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Holy Smoke: Fires in Places of Worship

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I. SYNOPSIS

Fires in places of worship are rare in most fire department’s jurisdictions, but when they happen they can be one of the most challenging fires that we encounter. Knowing the reasons why fires in these buildings start, their usual locations, building construction features, and key strategies/tactics in fighting these fires can mean the difference between controlling the situation in a safe manner or losing the building and perhaps firefighters. Some of the information presented will be useful to educate the public in how to prevent such fires.

II. OBJECTIVES

Upon successful completion of this course the student should be able to:

1. state the three primary causes of fires in place of worship structures.
2. describe the construction features that present challenges to firefighting personnel and that can assist the spread of fire at place of worship structures.
3. describe occupancy features of place of worship structures that with which firefighters should be familiar.
4. describe the strategy, tactics, and procedures that should be followed when fighting fires in place of worship structures.
5. state other considerations that firefighters should be aware of when fighting fires in places of worship.
6. list items unique to place of worship structures that should be included in pre-incident planning documents.

III. INTRODUCTION

This course is designed to be used by firefighters and fire officers who may respond to fires in places of worship. This course may also be used by individuals in the public education and fire prevention sectors to prepare a fire prevention program for places of worship. Previous knowledge of standard firefighting practices and basic building construction should be a pre-requisite.

IV. TRAINING CONTENT

When people think of places of worship they normally think of churches. In fact many other buildings and occupancies can be classified as places of worship, such as mosques, synagogues, chapels, church halls, and religious education facilities. Some of these occupancies may be located in private homes or “storefront”-type facilities. The most recent statistics published by the National Fire Protection Association (NFPA) report that on an average 1,300 places of worship fires are reported each year, contributing to approximately \$38 million in property loss.

One-quarter of all fires occurring in places of worship are reported as incendiary or suspicious. Some of these fires have been reported as hate crimes. Although not a significant number (less than one percent of reported incendiary and suspicious fires in structures) when compared with the overall arson problem, it must be taken into account by responding fire units with regard to evidence preservation and the recognition of suspicious fires. Arson/suspicious fires account for the largest cause of fires in places of worship.

Electrical distribution fires are the second leading cause of fires in places of worship. These occurrences are often in older churches where electrical wiring may be fragile. Following electrical distribution fires, open flame and heating fires are the next most frequent causes.

Fires that originate in structural areas of these buildings (exterior walls and ceiling/roof assemblies) account for the largest percentage in terms of area of origin. The areas most encountered as an area of origin are large assembly areas and kitchens.

Building Construction Features

The construction of places of worship may present challenges to firefighters and assist with the spread of the fire. The following are some of the features that may be present:

- Large complex buildings with many voids and concealed spaces
- Open design with large areas. This type of construction will usually involve some form of truss system. Lightweight wooden trusses can collapse after 10 minutes in a fully developed fire and lightweight steel trusses can collapse in an equally short period of time.

- Support pillars that appear solid may actually be built-up wooden members covered with plaster. Steel columns may be covered with a decorative plaster and actually be a channel for fire to spread vertically to the cockloft areas. Some columns in older buildings may be cast iron. These present challenges because the beams that rest on the column may in fact be cut away to allow the full width of the column to pass through the beam, substantially reducing the amount of wood in the beam. If hollow columns have been stacked above one another, a hidden flue for fire transmittal is possible. It also has been reported that heated cast iron columns may fail when struck with the cooling water of a hose stream.

Balconies

Balconies used for seating or choir functions may be suspended. In a fire the loads may be obscured by smoke, and the suspension system may be subjected to temperatures hundreds of degrees higher than at floor level. In some churches the supporting rods for balconies may be boxed in with wood, to hide the architectural unsightliness of the steel rods. In a fire this feature may increase the temperatures the rods are subjected to if the wood covers burn.

Expensive Stained Glass Windows

Such windows may or may not be able to provide ventilation. Many times, these windows will be covered with plexiglass or wire mesh to protect them, which in turn may impede ventilation.

