Report of the Tennessee Advisory Commission on Intergovernmental Relations

Fire Sprinkler Requirements for Places of Worship

Protecting People and Property

November 2014

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Report of the Tennessee Advisory Commission on Intergovernmental Relations

Fire Sprinkler Requirements for Places of Worship: Protecting People and Property

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State of Tennessee
Tennessee Advisory Commission on Intergovernmental Relations
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November 20, 2014

The Honorable Dale Carr
Chair, House Local Government Subcommittee
301 6th Avenue North
Suite 107 War Memorial Building
Nashville TN 37243

Dear Chairman Carr,

Transmitted herewith is a Commission Report on House Bill 1649 by Representative Timothy Hill (Senate Bill 1749 by Niceley) of the 108th General Assembly, referred by the House Local Government Subcommittee for study in 2014. The report was approved by the Tennessee Advisory Commission on Intergovernmental Relations November 20, 2014, and is hereby submitted for your consideration.

Respectfully yours,

Senator Mark Norris
Chairman

Lynnisse Roehrich-Patrick
Executive Director

The Tennessee Advisory Commission on Intergovernmental Relations

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MEMORANDUM

TO: Commission Members

FROM: Lynnisse Roehrich-Patrick
Executive Director

DATE: 19 November 2014

SUBJECT: Fire Sprinkler Requirements for Places of Worship, Protecting People and Property—Final Report

Prepared in response to a request by the 108th General Assembly's House Local Government Subcommittee to study House Bill 1649 by Representative Timothy Hill (Senate Bill 1749 by Niceley), the attached report does not recommend changing the state building code to create the exceptions proposed in the bill. The bill would have exempted single-story places of worship located in unincorporated areas of the state from laws and regulations requiring places of assembly to have fire protection sprinkler systems as long as they

- have a capacity of no more than 400 persons;
- do not have a water supply located on the property;
- have a minimum of two exits, plus one additional exit for every 2,500 square feet or portion thereof over 4,500 square feet;
- have a fire alarm system;
- have fixed seating for at least 250 persons; and
- were built on or after July 1, 2012.

Few states make similar exceptions because of the risk they pose to the health, safety, and welfare of the public, firefighters, and property, and because reasonable means are available to support sprinkler systems where public water supplies cannot.

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Fire Sprinkler Requirements for Places of Worship: Protecting People and Property

From 2009 through 2013, there were 161 fires in places of worship in Tennessee. Those in places of worship without sprinklers that reported property losses caused an average of $181,664 in damage per fire, nearly eight times the amount of damage caused in places of worship with sprinklers—$23,657 per fire. No one died in any of these fires, but three firefighters were injured in places without sprinklers. Tennessee's experience demonstrates that sprinkler systems help suppress fires and reduce the risk of both injury and loss of life as well as the cost of property damage.

In Tennessee, from 2009 through 2013, fires in places of worship without sprinklers caused nearly eight times the amount of property damage caused in places of worship with sprinklers.

Like most states, Tennessee has required sprinkler systems in buildings with rooms designed to accommodate large groups of people, including places of worship, at least since the 1980s. Exiting these buildings safely in an emergency is difficult, especially during a fire. The panic that often ensues can further endanger the lives of the people in the structure as well as the firefighters called to the scene. The current building code requires places of worship, in both incorporated and unincorporated areas, to have sprinklers if the auditorium

1. exceeds 12,000 square feet,
2. has an occupant load of 300 or more, or
3. is located on a floor other than the level of the building exit.

Architects and engineers of places of assembly that accommodate 300 or more people, including places of worship, must submit plans that meet all building standards, including these sprinkler requirements, for approval by the state fire marshal's office before construction begins.

Automatic sprinkler systems are effective in 96% of fires when they are activated, and they are activated 91% of the time. When they are not activated, it's generally because someone shut the system off before or during the fire. National data show that sprinklers in places of worship contain a fire to its room of origin in 83% of all fires. Limiting a fire's spread is important for the safety of community members and firefighters. In an investigation of a 2004 fire that engulfed a church without sprinklers in Carthage, Tennessee, resulting in one firefighter fatality and two firefighter injuries, the National Institute of Occupational Safety and

Health recommended installing sprinkler systems in places of worship.[1] The report noted that sprinklers reduce risks to community members and firefighters because they can contain fires until the fire department arrives.

In 2013, the Dyson Grove Baptist Church in Johnson County, Tennessee, moved into a new, larger building that the congregation had built on a rural site without access to a public water supply. The church was built without a sprinkler system, and the architect who designed it did not submit plans to the state fire marshal's office. A state electrical inspector, seeing that the plans were not approved, reported the violation to the state fire marshal's office, which required the church to submit plans. According to the state fire marshal's office, the church's sanctuary can accommodate 369 people, enough to require an automatic sprinkler system. The fire marshal's office is allowing the church to continue using the building while the architect and church members develop a plan to comply with the code, for example by reducing the size of the sanctuary or installing an automatic sprinkler system with a water tank and pump sufficient to support it, as has been done in similar situations. Dyson Grove's architect has submitted new building plans with a sprinkler system supported by an underground water storage tank and a pump system. The fire marshal's office reviewed and approved the revised plans.

