.

An often unrecognized, but significant threat to historic religious buildings is **old, faulty wiring**. The disturbance of old wire coated with brittle insulation can cause sparks that can lead to fire. The organ is particularly vulnerable: its hot, dry environment is the perfect place for nest-making, insulation-chewing rodents. Even without disturbance, old wiring may overheat due to the increased electrical load associated with construction. Multiple extension cords running to heavy equipment are a good indicator of a potentially overloaded electrical system.

Adequate **lightning protection systems** are particularly important for buildings with steeples, towers, and high roof peaks. These systems, however, can become ungrounded during construction. An ungrounded system is worse than no protection at all.

Carelessness on the job site underlies many of these potential threats and has been the recent cause of many fires. In the worst cases, one careless mistake is compounded by another. A tragic example is a case where the use of a propane torch caused a fire that was not detected until three hours after the work crew had left. Propane fuel tanks had been stored on the third floor of the property. When the fire spread to this area, the tanks exploded and blew the entire roof off the building.

An Ounce of Prevention

Having identified the probable causes of construction-related fires, take measures to reduce the threat of a fire starting or spreading rapidly.

Make fire safety an important consideration in project planning, writing specifications, and contractor selection. Consult with local preservation organizations, municipal agencies, or other preservation professionals about the safest procedures for performing the necessary work. Discuss the project with your local fire department. Explain the safety expectations to contractors during pre-bid walk-throughs. Although job safety is legally the contractor's responsibility, for some projects an architect or a safety consultant may add specific requirements that the contractor must provide, such as a fire watch or even installing a temporary sprinkler system. Fire safety and security costs should be part of the project budget. Choose an experienced contractor with a good safety record who makes you feel confident that workers will be properly trained and supervised in safety practices.

• Explain to the contractor and all crew members the architectural and historic significance of the building. Show them how to call the fire department, where phones and call boxes are located, where fire extinguishers are stored, and where the nearest water source is located. Explain the fire fighting plan to them. If the crew understands your interest in restoring and preserving the building, they are more likely to be careful on the job site. Don't be reluctant to report any carelessness to the contractor immediately.

• Have an electrician inspect the wiring prior to the start of construction. Inadequate electrical service should be upgraded or auxiliary power provided. If the wiring is found to be old, frayed, or brittle, replace it or disconnect it until it can be replaced.

• Specify the safest methods possible for performing work such as preparing wood surfaces for repainting by scraping and sanding, without using heat guns or torches. Consider choosing a roofing system that does not require an open-flame torch for installation. Perform all welding and cutting of metal materials off site.

• When hazardous devices and materials are used, make sure the contractor and operators know how to use them properly and follow safety procedures. Carefully supervise all open-flame and electric coil work on site. In many cities and counties, including New York City, operators must be licensed to use propane torches and equipment must be approved by the fire department. Specify a mandatory fire watch, requiring frequent inspection of the building several hours following completion of this work, especially attics and related spaces.

• Properly ventilate all areas where chemical solvents are used; this will prevent the accumulation of a concentration of fumes that can cause an explosion. Use explosion proof fans that are designed to protect the air flow from sparks.

• Store all flammable liquids away from the job site. Dispose of all rags, paper, and construction debris off the site or in airtight fireproof containers. Materials subject to spontaneous combustion must be immersed in water and stored separately.

• Use non-flammable drop cloths and tarps.

• Keep fire extinguishers rated for the types of flammable materials on the site within reach of the crew, in addition to having multi-purpose dry chemical extinguishers suitable for most common materials available. Have personnel trained in how and when to use portable fire extinguishers on duty at all times.

• Prohibit smoking on the job site.

• Secure the site during off-hours with additional lighting, fences, intrusion alarms, guards, or guard dogs.

• At the completion of any exterior work that could have disturbed the lightning protection system, have it inspected by a qualified installer. Perform necessary repairs immediately. For projects of long duration, protect and inspect the system during work to ensure that it remains functional.

Recognizing the probable causes of fire and taking the necessary steps to eliminate risks are crucial components of any building-related project. Take the opportunity to implement these measures that will protect your house of worship during construction projects and thereafter.

This article was revised from *Preventing Fire During Construction Projects* from *Common Bond* Volume 2, Number 4 (Fall 1986), by Michael Lynch, P.E., R.A., Senior Restoration Coordinator, New York State Office of Parks, Recreation and Historic Preservation. Additional information provided by Tom Cusa, Nicholson & Galloway, Inc.; Roz Li, Li/Saltzman Architects, P.C.; and Ed Kamper.

Fire Prevention Checklist

Too often, cherished houses of worship are damaged or destroyed by fire. High, open spaces and towers, and occupancy during only a few hours each day, invite small fires to grow rapidly. To decrease the chances of fire, a congregation must undertake advance planning by evaluating and reducing the probable causes and be prepared to react in a calm, organized, and deliberate manner if disaster strikes. Appoint one key person to represent the congregation in the preparation of a plan and to be contacted in the event of a fire. This person should explain the plan to staff, building users and tenants, and contractors before the start of construction.

Working with the Local Fire Department

❑ Consult with the local fire department and request its assistance in developing a fire preparedness plan. Explain the architectural and historical significance of the building and its contents, including the stained glass windows, and discuss ways to protect them.

❑ Ask the fire department to inspect your building for hazards. In addition, many insurance companies and brokers will survey buildings and provide information on risk reduction measures. Consultants can be hired to prepare life safety reports with prioritized recommendations, cost estimates, and contractor and product referrals.

❑ Ask the fire department to determine response time, study access, identify water sources, and check hydrant water pressure for fires in your building and adjacent properties.

❑ Make sure that the fire department will have prompt access to a complete set of keys no matter what time of day. Establish a list of priority items that might be damaged by fire, water, or smoke. If these items need to be removed in the case of a fire, make sure the fire department knows what and where they are and can gain access to them if they are kept in locked rooms or storage cases.

Early Detection

❑ Install hard-wired smoke and heat detectors connected to a 24-hour centrally-controlled alarm system. Have manual pull stations at exits. A direct reporting system hastens response time by critical minutes or even hours.

❑ Automatic sprinkler systems are recommended, especially for buildings with wood frames or truss systems.

❑ At the minimum, install battery-operated smoke detectors and fire extinguishers.

❑ Ask neighbors to be alert to break-ins or signs of smoke and to call the police or fire departments immediately.

Documentation and Insurance

❑ Choose a good insurance broker to advise you in keeping policies up-to-date, reducing risks, and settling claims.

❑ Maintain up-to-date inventories and assessments of building contents. Keep a complete set of documentary photographs of the building and its contents, including the stained glass windows. Also document the building with measured drawings that will assist in restoration or reconstruction.

❑ Store duplicate records in separate locations, with one set off site. Keep important original materials, including photographic negatives, in fireproof vaults such as at an insurance office, historical society, or bank safe-deposit box.

Administration

❑ Conduct fire drills with staff and other groups that use the building. Train staff in the proper use of fire extinguishers.

❑ Create a phone chain of individuals that would notify key staff and members of the congregation in an emergency and identify meeting places.

❑ Gather phone numbers of providers of emergency services, such as water and smoke extraction, dehumidification, and stained glass window stabilization, and file this information in an off-site location.

❑ Plan security measures to prevent accidents and deter vandals. These may include a temporary guard, blocking off sidewalks, and securing openings.

❑ Prepare a list of tasks and committees that may be necessary, such as settling the insurance claim, securing and cleaning up the site, public communications, crisis counseling, developing restoration plans, and fundraising.