

# **Fire Sprinkler Retrofit ... A Step-By-Step Approach For Communities**







**NATIONAL  
FIRE  
SPRINKLER  
ASSOCIATION, INC.**

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To The User:

“Fire Sprinkler Retrofit...A Step by Step Approach for Communities,” is designed to provide a guide for fire departments that desire to undertake the implementation of aggressive fire sprinkler retrofit initiatives at the state and local level. Like the one and two-family guide, “Residential Fire Sprinklers...A Step by Step Approach for Communities,” published by NFSA in 2003, it is intended to guide the local fire official through the often-cumbersome political process in a logical, step-by-step manner that will maximize the chances of success.

It is a sad commentary on public policy toward fire protection in America that we still have a vast inventory of existing older high rise buildings, nursing homes, student housing and nightclub and entertainment venues that remain unprotected with fire sprinklers. Every day somewhere in America we read about multiple life loss and/or high property loss fires that could have been averted had fire sprinklers been present.

Fire officials know the solution. This guide can help you put that solution to work. Be assured that NFSA is committed to working with you in achieving this common goal.

Sincerely,

John Viniello, President  
National Fire Sprinkler Association



# FIRE SPRINKLER RETROFIT ... A STEP-BY-STEP APPROACH FOR COMMUNITIES



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## ACKNOWLEDGEMENTS

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As with our residential guide, the lion’s share of the credit for the original draft of the manuscript must go to Mr. Steve Hart of the National Automatic Sprinkler Industry Group. As a past local Fire Marshal and Deputy State Fire Marshal in California, Steve’s knowledge and experience in local and state fire protection issues and initiatives made him the perfect choice to produce an initial draft for the team to work from and eventually produce this user friendly guide.

Finally, I wish to extend my personal thanks and that of NFSA to Kevin Kelly and Nicole Sprague of the NFSA Engineering Division for their tireless efforts in working with me to take the initial manuscript from draft to reality.

Jim Dalton, *Director of Public Fire Protection*  
**National Fire Sprinkler Association**

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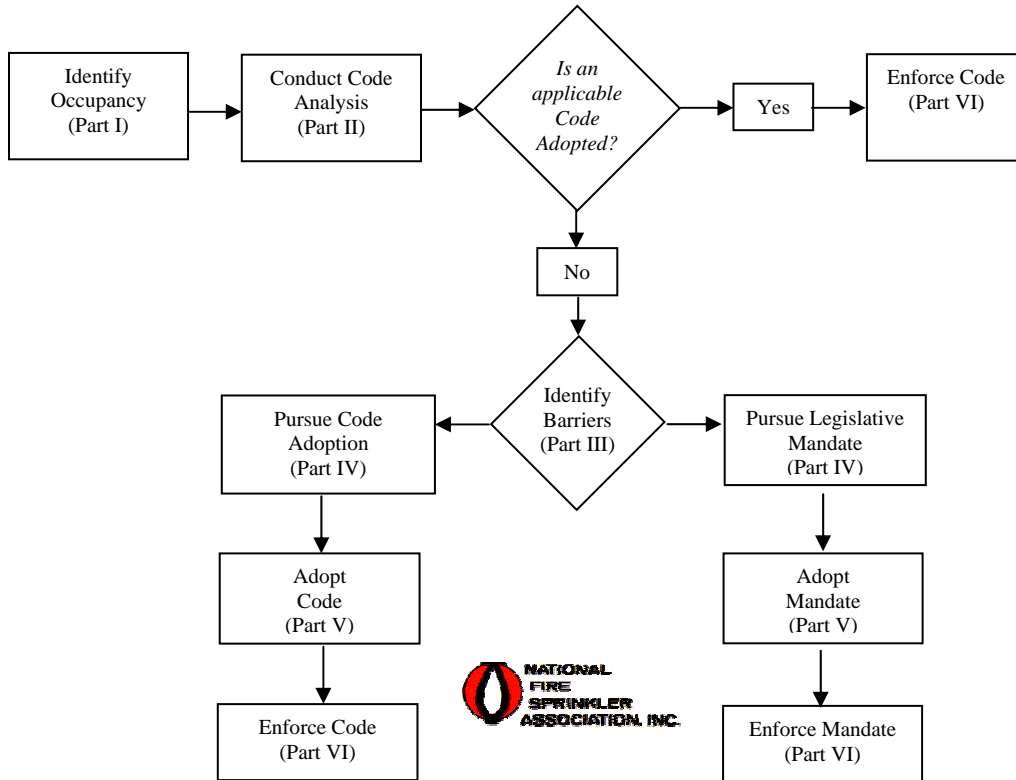
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## Introduction