House Bill 1649 sought to exempt single-story places of worship that meet specific size, occupancy, and exit requirements and that are located in unincorporated areas without a water supply from the requirement to install fire protection sprinkler systems.

In the meantime, the Dyson Grove congregation, believing that their building should be exempt from the current sprinkler requirement, asked their legislators to change the law. In response to their request, a bill was introduced to exempt single-story places of worship located in unincorporated areas from state laws and regulations requiring places of assembly to have fire protection sprinkler systems as long as they

- have a capacity of no more than 400 persons;
- do not have a water supply located on the property;
- have a minimum of two exits, plus one additional exit for every 2,500 square feet or portion thereof over 4,500 square feet;
- have a fire alarm system;
- have fixed seating for at least 250 persons; and
- were built on or after July 1, 2012.

Only six states have exceptions such as these, and one of them—Florida—is considering eliminating theirs. Delaware and Massachusetts actually require sprinklers for smaller places of assembly than does Tennessee.

The House Local Government Subcommittee asked the Commission to study the proposed legislation, House Bill 1649 by Representative Timothy

[1]Lutz 2006, 8.

Hill (Senate Bill 1749 by Niceley; see appendix for a copy). Citing the threat that it posed to the health, safety, and welfare of the public and firefighters, as well as the increased risk to property, no engineers, architects, or fire officials interviewed by commission staff support the bill. For this reason, and because reasonable means are available to support sprinkler systems where public water supplies cannot, the Commission does not recommend changing the state's building code to exempt places of worship in such areas from current fire safety requirements.

Risks Posed by Fires in Rural Places of Worship

Fires in rural places of worship are particularly dangerous for community members, firefighters, and property. Although from 2009 through 2013 there were no fire deaths or injuries in rural places of worship in Tennessee, a 2011 University of Tennessee study found that people living in rural areas are at the highest overall risk for fire death in the state.[2] Nationwide, rural communities have a fire death rate that is twice that of non-rural communities.[3] Fires in rural areas often cause more damage to property. The US Fire Administration reports that rural residential fires are almost twice as likely to spread throughout an entire structure as those in non-rural areas.[4] From 2009 through 2013 in Tennessee, the average property value loss per fire in places of worship without sprinklers that reported damages was 36% in unincorporated areas compared with only 22% in incorporated areas.[5] Fires in places of worship can also be emotionally burdensome because of the importance of these structures to the community, especially in small rural communities where they may be the only gathering place.

A 2011 University of Tennessee study found that people living in rural areas are at the highest overall risk for fire death in the state.

Three major factors contribute to the increased risk that fires in rural places of worship pose to the health, safety, and welfare of people and property:

1. Fighting rural fires is challenging.
2. Places of worship, like all structures with large auditoriums, are prone to collapse in fires.
3. Safely exiting places of worship during a fire is difficult.

[2]Folz et al. 2011, 15.
[3]Gamache et al. 2007, 7.
[4]Ibid., 26.
[5]Based on data received in an email from Peyton Bullen, Program and Policy Director, Tennessee Department of Commerce and Insurance, May 27, 2014. Property loss is calculated using the number of total fires with reported losses—7 of 12 fires with sprinklers and 71 of 94 without sprinklers had reported values. The data does not distinguish between fires with zero property damage and fires in which the person reporting it chose not to enter a value for property loss or total value of property in the national fire database.

These factors can be mitigated by installing smoke detectors, staffing fire departments with more full-time firefighters, improving access to water supplies, and installing automatic sprinkler systems. Some but not all of these options are available to rural churches such as the recently constructed Dyson Grove Baptist Church in Johnson County, which is seeking relief from current state building code requirements.

The Challenges of Fighting Rural Fires

Longer response times and limited access to water make fighting fires in rural places of worship more difficult. A recent example of the problems fire departments face in these cases occurred on January 24, 2014, when a fire destroyed the Lifespring Church outside the municipality of Greencastle, Indiana. The church was located about five miles from Greencastle and almost four miles from the nearest fire department. Over 100 firefighters—a mix of volunteers and professionals—responded to the fire, but their efforts were hindered by the distances they had to travel and their limited access to water. Because the church was in an area without fire hydrants and did not have water stored on site, the firefighters had to shuttle tanker trucks back and forth between the church and the towns of Greencastle and Bainbridge, five and six miles away by road. No one was hurt in the incident, but little was left of the building other than its exterior walls.[6]

The longer distances that firefighters must travel to reach rural fires and the difficulty of mobilizing volunteer firefighters increase the response times of even the best-trained, best-equipped departments.

The longer distances that firefighters must travel to reach rural fires and the difficulty of mobilizing volunteer firefighters increase the response times of even the best-trained, best-equipped departments. In Tennessee from 2009 through 2013, the average response time for church fires in municipalities was a little more than four minutes, while the average response time outside municipalities was nine and a half minutes.[7] Fire stations tend to be farther apart in rural areas than in non-rural areas and are responsible for larger geographic areas. Some firefighters responding to the Lifespring Church fire came from more than thirty miles away.