Interconnection With Other Buildings in the Complex

Sometimes these buildings are connected at various areas with education buildings, rectories, or manses. This author has seen interconnections only in the basement area for ventilation and/or heating systems.

Common Heating Systems

At times a heating system may be common to the main building and other incidental buildings within the complex. Common ductwork may spread the fire to areas not anticipated by the incident commander. Electrical power for the heating units may be located in a building other than the one in which the heating unit is located.

Renovations and Alterations

Renovations and alterations may have created hidden voids where fire can spread undetected, or they may weaken the structure, creating a collapse potential.

Security Measures

Because many places of worship are unattended during much of the week, elaborate security measures may have been taken. These include locks on doors and windows, security alarm systems, and increased perimeter fencing. The additional locks will increase our forcible entry times and the increased perimeter fencing may hinder apparatus placement. These security measures should be identified during pre-incident planning. One positive aspects of increased security is the fact that when installing a security system, a fire alarm system may also be installed at the same time, often with central station connection. Central station connection provides an earlier notification to the fire department.

Automatic Detection, Extinguishment, and Notification Systems

Many if not most places of worship lack fire alarm, detection or sprinkler protection. This will contribute to a rapid fire spread.

Roofing Material

Slate roofing has been installed on many places of worship. This type of roofing will impede vertical ventilation and may not allow roof operations due to the slipperiness of the material and the steep angles of the rooflines. Also, slate roofs may add considerable weight to the roof load. The pitch of the roofs on many churches without slate roofs must also be considered during vertical ventilation operations.

Bell Towers and/or Spires

Large bell towers and spires may rise to great heights above the main building. In many cases these bell towers contain large bells that add considerable weight to the tower. Collapse of these structures must be anticipated early and collapse zones maintained.

Occupancy

Due to the economic downturns experienced in past years, many congregations have experienced financial problems and are renting parts of their buildings to other organizations and/or congregations. Community outreach is another reason congregations have opened their buildings to other groups. This has resulted in the following information that must be recognized and planned for by the fire service:

- In addition to Sundays, religious buildings may be occupied during the week with day care agencies, schools, soup kitchens, food pantries, and so forth. Night use for religious services must also be anticipated and identified. The buildings may be used by civic groups at night.

- Live-in cleaning or security personnel may also be present. Other individuals may also be living in the buildings, such as transients in need of assistance. Residences are often provided for the clergy and facilities are often provided for other religious workers, such as rectories, convents, or manses. Places of worship may offer multi-use occupancies, which share facilities with non-religious institutions.
- Many times basements may be occupied, often in violation of existing occupancy regulations and without adequate emergency egress. Code violations may exist regarding occupancy and construction/renovations.

Strategy, Tactics, and Procedures

As noted previously, many inherent construction features may contribute to rapid fire spread in a place of worship. Fires in these structures usually result in rapidly spreading fire, which often reaches advanced stages when the fire department arrives. These reasons mean that an exterior attack would be indicated in an advanced fire. The following are items that must be considered when fighting fires in places of worship:

- A size up must be performed immediately upon arrival by the initial incident commander as well as all personnel on the scene. Every individual on the scene involved in firefighting activities or standby must develop a size up for his own safety. Communicate items of importance through the chain of command to the incident commander; in cases of emergency, communicate directly to the incident commander. Instances have occurred on the fireground in which individuals failed to provide crucial information because they were afraid to offer this information for one reason or another. This resistance may have led to firefighter injuries and deaths. The incident commander and company officers must use information contained in their pre-incident plans to assist with the size-up process.
- Due to the size of these structures and the complexities of firefighting, the need for additional alarms must be considered. Additional units should be in staging before they are needed for firefighting duties. The need for many large-caliber streams and associated staffing to achieve placement and supply must also be considered when requesting additional alarms.