This NFSA Guide will walk you through a Fire Sprinkler Retrofit Decision Flow Chart which will help establish if current State, Local laws, and/or Ordinances have been adopted which include sprinkler retrofit provisions. Additionally, the Decision Flow Chart (described in detail in Part I) is supported by a Code Matrix (described in detail in Part II), which has been developed to identify the various Codes (Building and/or Fire, New and Existing, NFPA and/or ICC) and the respective Code Sections that currently address retrofit of the various Occupancy Classifications.

### **Fire Sprinkler Retrofit Decision Flow Chart**



The body of this Guide is divided into six (6) Parts which follow the Flow Chart to assist you in research, planning, adoption and implementation of a set of Retrofit Fire Sprinkler Requirements.

- Part I – Identifying the Occupancy(s) to be Retrofitted with Automatic Fire Sprinkler Systems
- Part II – Conducting a Code Analysis
- Part III – Identifying Barriers
- Part IV – Preparing the Necessary Documents
- Part V – The Adoption Process
- Part VI – Implementation and Customer Service

In addition, the Appendices Sections of this Guide has a wealth of supportive information, including a list of additional resources that will be helpful to you not only in the research, planning and adoption phases, but also in the implementation and maintenance of these retrofit requirements.

## Historical Overview

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In March of 1968 the United States Congress passed Public Law 90-259 – The Fire Research and Safety Act of 1968 that, among other elements, authorized directly or through contracts and grants, “*research into the causes and nature of fires, and the development of improved methods and techniques for fire prevention, fire control, and reduction of death, personal injury, and property damage*”. (Title-1 of Public Law 90-259)

In addition, the National Commission on Fire Prevention and Control was created and directed “*to undertake a comprehensive study and investigation to determine practicable and effective measures for reducing the destructive effects of fire throughout the country*”. (Title-II of Public Law 90-259)

On May 4, 1973 the National Commission on Fire Prevention and Control issued its comprehensive report “**AMERICA BURNING**” which outlined the nation’s fire problem, fire and the building environment, the fire service and fire prevention efforts, and programs for the future. This report identified that almost seven (7) of every ten (10) fires occurred in residential occupancies (based on 1971 NFPA data). Additionally, it was noted that eighty-seven percent (87%) of the fire deaths in building fires occurred in residential occupancies. (American Burning – page 54)

In addition, the Commission recommended “*the proposed U.S. Fire Administration support the development of the necessary technology for improved automatic extinguishing systems that would find ready acceptance by Americans in all kinds of dwelling units*”. (America Burning – page 120)

Since the issuance of America Burning, local communities throughout the country began to utilize and mandate the installation of automatic fire sprinklers in all types of occupancies. These local initiatives were isolated in communities throughout the nation, in cities like San Clemente, CA, Cobb County, GA, Altamonte Springs, FL, Anaheim, CA, Scottsdale, AZ, Prince George’s County, MD, Napa, CA and many more, while communities focused on “newly constructed Single-Family Dwellings” still others focused there local or state mandates on existing Critical Occupancies; such as but not limited to:

- High-rise Buildings
- Nursing Homes
- Night Clubs
- Student Housing
- Historically Significant Buildings
- Downtown (core) Business Districts

In the summer of 1999 the Director of the Federal Emergency Management Agency (FEMA) formally recommissioned a Blue Ribbon Panel of experts to assess the progress on the issues raised in the report America Burning created more than twenty-six (26) years ago. This “panel of experts” developed an updated report “**AMERICA BURNING RECOMMISSIONED – AMERICA AT RISK**” which formulated its conclusions in the form of “Findings and Recommendations”. On May 3<sup>rd</sup> of 2000 the report was issued, with a publication date of October 2000.