Furthermore, many rural and unincorporated areas are served by majority volunteer fire departments. In Tennessee, 81% of fire departments, 575 of 709, are defined as volunteer forces.[8] These firefighters, who are becoming more difficult to recruit and retain,[9] often must travel from their homes or places of work to a fire station before responding to an incident.[10] The

[6]Associated Press 2014 and WLKY 2014.
[7]Based on data received in an email from Peyton Bullen, Program and Policy Director, Tennessee Department of Commerce and Insurance, May 27, 2014.
[8]Data received in an email from Dennis Mulder, TFIRS Coordinator, Tennessee Department of Commerce and Insurance, August 19, 2014.
[9]Lauer 2006, 39.
[10]Bialik 2012.

longer time that it takes firefighters to arrive on scene in rural areas allows fires to grow larger, making them more difficult and more dangerous to extinguish.

Limited access to on-site water also increases the challenges for firefighters in rural areas and greatly increases the risks to property and people. In areas without fire hydrants, all water used to fight a fire must either be found in close proximity to the blaze or be transported to the site. Local streams, ponds, and wells often cannot provide sufficient water to fight a fire and can be difficult to access.[11] Without a sufficient water source on site, the fire department must transport all of the water needed to extinguish a fire in tanker trucks, which may not be able to carry enough water.

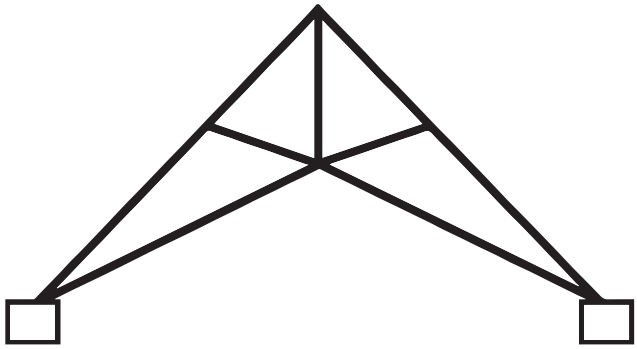
A 2011 church fire in a rural area outside of Muncie, Indiana, illustrates these problems well. A firefighter died when the roof of the building's sanctuary collapsed, trapping him inside. Several other firefighters were injured as they navigated pews and jumped through windows to escape the smoke-filled sanctuary. Investigative reports attributed the fire's deadliness to a number of factors. By the time firefighters arrived, the fire had engulfed the church's attic and begun to undermine the roof's lightweight wooden truss construction. Furthermore, firefighters had to rely solely on water from tanker trucks to fight the blaze because the church was located in a rural area without fire hydrants and did not have an automatic sprinkler system.[12]

Even under the best of conditions—even in incorporated areas with professional fire departments and sufficient fire hydrants—fighting fires is difficult. A 2013 fire that ignited after Sunday services at St. Mary Coptic Orthodox Church across the road from the Nashville International Airport destroyed the church sanctuary even though a fire hydrant was on-site and more than 75 professional firefighters worked for hours to extinguish the fire, using 35 fire engines, ladder trucks, and other support vehicles. Although a few people were inside the building when the fire started, and the roof collapsed before the fire was extinguished, no one was hurt.[13]

Limited access to on-site water increases the challenges for firefighters in rural areas and greatly increases the risks to property and people.

[11]Cote 2003, section 10, page 34.
[12]TheIndyChannel.com 2011 and Wertman 2012.
[13]Bruck 2013 and News Channel 5 2013.

Dyson Grove Baptist Church



Example of a Roof Truss

Risk of Collapse in Buildings with Large Auditoriums

Roofs constructed with trusses spanning large spaces without additional support are prone to collapse in a fire. A truss's triangular shape provides structural rigidity under normal conditions but can deteriorate quickly and without warning in a fire, allowing the roof to collapse. Trusses can be particularly dangerous because the failure of even one can undermine the whole system and, when hidden from view in attics, they can allow fires to grow unnoticed.[14] Even so, because they are relatively inexpensive, they are often used in buildings with cathedral ceilings to span long distances and create unobstructed open spaces. The Dyson Grove Baptist Church is a typical example. The church's sanctuary is a 5,000-square-foot open room that can accommodate 369 people. It has a wooden cathedral ceiling and wooden trusses that span its 62-foot width and support its roof.[15]

Difficulty of Safely Exiting Buildings that Accommodate Large Groups of People

Any building that accommodates large groups of people is difficult to exit safely in an emergency. This is especially true when panic ensues during a fire.[16] For example, one hundred people lost their lives and more than 200 were injured in a 2003 fire at the Station nightclub in Rhode Island. The building did not have sprinklers, and the fire spread so quickly that smoke was visible from outside the building after only one minute. After five minutes, flames were coming through the roof. The number of people trying to get out of the building at the same time overwhelmed the exits and created a "crowd-crush" in which many people were stuck in the exit doorways. Rescue efforts were further complicated when major sections of the roof collapsed, preventing firefighters from accessing the inside of the building to help potential survivors until the entire fire was suppressed. The bodies found inside piled on top

