

**CITY OF NAPERVILLE
MEMORANDUM**

DATE: May 11, 2018

TO: Building Review Board

FROM: Scott Scheller, Fire Marshal

THROUGH: Mark J. Puknaitis, Fire Chief

SUBJECT: 2018 International Residential Code Update

ACTION REQUESTED:

Provide discussion and feedback on significant changes related to residential fire suppression systems identified through the 2018 International Residential Code update.

BACKGROUND:

Building codes establish a minimum standard for construction to ensure the health, safety and welfare of the general public. On April 18th, 2018, City staff presented an overview of the significant changes from the 2012 to the 2018 International Building Code to the Building Review Board (BRB). Of the significant changes, one was identified, the residential sprinkler requirement, as needing additional information for discussion to fully evaluate the information related to this code provision.

Following the review of the information presented and subsequent discussion, feedback from the BRB will be presented to City Council for their review and comments prior to soliciting formal comments from the building community and public this summer. Staff recommendations will be brought back to the BRB and City Council in the fall 2018 for adoption.

DISCUSSION:

The City currently follows the 2012 International Residential Code (IRC). The section relevant to automatic fire sprinkler systems in the 2012 edition has been amended to exclude fire sprinklers in new construction if, the underside of all interior stairs are protected with at least .5 inches of gypsum board or equal and each one and two family dwelling has at least two means of egress.

The provision for sprinklers in residential structures was actually added in the 2009 IRC. During the six-year City of Naperville code update cycle from the 2006 to the 2012 edition, residential sprinklers were discussed but City Council decision at that time was not to require sprinklers, citing a number of reasons including cost, installation methods, sprinkler system maintenance and insufficient data on the success of residential sprinklers. During the last code cycle update, there were over 70 jurisdictions that had some form of residential sprinkler requirements in place. As of today, there are over 100 communities in Illinois that have adopted residential

sprinklers. Improvements, better data and review of the 2018 IRC prompted the reevaluation of this subject.

Purpose of the Building Code

Sprinklers in residential structures are a life safety measure and are intended to improve the likelihood of the occupants escaping or being evacuated during a fire from injuries or death. When installed according to referenced standards, the automatic sprinkler system aids in the detection and control of fires in residential occupancies and is expected to prevent total fire involvement (flashover) in the room of origin, if it is sprinklered. Stopping a fire before flashover dramatically reduces the threat to occupants in other parts of the dwelling. Victims in or near the room of origin are affected well before the room actually flashes over because this is when the temperature, smoke and carbon monoxide make the room untenable to life. A residential sprinkler stops the fire before it makes the room untenable to life, so it dramatically increases the chances of survival in the room of origin as well. NFPA statistics show that in 2016 roughly 74% of all structure fires occurred in residential properties. In that same year, Naperville saw 79 % of all structure fires occurring in residential structures.

According to the U.S. Fire Administration, when fire sprinklers are installed in a residence, the chances of dying in a fire are reduced by 69%, when compared to a residence without sprinklers. When both smoke alarms and sprinklers are present in a home, the risk of dying in a fire is reduced by 82%, when compared to a home without either.

Sprinklers do more than save lives; they also protect property from destruction by fire. In many situations, that means a family that survived a fire will also have a place to live and enough resources to continue living their lives as they did before.

Consideration of Other Factors

A number of other factors were also considered as part of the discussion, including average construction costs, constructability, types of structure fires (residential/commercial), and the benefits that sprinklers offer for the protection of the inhabitants. Based on an updated study by the NFPA, *Home Fire Sprinkler Cost Assessment – 2013*, the average cost nationwide saw a reduction in cost from 1.61 per sprinklered square foot to \$1.35 per square foot. In general, the design and installation of residential fire suppression systems in recent years has been streamlined and improved, which helps lower the overall cost of installation. While each home design is unique, costs may vary. General costs were obtained and are outlined in Attachment 1.

There are a number of items which has led to decreased installation costs such as local competition, cheaper materials, and efficient design methods. In addition, most new home construction in Naperville would not need to have the domestic water line increased because most systems can meet design requirements with the current minimum one-inch service. And since city water is available, systems will not require storage tanks and fire pumps to be installed.

For builders and homeowners who have not had experience with residential systems, this topic can raise a number of questions and concerns, some of which staff has provided answers to in Attachment 2.

Other Building Code Options

While the 2018 IRC as drafted requires sprinklers in all dwelling units, the requirement of sprinklers in commercial structures (IBC) is based on building use and typically a minimum building size, or square footage threshold prior to requiring sprinklers. For example, restaurants in Naperville that are in excess of 2,500 square feet would require installation of an automatic sprinkler system. As such, Naperville could suggest a local amendment to the IRC requiring sprinkler installation in residential structures of a certain size. In reviewing typical threshold requirements for commercial structures and average residential home sizes in Naperville, staff believes that if a minimum threshold is used, homes 5,000 square feet or larger should be used as that minimum before sprinklers would be required by code. Staff would be looking for feedback on how a minimum threshold would be defined (i.e. gross square footage, including basements or exclusion of garage space). Using a 5,000 square foot threshold, approximately 66% of the single family detached homes constructed in the past 15 years in Naperville would have impacted.