Finding No. 1 – “Implementation of Loss Prevention Strategies”

Finding No. 2 – “The Application and Use of Sprinkler Technology”

*The most effective fire loss prevention and reduction measure with respect to both life and property is the installation and maintenance of fire sprinklers. If the focus is limited to prevention and reduction of the loss of life, smoke alarms are also extremely effective. However, the use of sprinklers and smoke detectors has not been sufficiently comprehensive.*

**Recommendations:**

*FEMA/USFA should develop a long-term implementation strategy for fire sprinklers and smoke alarms. The plan should include the following implementation aspects:*

- *The approach should be community based;*
- *No tactic or strategy should detract from the requirement for sprinklers. Smoke alarms (or other measures) should always be the locality’s second option as a loss reduction measure;*
- *Exploration of the technical, economic and practical aspects of utilizing alarm and sprinkler systems that provides automatic notification to a firehouse. These systems should be professionally maintained and monitored;*
- *Confirmation of the accuracy of the belief that the appropriateness of the emplacement of sprinklers and alarms may be based on rural and urban distinctions, and whether other distinctions such as residential construction, commercial construction and critical facilities may also be appropriate;*
- *The plan should distinguish between requirements for new construction and existing construction.*

**Statistics and Facts on Fires in the United States**

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An overview of the 2004 United States Fire Experience, as published by the National Fire Protection Association (NFPA), the data revealed that every 20-seconds, a fire department responds to a fire somewhere in the nation. A fire occurs in a structure at the rate of one every 60-seconds, and in particular a residential fire occurs every 77-seconds. Here are the numbers they used:

- **1,550,500 fires were attended by public fire departments**
- **526,000 fires occurred in structures**
- **410,500 fires or 78% of all structure fires occurred in residential properties**
- **297,000 fires occurred in vehicles**
- **727,500 fires occurred in outside properties**

The toll in terms of civilian fire deaths and civilian fire injuries for 2004 was once again a tragic story, with the following statistics:

- **3,900 civilian fire deaths occurred in 2004.**
- **About 82% of all fire deaths occurred in the home.**
- **3,190 civilian fire deaths occurred in the home.**

- **Nationwide, there was a civilian fire death every 135 minutes (approximately once every 2-1/4 hours).**
- **17,785 civilian fire injuries occurred in 2004.**
- **14,175 of all fire injuries occurred in residential properties.**
- **Nationwide, there was a civilian fire injury every 30 minutes (every ½ hour).**

The toll in terms of property damage loss was also devastating, with the following dollar figures and fire facts as follows:

- **An estimated \$9.8-Billion in property damage occurred as a result of fire in 2004.**
- **An estimated \$8.3-Billion of property damage occurred in structural fires.**
- **An estimated \$5.9-Billion of property loss occurred in residential properties.**
- **An estimated 36,500 intentionally set structural fires occurred in 2004.**
- **Intentionally set fires in structures resulted in 320 civilian fire deaths.**
- **Intentionally set structural fires resulted in \$714-Million in property loss.**
- **36,000 intentionally set vehicle fires occurred in 2004.**

*(**Note:** These statistics are compiled annually by the National Fire Protection Association and are published (typically) in a fall Issue of the NFPA monthly magazine – NFPA Journal)*

*(**Note:** The above fire statistics were taken from the September 2005 Fire Loss in the United States During 2004 Report issued by the Fire Analysis and Research Division of the National Fire Protection Association.)*

**Multiple Sprinkler Performance Studies have Indicated a High Success Rate:**

There have been several studies conducted to establish the effectiveness of automatic fire sprinklers over a sustained period of time. While the percentages vary from study to study, the results reflect a success rate of between 86.1% and 99.4% when looking at the nearly 100,000 combined fires (Actual: 93,739) in just three such studies.