[14]McBirney 2012, 9, Merinar et al. 2005, 1, and Sanders 2014.
[15]Based on information received in emails from Joe Damons, Facilities Construction Specialist, Tennessee Department of Commerce and Insurance, September 10 and November 12, 2014.
[16]Cote 2003, section 13, page 29.

of each other suggested the panic that resulted when people were unable to escape.[17]

The addition of fixed seating such as church pews exacerbates the problem by making it more difficult to navigate aisles and find exits, especially when visibility is reduced by smoke. The National Fire Protection Association's Fire Protection Handbook notes that church visitors attending special events like weddings and funerals who do not use the building frequently might not be familiar with its layout and emergency procedures, increasing the risk of injury or loss of life both to themselves and those who try to help them.[18]

Significance of Financial and Community Losses

The financial costs of fires in places of worship can be devastating. From 2009 through 2013, there were 161 fires in places of worship in Tennessee, an average of almost three fires per month. The following map shows the location of fires across the state during this period. Losses from the 99 of the 161 fires for which amounts were reported totaled almost $15 million in property damage, an average loss of $150,599 per fire, ranging from less than $100 to $1.5 million. The average reported property loss per fire in places of worship that did not have sprinklers was nearly eight times greater than in places of worship with sprinklers—$181,664 per fire without sprinklers compared with only $23,657 per fire with sprinklers.[19]

After a church fire in Lebanon, Tennessee, a church member said it was like dealing with the loss of a family member.

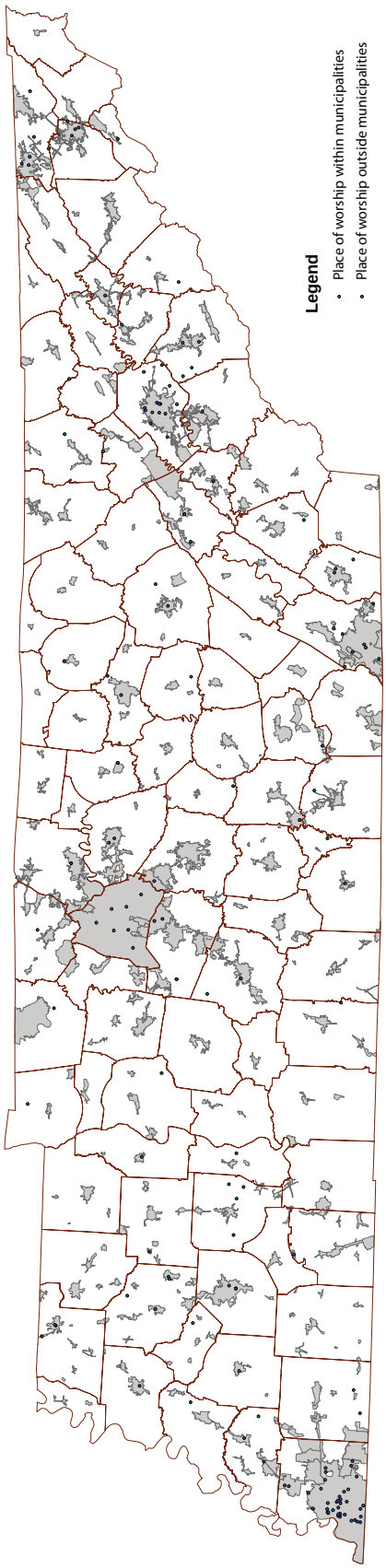
Fires in places of worship can also leave a community without an important gathering space, a distressing and emotional loss that's not easy to quantify. For church members, the loss can be like dealing with the death of a family member.[20] After a June 2014 fire destroyed Trinity Church of the Nazarene in Donelson, a church member said "I know it's just a building, but it's still a part of us. I just don't know. It's not good. It's rough."[21] Congregations are not always able to rebuild quickly, disrupting the services that they provide and the activities that their buildings host for the community.

Reducing Fire Losses in Rural Places of Worship

Effective methods for reducing the risks that fires in rural places of worship pose for community members, firefighters, and property include installing smoke detectors; staffing fire departments with more full-time firefighters;

[17]Grosshandler et al. 2005, iii, xx, 2-2, 2-5, 3-2, 3-4, 3-6.
[18]Cote 2003, section 13, pages 29-30.
[19]Based on data received in an email from Peyton Bullen, Program and Policy Director, Tennessee Department of Commerce and Insurance, May 27, 2014.
[20]WSMV.com 2012.
[21]Flores 2014.

Fires in Places of Worship, 2009-2013



Source: Division of Fire Prevention, Tennessee Department of Commerce and Insurance, 2014.

improving access to water supplies by adding tanks, reservoirs, and fire hydrants; and installing automatic sprinkler systems to provide immediate fire suppression. Although each of these methods helps limit the danger to people and property in a fire, automatic sprinkler systems are the most effective.