- Advanced fires should be fought using an exterior attack. High ceilings, hidden voids, and the use of truss construction will contribute to a fire that is unstoppable using handlines and will contribute to early collapse. Collapse can occur with little or no warning. If structural steel or cast iron members are involved, the collapse can be total and involve the side walls of the building. Establish and maintain collapse zones. There may be no way of predicting which way the building will fall.
- If interior fires can be fought using an interior attack, firefighters should be kept out of the nave area. Large pieces of plaster from the ceiling can fall and severely injure firefighters. Forcible entry should be performed through the rear and side doors. Fire hoses should be stretched through these doors but never across the nave of the building. The use of tower ladders/aerial platforms is valuable at these structures; they can be used for elevated streams, roof ventilation, and observation platforms. When using a tower ladder/ladder platform for roof ventilation, position the ladder away from bell towers, steeples, and gable ends. Position the base of the boom opposite a valley or along the eaves and into the plane of the roof. Cut the hole as high as possible and enlarge quickly. Notify the incident commander of conditions found.
- If fire is suspected in the attic, locate the scuttle opening. If fire has taken over a large portion of the attic, then exterior operations are warranted. Fire in possessing an extensive area of the cockloft indicates that collapse of the ceiling and possibly the building is imminent; the building must be evacuated.
- Due to the value of the stained glass windows, vertical ventilation should be attempted prior to breaking the windows. Some stained glass windows are valued at one million dollars or more.
- Rapid intervention teams (RITs) and accountability systems must be in place. Because of the complexity of the fire operations and multiple fire attack points, additional RITs will be necessary. Due to the large size of these structures, most cases will require divisions to be set up to control the operations in remote areas and areas outside the incident commander's view. Safety officers must be appointed and collapse zones established and enforced.
- Long hose stretches must be anticipated. The use of large-diameter hose and manifolds will be beneficial to fire operations.

Other Considerations

As noted previously, arson may be the cause of the fire and/or the fire may be a “hate” crime. It is vital that initial arriving units observe the fire conditions, the location of the fire upon arrival, and any other indicators that may assist with the cause and origin investigation. If the fire department has a videographer, the scene and the fire operations should be filmed for later use by investigators. Any evidence of arson must be preserved.

Pre-incident Planning

Pre-incident planning is essential for fires in places of worship. In addition to the normal pre-incident planning items, the following must also be considered and highlighted:

- Times of occupancy
- Unusual occupancies (people living in building)
- Interconnected areas
- Additional access
- Weight considerations in bell tower
- Value of stained glass windows
- Priceless artifacts that may be inside the building
- Location of sacred articles and texts
- Seating arrangements i.e., fixed or moveable
- Holder of keys for access (consider the use of Knox boxes)

As part of our pre-incident planning and/or inspection visits, fire crews should conduct a thorough inspection. All nooks and crannies, including the attic area and the organ and choir lofts should be inspected. Areas of possible fire travel and ignition sources should be noted. Educating religious and lay leaders should be done to highlight the need for good housekeeping and fire prevention activities. They should also be encouraged to install fire detection and suppression systems. Evacuation plans should also be in place.

The fire department should stress the importance of regular inspections by the institution and that the members of the religious body know the evacuation plan. Evacuation/fire drills should be conducted by the place of worship twice a year. A good time for such drills is at the conclusion of the regular religious service.

Although fires in places of worship may be rare in your community, if they happen they can be one of the most challenging fires of your career. By knowing the design and occupancy features of these structures and performing pre-incident planning, the outcome of a fire may be different. In addition, closely working with the community in the areas of fire prevention and risk management may help prevent a fire from starting.

V. GLOSSARY

Convent—a local community or house of a religious order or congregation; an establishment of nuns.

Manse—the residence for clergy.

Rectory—the residence of a parish priest.

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VII. TEST

1. Which of the following is NOT one of the leading causes of fires in places of worship?
 - a. Incendiary/suspicious fires
 - b. Electrical distribution
 - c. Open flame and heating
 - d. Children playing with matches

2. Which of the following construction features would NOT assist with fire spread and present challenges to firefighters in places of worship?
 - a. Large complex buildings with many voids
 - b. Robing rooms for clergy
 - c. Interconnection with other buildings
 - d. Concealed spaces

3. Which of the following statements is true?
 - a. Solid-looking support pillars are always what they appear.
 - b. Steel columns will never transmit heat or flame.
 - c. Balconies used for seating or choir functions may be suspended.
 - d. Supporting rods for balconies will never be concealed with wood.