- |   |       |
|---|-------|
| • Australia and New Zealand (1886-1988; 9,022 fires)        | 99.4% |
| • National Fire Protection Assoc. (1925-1969; 81,425 fires) | 96.2% |
| • Factory Mutual Research (1970-1977; 3,292 fires)          | 86.1% |

## Part I

### Identifying the Occupancy(s) to be Retrofitted With Automatic Fire Sprinkler Systems

#### Scope of Proposal (state, county, city, district, specific area, or by occupancy)

Establishing the scope of the proposed retrofit fire sprinkler requirements is one of the first decisions which must be understood and defined. If the proposal is to be considered statewide, then state legislation must be used; however, if the retrofit fire sprinkler requirements are to be adopted and enforced at the local level (county, city, or portion thereof), then the ordinance/requirement and impact will be limited to the local jurisdiction.

If *“built-in”* fire protection is the *“CORNERSTONE”* of the Master Plan.

\_\_\_\_\_ How does this ordinance fit with the **MISSION STATEMENT, VALUE**

#### **Built-In Fire Protection as a “CORNERSTONE” of the Master Plan**

In recent years there has been a growing movement towards the concept of a public/private partnership in providing a higher level of services to the community. The use of automatic fire sprinklers has been recognized for years to enhance the ability of the fire agencies in the reduction of fire loss, fire related injuries and property losses. Many communities and fire agencies work under a General Plan and/or Master Plan and as such the aspects of fire protection are typically outlined. Based on Climatic, Geographic, and Topographic considerations (*as in the case of California*) the need for built-in fire protection may be an effective way to address these concerns. Consider these additional elements as you proceed with the development and presentation of your retrofit fire sprinkler ordinance package:

\_\_\_\_\_ The automatic fire sprinkler ordinance may allow the Fire Department to perform their other functions better (Medical Aid, Transport, Training, Rescue, Hazardous Materials, Fire Prevention Inspections, Equipment Maintenance, etc.)

- Response time enhancement
- Better and safer utilization of staffing and equipment
- Reduces the out-of-service time while on-scene at a fire call
- Reduced workman’s compensation expenses
- Station locations studies, based on medical emergencies

\_\_\_\_\_ Automatic Fire Sprinkler Ordinances are long range planning elements and will be beneficial for years and decades to come.

- If the fire problem for the community/jurisdiction has been researched and found to be in specific occupancies, then you will be solving the fire problem(s) of the future for your community today.

\_\_\_\_\_ Automatic Fire Sprinkler Ordinances can be used to enhance water conservation programs and/or policies.

- Credit for smaller water mains, based on historic fire-flow demand tables.
- Water storage capacities can often be reduced, based on critical demand calculations
- Water usage can often be reduced based on fire-flow comparisons:

Fire-fighter with 1-1/2" hose:

175 x 5 = 875 gallons of water  
 400 x 5 = 2,000 gallons of water

Fire sprinkler system:

18 x 5 = 90 gallons of water  
 40 x 5 = 200 gallons of water

**Note:** *Duration of flow is 5-minutes.*

As the retrofit concept begins to evolve, it is important to start to define exactly what will be the focus (targeted buildings) for the ordinance/requirement, whether that be a specific downtown area (such as a historical business district) or citywide in the case of wanting to get all existing high-rise buildings sprinklered, or all "Residential Board and Care Facilities" retrofitted.

Therefore, one must begin the process of defining certain known and/or unknown (but necessary) elements in the initial stages of the evolution of developing a retrofit ordinance/requirement. The following questions should be addressed as honestly as possible:

Who Wants the Ordinance?

- |   |  |
|---|--|
| <input type="checkbox"/> Fire Marshal           | <input type="checkbox"/> Community Leaders |
| <input type="checkbox"/> Fire Chief             | <input type="checkbox"/> Developers        |
| <input type="checkbox"/> City or County Manager | <input type="checkbox"/> General Public    |

Why is the Ordinance being considered at this time?

- |  |  |
|--|--|
| <input type="checkbox"/> Cost Savings                                  | <input type="checkbox"/> Manpower Limitations            |
| <input type="checkbox"/> Public Safety Issue                           | <input type="checkbox"/> Curb an Identified Fire Problem |
| <input type="checkbox"/> Normal Adoption Sequence                      | <input type="checkbox"/> Intense Growth Pattern          |
| <input type="checkbox"/> Follow-up to a Recent Significant Fire/Event? |  |
| <input type="checkbox"/> To Keep Up With Social/Technological Changes  |  |
| <input type="checkbox"/> Resolve future problems now!!!                |  |

When would the Ordinance take affect?