Smoke Detectors and Remote Monitoring Systems

Properly maintained smoke detectors are critical for alerting building occupants to a fire, reducing property loss and the risk of injury and death.[22] The National Fire Protection Association (NFPA) reports that from 2007 through 2011 almost two-thirds of all deaths in residential fires occurred in homes without functioning smoke detectors.[23] They are inexpensive to install and are recommended by fire professionals for residential and non-residential buildings.[24]

Remote monitoring systems—which can be connected to smoke detectors or automatic sprinklers—can help reduce property loss by reporting fires directly to 911 communication centers and fire departments.[25] Especially in rural areas with volunteer firefighters and longer response times, remote monitoring systems serve as an early warning that alerts the fire department regardless of whether someone hears the alarm at the site.

Although smoke detectors and remote monitoring systems alert building occupants and fire departments to the presence of smoke or fire, they are not a substitute for a functioning sprinkler system because they do not directly suppress and contain fires.

Smoke detectors and remote monitoring systems alert occupants and fire departments to the presence of smoke or fire, but they are not a substitute for a functioning sprinkler system because they do not directly suppress or contain fires.

Training and Full-Time Firefighters

According to the Federal Emergency Management Agency, a "properly organized, staffed, and deployed fire department" is key to preventing loss of life and property damage from fires.[26] The US Fire Administration has found that improving firefighter training and equipment can help reduce injuries, deaths, and property damage caused by fires.[27] It lists better training and equipment as two factors that, in addition to the near universal installation of smoke detectors and increasing installation of sprinklers, have contributed to the decline in five-year fire loss rates across the United States.[28] Similarly, researchers at the University of Tennessee report that

[22]Cote 2003, section 9, page 5 and Hamins et al. 2012, 30.
[23]Ahrens 2013, iv.
[24]Abdelrazek et al. 2013, 13.
[25]Cote 2003, section 9, page 10.
[26]Federal Emergency Management Agency 2002, 26.
[27]Abdelrazek et al. 2013, 12.
[28]US Fire Administration 2010, 8.

investments in training and equipment result in shorter response times and increase the firefighting capability of fire departments.[29]

Nevertheless, NFPA standards give volunteer fire departments more than twice as long to respond to fires because they often need to alert volunteers who aren't at the station.[30] According to the state fire marshal, from 2011 through 2013, the average response time in Tennessee for all-volunteer fire departments was more than double the average time for career departments—10 minutes, 27 seconds, for volunteer departments versus only 4 minutes, 29 seconds, for career departments.[31] A volunteer department that meets NFPA standards may nevertheless have much slower response times than a professional department.[32] Longer response times allow fires to grow larger, making them more difficult to extinguish and increasing the risk to people and property.

Unfortunately, fire departments in rural areas are less likely to be well funded, and many do not have the financial means to support full-time staff. In Tennessee, rural fire departments receive less public funding than suburban or urban departments and are more likely to rely on volunteers. In 2011, there were 181 Tennessee fire departments that relied on donations for 50% or more of their revenue. Most were located in unincorporated areas, and all but two were staffed entirely by volunteers.[33]

Access to Adequate Water Supplies

Water Storage Tank

Regardless of how a fire department is staffed or how well it's funded, it must have ample sources of water. In densely populated areas, public water systems can provide sufficient water to fight fires; however, they may not be able to provide sufficient flow for fighting fires in sparsely populated areas where distribution lines must be small in order to ensure a healthy, potable water supply. Water utilities generally do not serve the most rural areas because covering the expense—including the initial cost of construction as well as the operational cost of flushing the lines—would require unaffordable water rates.[34]

[29]Folz et al. 2011, 34.
[30]Flynn 2009, 25-26.
[31]Data received in an email from Dennis Mulder, TFIRS Coordinator, Tennessee Department of Commerce and Insurance, September 23, 2014.
[32]Bialik 2012.
[33]Abdelrazek et al. 2013, 8-9.
[34]Telephone interview with Bill Dunnill, General Manager, Consolidated Utility District, Rutherford County, October 17, 2014.

In areas without on-site water sources, fire departments rely on tanker trucks to transport water to fires. This creates logistical challenges, especially with large fires. To provide enough water to extinguish these fires, departments have to shuttle multiple trucks back and forth to off-site water sources, which are often miles away. In a typical incident, two volunteer fire departments battled for six hours to extinguish a house fire in a rural part of Rutherford County on May 10, 2014. The nearest fire hydrant was three miles away, and firefighters had to shuttle water to the site. The home was completely destroyed.[35]

On-site storage tanks and reservoirs mitigate the challenges of transporting water in areas without a public water system by ensuring that firefighters have access to an adequate supply of water. These tanks and reservoirs can be large or small, depending on a building's size and fire suppression needs. Tanks, in particular, can also be elevated, on-ground, or underground depending on the site.[36] Although they are expensive to install—even small tanks can cost more than $15,000[37]—the use of tanks and reservoirs to supply water for fire suppression is common in rural areas in several other states, including Arkansas and Georgia.[38] In areas without access to public water, tanks and reservoirs can also support sprinkler systems.

Automatic Sprinkler Systems

Automatic sprinkler systems are the best first line of defense against fires, immediately reducing the danger fires pose to the health, safety, and welfare of community members and firefighters and reducing the damage to property caused by fires and the water used to put them out. Sprinklers address the two major challenges of fighting fires in rural areas—longer firefighter response times and limited access to water. They are activated by heat, operate before firefighters arrive, and can use water stored in on-site tanks and reservoirs.