RECOMMENDATION:

It is staff's recommendation to remove the City amendments to the 2012 IRC section R313.2 for residential sprinklers and adopt as written in the 2018 IRC.

ATTACHMENT 1

Fire Suppression System Costs and Constructability

1. Fire Suppression System Costs - Each home design is unique and costs may vary. Information from a local fire suppression contractor indicate that construction costs to install sprinklers in a residential home would be approximately 1-2% of the total construction cost of the home.

These prices are average prices using some optional materials by a licensed sprinkler contractor. Plastic piping, regular sprinkler heads, and using the minimum NFPA 13D requirements would reduce total building costs.

2. Construction method of copper/PVC – One option which could result in lower installation costs is to use a combination of copper piping and PVC pipe. The copper pipe would be used for the domestic plumbing (drinking water) and PVC piping can be used for the fire suppression system. This would involve installing a tee on the water service after the water meter. One branch of the water would be the domestic branch which would supply water to all the domestic water features. The other branch would have a double check valve installed on it. This would be the water supply for the fire system. The piping downstream of the double check valve (backflow preventer) supplying the fire sprinklers could be PVC (plastic) as this water would be considered non-potable. This configuration would still allow for a standard 1 inch or 1-1/2 inch service to the building without the need to upgrade the line to a larger size.
3. Water fixture count/domestic service size – Sprinklers do not add to the plumbing fixture count and will not result in any Infrastructure Availability Charge (IAC) fee increases.
4. Residential systems vs. commercial systems – The design and construction of residential sprinkler systems are not as complex as those used in commercial buildings, which results in less expensive maintenance. Typical maintenance for a residential system would require the homeowner to walk around the home and make sure the sprinklers are not obstructed by something that would block the water coming out and make sure the main control valve does not get shut off. An annual test would be required for the backflow preventer just as any yard sprinkler system would however, this cost could be offset by the homeowners insurance discount of 5 – 10 percent offered by most insurance companies.

ATTACHMENT 2

Common Questions and Concerns Related to Residential Fire Suppression Systems

1. *If I burn something in the oven and my smoke detector goes off, will my sprinklers be activated?*

No, each individual sprinkler is designed and calibrated to activate when it senses a significant heat change. They do not operate in response to smoke, burned toast, cooking vapors, steam or an activated smoke alarm. The sprinkler system will only be activated when temperatures reach 155 degrees at that sprinkler. Roughly 90% of the time, fires are contained by the operation of just one sprinkler head.

2. *I don't want to repair water damage in my entire home if there is only a small fire that can be put out quickly.*

Sprinklers are intended to put out the fire before it spreads, and sprinkler heads will only be activated in the area where they are needed. Any resulting water damage will be much less severe than the water damage caused by water from firefighting hose lines. Most sprinkler heads flow between 9 and 18 gallons per minute vs. a hose line at 250 gallons per minute.

3. *I'm worried about the sprinkler pipes freezing and causing unnecessary water damage.*

Sprinkler pipes are no more susceptible to freezing and bursting than your domestic water pipes. In all cases, it is important to keep your home heated above freezing during the winter when you are away.

4. *I think that the sprinkler heads are unattractive and make my home look institutional.*

Just as all construction materials have evolved to provide attractive architectural options (ex. lighting, door hardware), so has sprinkler systems. There are many options available from recessed heads, to various color options.

5. *We do not need sprinkler mandates; home fire sprinklers should be a matter of choice.*

Every major model safety code now requires home fire sprinklers in new construction. In 2006 three major NFPA codes were revised to include residential sprinklers in new construction and in 2008 the International Code Council voted to add a similar provision to the 2009 edition of the International Residential Code. These changes occurred through a process taking into account both private and public concerns and not influenced by any single special interest group. National model codes represent minimum standards of safety to protect people in their homes. U.S. consumers expect that the products they buy, including their homes, come equipped with the minimum standards of safety. Minimum standards of safety are always included in the fixed cost of a product.

6. *New homes are safer because of things like sheetrock and new electrical systems.*

Approximately 4 out of 5 home fires are caused by human action like misuse of matches, cooking, candles and smoking materials. Building appliances also cause many fires. Few fires start in structural components and most often than not, the contents are the problem, not the structure. Synthetic materials for furniture, carpeting, and bedding have caused the time to flashover to drop from an average of 17 minutes in the 70's and early 80's to around three minutes today.