- |  |  |
|--|--|
| <input type="checkbox"/> Immediately   | <input type="checkbox"/> Phased in Over Period of Time |
| <input type="checkbox"/> Upon a Physical Change (area, height, growth, annexation) |  |

What Occupancies would be impacted by the Ordinance?

- |   |  |
|---|--|
| <input type="checkbox"/> All "existing occupancies"     | <input type="checkbox"/> Apartment Buildings         |
| <input type="checkbox"/> Assembly occupancies           | <input type="checkbox"/> Lodging and Rooming Houses  |
| <input type="checkbox"/> Educational occupancies        | <input type="checkbox"/> Mercantile                  |
| <input type="checkbox"/> Day Care                       | <input type="checkbox"/> Business                    |
| <input type="checkbox"/> Health Care                    | <input type="checkbox"/> Industrial                  |
| <input type="checkbox"/> Residential Board and Care     | <input type="checkbox"/> Storage                     |
| <input type="checkbox"/> Ambulatory Health Care Centers | <input type="checkbox"/> Special Structures          |
| <input type="checkbox"/> Detention and Correction       | <input type="checkbox"/> High-rise Buildings         |
| <input type="checkbox"/> Hotels and Dormitories         | <input type="checkbox"/> Underground/Windowless      |
| <input type="checkbox"/> Historical Buildings           | <input type="checkbox"/> An Area/District (specific) |

Will the retrofit fire sprinkler ordinance also impact the existing "housing" stock?

- Residential (single-family dwellings)
  - What about two-family dwellings, attached (duplex/two-plex)?
  - What about "Manufactured Housing" and "Mobilehomes"?
  - What about attached "Townhouses" and "Condominiums"[R-3's]?
- Multi-Family Residential [R-1's]  
(Motels/Hotels, Apartments, Condominiums, Townhouses, etc.)
- Residential High-rise Buildings
- Mixed Occupancy (Commercial & Residential) Buildings

Would retrofit/retroactive provisions be identified which trigger the requirements of this Ordinance?

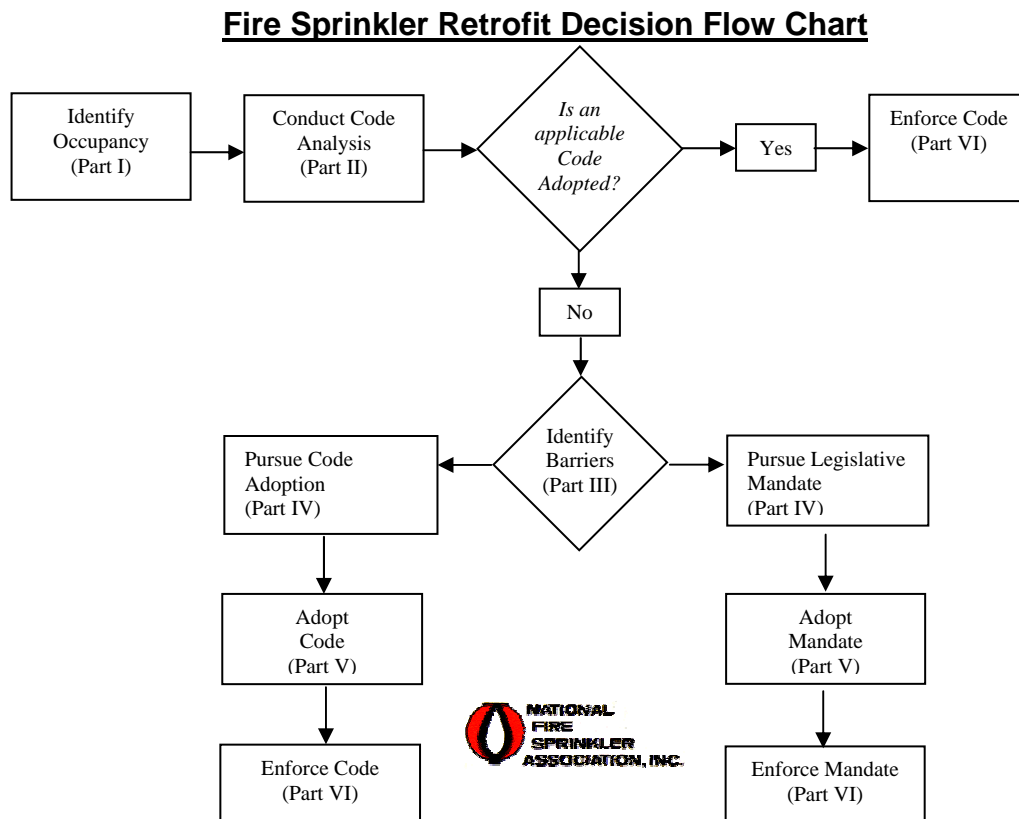
- Based on area of existing buildings
- Based on area added to existing building
- Based on height of building
- Based on height added to existing building
- Based on occupancy change or use change
- Based on fire-flow demands
- Based on a geographic location of the building with respect to community
- Based on type of construction (example: Type V-non-rated)
- Other criteria (specify)