According to the NFPA, automatic sprinklers are effective at suppressing fires in 96% of incidents in which they are activated, and they are activated in 91% of fires.[39] In the relatively few fires when sprinklers do not activate, it is most often because someone turns off their water supply before the

Automatic sprinkler systems are the best first line of defense against fires, immediately reducing the danger fires pose to the health, safety, and welfare of community members and firefighters and reducing the damage to property caused by fires and the water used to put them out.

[35]Iaccheri 2014.
[36]National Fire Protection Association 2006, section 22, page 5.
[37]Telephone interviews with Richard Smith, Division Manager, Superior Fire Protection, October 6, 2014; Tracy Maktenieks, Area Manager, Delta Fire Systems, October 15, 2014; and Jeff Hewitt, Corporate Engineer, American Fire Protection, October 14, 2014.
[38]Telephone interviews with representatives of fire marshal offices in Arizona, Arkansas, Colorado, Georgia, Idaho, Kansas, Nevada, New Mexico, North Dakota, and Utah, September 2014.
[39]Hall, Jr. 2013, 7.

Source: Hall, Jr., John R. 2013. *U.S. Experience with Sprinklers.* Quincy, MA: National Fire Protection Association (page vi).

fire starts or overrides the system during the fire.[40] The following figure shows the reasons sprinklers fail to operate.

Based on NFPA investigations, fires grow more quickly when there is no sprinkler system.[41] In places of worship that have sprinklers, 83% of all fires are confined to their room of origin compared with only 54% of fires in those without.[42] From 2007 through 2011 nationwide, no deaths occurred in fires at places of worship with sprinklers,[43] but fires in places of worship without sprinklers killed an average of two and injured an average of 19 people each year.[44] In Tennessee from 2009 through 2013, although there were no deaths in fires in places of worship, three firefighters were injured in places of worship without sprinklers.[45]

Sprinkler systems also reduce property damage. From 2007 through 2011 nationwide, the average loss per fire in places of worship without sprinklers was $67,000 while the loss with sprinklers was $18,000.[46] In Tennessee from 2009 through 2013, the average reported property loss per fire in places of worship that did not have sprinklers was nearly eight times greater than in places of worship with sprinklers—$181,664 per fire without sprinklers compared to only $23,657 per fire with sprinklers.[47]

Sprinkler systems are designed to prevent unnecessary water damage. During fires, only the sprinklers closest to the fire will activate and operate.[48] In areas where freezing temperatures are expected, sprinkler systems are designed so that water flows through the pipes only in the event of a fire, reducing the potential for damage from frozen or broken pipes.[49]

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[40]Ibid., vi.
[41]Cote 2003, section 10, page 188.
[42]Hall, Jr. 2013, 26.
[43]Ibid., 35.
[44]Campbell 2013, iv.
[45]Data received in an email from Peyton Bullen, Program and Policy Director, Tennessee Department of Commerce and Insurance, May 27, 2014.
[46]Campbell 2013, i.
[47]Based on data received in an email from Peyton Bullen, Program and Policy Director, Tennessee Department of Commerce and Insurance, May 27, 2014.
[48]Hall, Jr. 2013, 39 and Hickey 2008, 125-126.
[49]Hickey 2008, 103.

The cost of installing sprinkler systems varies from around $1 to $2 per square foot in residential buildings[50] and $2 to $4 per square foot in non-residential buildings,[51] not including the cost of installing a water supply system if one is required. The estimated cost of a sprinkler and water system, including a tank, pump, water lines, and other components, for a building similar to the Dyson Grove Baptist Church varies greatly depending on the building and site, ranging from approximately $100,000 to more than $200,000.[52] The tank and pump are usually the largest portion of the total cost, while the sprinkler system might be only 10% to 40%. Some of the cost can be offset by reducing the need for fire-rated walls and other structural features that are not required when sprinklers are installed.[53] A reduction in insurance premiums, while possible, may not be substantial for large, infrequently used buildings.

Tennessee Requirements for Fire Sprinklers in Places of Worship

At least since the 1980s, Tennessee's building codes have required sprinkler systems in buildings that accommodate large groups of people, including places of worship, community halls, gymnasiums, and libraries.[54] Tennessee law gives the state fire marshal authority to adopt and enforce rules establishing minimum statewide safety standards for fire prevention, fire protection, and building construction.[55] The law requires the standards to provide a "reasonable degree of safety to life and property from fire and hazards incident to the design, construction, alteration and repair of buildings or structures."[56]

Tennessee's current building code is the 2006 International Building Code developed by the International Code Council.[57] It requires sprinkler systems in buildings with rooms designed to accommodate large groups of people, including places of worship, if the auditorium