4. Stained glass windows
 - a. are often inexpensive and not considered valuable.
 - b. are often expensive, considered valuable, and may not provide adequate ventilation.
 - c. can be easily repaired or replaced.
 - d. can be purchased at local hardware stores.

5. Which of the following statements is true?
 - a. Renovations and alterations to places of worship will never create hidden voids.
 - b. Most places of worship will have automatic fire detection and suppression systems.
 - c. Bell towers and/or spires may rise to great heights above the main building.
 - d. Slate roofs will never be installed because of their weight.

6. Places of worship may be used for a variety of purposes. Which of the following is a use or type of occupancy that you would NOT expect in a place of worship?
 - a. A day care center
 - b. A school
 - c. A soup kitchen
 - d. An automotive repair facility

VII. TEST

7. During your size up for fires in places of worship, you should
 - a. include your pre-incident plans to assist you with the size up.
 - b. proceed immediately to the fire with all your available resources.
 - c. be focused on extinguishing the fire with the first arriving engine crew.
 - d. assume that the fire will be small and can be quickly extinguished.

8. Strategies and tactics for fires at places of worship include all of the following EXCEPT
 - a. multiple alarms and/or the special calls for additional fire companies must be considered.
 - b. the need for large-caliber streams and their associated staffing to achieve placement should be considered.
 - c. fighting advanced fires using an interior attack.
 - d. use of tower ladders/ladder platforms is invaluable for these types of fires.

9. Which of the following conditions would NOT be considered at a fire in a place of worship?
 - a. The fire was intentionally set.
 - b. The fire was set to cover up another crime.
 - c. The fire was caused by a malfunction in the building's heating system or electrical distribution system.
 - d. The fire was set by the congregation.

10. The following statements apply to preplanning for fires at places of worship EXCEPT
 - a. as part of the pre-incident planning visits, fire crews should conduct a thorough inspection.
 - b. areas of possible fire travel and ignition sources should be noted.
 - c. educating religious and lay leaders should be done during pre-incident planning visits to highlight the need for good housekeeping and fire prevention activities.
 - d. because of the certainty of Sunday-only occupancy, possible use of the building during other times should not be investigated.

VIII. ANSWER KEY

1. D Children playing with matches is not a leading causes of fire. Incendiary/suspicious fires are the leading cause; electrical distribution fires are the second-leading cause, followed by open flame and heating fires. (Objective 1)
2. B Robbing rooms for clergy would not assist fire spread or present challenges to firefighters. (Objective 2)
3. C Balconies used for seating or choir functions may be suspended. In a fire the loads may be obscured by smoke, and the suspension system may be subjected to temperatures hundreds of degrees higher than at floor level. (Objective 2)
4. B Stained glass windows are often expensive and they may or may not be able to provide ventilation. Many times these windows are covered with plexiglass or wire mesh to protect them, which may restrict ventilation. (Objective 2)
5. C Large bell towers and spires may rise to great heights above the main building. In many cases these towers contain large bells that add considerable weight to the tower. Collapse of these structures must be anticipated early and collapse zones maintained. (Objective 2)
6. D In addition to Sundays, religious buildings may be occupied during the week with day care agencies, schools, soup kitchens, food pantries, and so forth. Night use for religious services must also be anticipated and identified. The buildings may be used by civic groups at night. (Objective 3)
7. A The incident commander and company officers must use information contained in their pre-incident plans to assist with the size-up process. (Objective 4)
8. C Advanced fires in places of worship should be fought using an exterior attack. An interior attack should never be used due to the potential for roof collapse. (Objective 4)
9. D Intentionally set fires, suspicious fires, electrical distribution fires, and open flame and heating fires are conditions that would be considered in places of worship. (Objective 5)
10. D Times of occupancy should be noted. Religious buildings may be occupied on days other than Sunday by day care agencies, schools, soup kitchens, and so on. Nighttime use for religious services must also be considered. (Objective 6)

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