[50]Newport Partners 2013, 2.
[51]Telephone interviews with Richard Smith, Division Manager, Superior Fire Protection, July 21, 2014; Mark Wheeler, Vice President, Arkansas Automatic Sprinklers, October 14, 2014; and Tracy Maktenieks, Area Manager, Delta Fire Systems, October 15, 2014.
[52]This estimate is based on information received in emails from Richard Smith, Division Manager, Superior Fire Protection; Ken Brinkley, Vice President Sales/Principal, Music City Fire Sprinkler; Rich Haffke, Project Manager, Overhead Fire Protection; and Mark Hall, Owner, Reliable Fire Protection, October 2014.
[53]Endthoff 1998 and Licht 2000.
[54]Telephone interview with Gary West, Assistant Commissioner, Tennessee Department of Commerce and Insurance, July 17, 2014.
[55]Tennessee Code Annotated, Section 68-120-101.
[56]Fire Prevention Division, Tennessee Department of Commerce and Insurance.
[57]Rules of Tennessee Department of Commerce and Insurance Division of Fire Prevention, Chapter 0780-02-02.

1. exceeds 12,000 square feet,
2. has an occupant load[58] of 300 or more, or
3. is located on a floor other than the level of building exit.[59]

Places of worship need to install sprinkler systems only if they meet one or more of these three conditions, whether they are in incorporated or unincorporated areas. The state fire marshal's office requires architects of places of assembly that accommodate 300 or more people, including places of worship, to gain its approval for building plans before beginning construction.

Places of worship in Tennessee need to install sprinkler systems only if they meet certain conditions in the state building code.

Proposed Legislation

Dyson Grove Baptist Church in Johnson County is an example of a place of worship in a sparsely populated, rural area without access to a public water supply and, because of its size and design, is required by the state building code to install a sprinkler system. The church congregation completed and moved into the building in 2013. The building does not have a sprinkler system, and the architect who designed it did not submit plans to the state fire marshal's office as required by law.[60] A state electrical inspector, recognizing that the plans were not approved, reported the violation to the state fire marshal, who contacted the architect and asked for a copy of the plans. Upon inspection of the plans, the fire marshal's office determined that the capacity of the auditorium was large enough to require a sprinkler system.

According to the state fire marshal's office, the church's sanctuary can accommodate 369 people, making it large enough to exceed the occupant load threshold in the state building code and, therefore, require a sprinkler system. The state fire marshal is allowing the Dyson Grove congregation to continue using the church temporarily while the architect and church members develop a plan to meet the requirements of the building code. Although they could have modified the design of the building so that the sanctuary would accommodate less than 300 people, they submitted

[58]Occupant load refers to the number of people who can safely occupy and exit a building. For definitions see International Code Council, International Building Code, 2006, section 1002.1. http://publicecodes.cyberregs.com/icod/ibc/2006f2/icod_ibc_2006f2_10_par004.htm?bu=IC-P-2006-000001&bu2=IC-P-2006-000019.

[59]International Code Council, International Building Code, 2006, section 903.2.1.3, Group A-3. http://publicecodes.cyberregs.com/icod/ibc/2006f2/icod_ibc_2006f2_9_sec003.htm?bu=IC-P-2006-000001&bu2=IC-P-2006-000019. See Section 303 for the definition of Assembly Group A-3.

[60]The Codes Enforcement Section of the Fire Prevention Division forwarded the architect's signed letter of competency to the Board of Architectural and Engineering Examiners, who reviewed the architect's qualifications and the project and imposed a civil penalty against the architect for practicing outside his area of competence. Rather than pay a fine, the architect chose to sign a consent order to voluntarily revoke his license to practice in Tennessee.

revised plans that include a sprinkler system with an underground storage tank and fire pump. The fire marshal's office reviewed and approved the revised plans.

Although they submitted new plans, the members of Dyson Grove also asked their legislators to change the law, believing that their building should be exempted from the sprinkler requirement. They argue that neither the well the church uses for its other water needs nor the stream that runs adjacent to the property is sufficient to support a sprinkler system and that connecting to the local water utility or installing a water tank and pump would be impractical and burdensome.


Dyson Grove Baptist Church

In response to Dyson Grove's concerns, Representative Timothy Hill introduced House Bill 1649 (Senate Bill 1749 by Niceley),[61] which was sent to the Commission by the House Local Government Subcommittee. If passed, the bill would amend current law to exempt from state laws and regulations requiring places of assembly to have fire protection sprinkler systems

- single-story places of worship
- located in unincorporated areas
- as long as they
  - » have a capacity of no more than 400 persons;
  - » do not have a water supply located on the property;
  - » have a minimum of two exits, plus one additional exit for every 2,500 square feet or portion thereof over 4,500 square feet;
  - » have a fire alarm system;
  - » have fixed seating for at least 250 persons; and
  - » have been built on or after July 1, 2012.

Engineers, architects, and fire officials interviewed by commission staff opposed the bill, citing the threat that it posed to the health, safety, and welfare of community members and firefighters. The Tennessee Fire Chiefs Association opposed the bill in its entirety because the codes provide the minimum standard of safety.[62] The Tennessee Society of Professional Engineers and the American Council of Engineering Companies of Tennessee both opposed the bill, saying that their main priority is the health, safety, and welfare of the public. They said people

[61]See appendix.
[62]Telephone interview with Roger Robinson, President, Tennessee Fire Chiefs Association, June 9, 2014.

visiting churches for special events would not necessarily know how to exit the building in a fire, increasing the risk for community members and firefighters.[63] The American Institute of Architects Tennessee noted that churches accommodate large numbers of people, making them particularly dangerous in the event of a fire in remote rural areas; sprinklers increase the safety of people using these buildings as well as firefighters.[64]

Exceptions for Places of Worship in Other States

As shown in the following table, only eight states have modified the model building codes' automatic fire sprinkler requirements for places of worship. Two make the requirement more stringent than the standard in the model code. Delaware lowered the square footage threshold for installing sprinklers from 12,000 to 10,000 square feet if a water system is available and stipulated that individual rooms may not exceed 10,000 square feet in buildings where no private or public water distribution system is available. Similarly, Massachusetts lowered the square footage threshold from 12,000 to 5,000 square feet. In these two states, sprinklers are required in smaller auditoriums than in Tennessee.

States with Exceptions to Fire Sprinkler Requirements for Places of Worship

State	Model Codes Adopted	Exception
More Stringent than Model Code		
Delaware	2012 NFPA 1 and 101	Reduced square footage threshold from 12,000 to 10,000 square feet.
Massachusetts	2009 IBC*	Reduced square footage threshold from 12,000 to 5,000 square feet.
Less Stringent than Model Code		
Florida	2009 IBC and 2009 NFPA 101	Increased occupant load threshold from zero to 100.
Indiana	2006 IBC	Reduced square footage threshold from 12,000 to 7,000 square feet and removed occupant load threshold.
Kentucky	2012 IBC	Removed occupant load threshold and level of exit discharge requirement.
North Carolina	2009 IBC	Removed occupant load threshold.
Ohio	2009 IBC	Removed square footage and occupant load threshold.
Virginia	2012 IBC	Removed occupant load threshold.

*International Building Code

Source: Information gathered from state fire marshal's offices and building codes departments in each state.

Six states—Florida, Indiana, Kentucky, North Carolina, Ohio, and Virginia—have adopted various exceptions for places of worship that make the sprinkler requirement less stringent. Each of these states has chosen either to remove or increase the occupant load threshold. Ohio also removed the square footage threshold, and Kentucky made an exception for places of worship in which the auditorium is located on a floor other than the level of exit from the building. Representatives from the building code department or state fire marshal's office in five of these six states cited the interests of rural places of worship without access to water as the reason for creating an exception to the sprinkler requirements. Florida alone specifically acted to exempt fellowship halls that lack fixed seating and is currently reviewing whether or not to remove its exception, returning to the original code.

Gaps in national fire incident data limit the ability to determine the effects of the exceptions in each state. Because fire departments report data voluntarily and participation rates vary, data quality and quantity are not necessarily consistent, making it difficult to compare fires before and after changes were made to the codes in different states.

[63]Telephone interview with Candy Toler, Executive Director, Tennessee Society of Professional Engineers and American Council of Engineering Companies of Tennessee, May 6, 2014.

[64]Telephone interview with Trey Wheeler, Vice President and Head of Government Relations Committee, American Institute of Architects Tennessee, May 14, 2014.

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Appendix

SENATE BILL 1749
By Niceley

HOUSE BILL 1649

By Hill T

AN ACT to amend Tennessee Code Annotated, Title 56, Chapter 19; Title 62, Chapter 32; Title 68, Chapter 102 and Title 68, Chapter 120, relative to fire sprinklers in places of worship.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF TENNESSEE:

SECTION 1. Tennessee Code Annotated, Title 68, Chapter 102, Part 1, is amended by adding the following language as a new section:

68-102-154.

(a) For purposes of this section, unless the context otherwise requires:

(1) "Building code" means any nationally recognized code that has been adopted by reference by the state or local government, or any code that has been implemented by ordinance or resolution by a local government;

(2) "Place of worship" means any building that is:

(A) Approved, or meeting criteria for approval, by the state board of equalization for property tax exemption pursuant to § 67-5-212, based on ownership and use of the building by a religious institution; and

(B) Utilized on a regular basis by the religious institution as the site of congregational services, rites, or activities communally undertaken for the purpose of worship; and

(2) "Water supply" means water supplied by a public or private utility water main, gravity tank, pressure tank, reservoir, or well.

(b) Notwithstanding any law, rule, building code, or fire safety standard to the contrary, a fire protection sprinkler system shall not be required in a single-story building located in an unincorporated area that meets all of the following requirements:

(1) Is a place of worship;

(2) Has a capacity of no more than four hundred (400) persons;

(3) Does not have a water supply located on the property;

(4) Has a minimum of two (2) exits, plus one (1) additional exit for every two thousand five hundred square feet (2,500 sq. ft.) or portion thereof over four thousand five hundred square feet (4,500 sq. ft.);

(5) Has a fire alarm system; and

(6) Has fixed seating for at least two hundred fifty (250) persons.

(c) It is the intent of the general assembly that this section shall apply retroactively to any place of worship built on or after July 1, 2012.

SECTION 2. This act shall take effect upon becoming a law, the public welfare requiring it.