Will any other elements (resolutions, guidelines, fee schedules, etc.) need to be adopted as a part of this Ordinance?

- YES     NO

## Fire Sprinkler Retrofit Decision Flow Chart

The following “Fire Sprinkler Retrofit Decision Flow Chart” has been developed to show the mental process, which must be clearly recognized and understood before proceeding to prepare, adopt and implement a retrofit fire sprinkler ordinance. It should also be noted that every step (position) on the decision tree will be covered in greater detail within the text of this Guideline Document; however, this section is to make certain that the reader clearly recognizes the various elements that must be considered.



### \_\_\_ **Identify Occupancy:**

It is essential that the target area(s), building(s), occupancy classification(s), and/or criteria for these buildings, which are to be required to be retrofitted with automatic fire sprinkler systems, be clearly identified (defined and listed). This will establish the impact on the agency (fire department) with regard to workload, and also reflect on the magnitude of the financial impact to the building owners, tenants, and community.

### \_\_\_ **Conduct Code Analysis:**

The code analysis is a critical step to insure that the agency (fire department) has performed a review of the currently adopted codes (Building and/or Fire Codes) and to have a clear understanding of what is currently required (permitted to be enforced) by the agency, based on state adoption, state preemptions/restrictions, and local adoptions.

The agency (fire department) must have a clear understanding of the states Building and/or Fire Code regulations in regard to the issue of Mini/Max restrictions. This refers to the issue of a



state adopting a Building and/or Fire Code with the premise that either or both Codes have been adopted as a “Minimum” (Mini) Code, which is to say that the state has established a minimum code threshold. Likewise, a state may have statutory authority to adopt the Building and/or Fire Code for that state, which are the “Maximum” (Max) Code, which is to say that the state has established a maximum code threshold. Additionally, some states do in fact establish the “Minimum and Maximum” threshold, which would bind the local authority having jurisdictions (AHJ’s) to simply enforce the state adopted Building and/or Fire Codes and allowing no amendments.

A recent survey of states having a Mini, Max, or Mini/Max requirement would show the following breakdown:

Minimum Requirement:

*(Alabama, Alaska, Arizona, Arkansas, California, Colorado, Delaware, Washington D.C., Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin [exception: mini/max- multifamily])*

Maximum Requirement:

*(None)*

Mini/Max Requirement:

*(Connecticut, Kentucky, Michigan, Massachusetts, Minnesota, New Jersey, North Carolina, Oregon [Min-Fire Code, Mini/Max-Bldg. Code], Vermont, Virginia [Min-Fire Code, Mini/Max-Bldg. Code], West Virginia [Min-Fire Code, Mini/Max-Bldg. Code], Wyoming)*

*(Note: With regard to Florida, Missouri, and New York, the issue of Minimum and/or Maximum is based on use and occupancy, and therefore cannot be placed into a single box of Mini, Max, and/or Mini/Max.)*

**\_\_\_\_ Identify Barriers:**

During this “Decision Tree” review process we will be identifying barriers that must be overcome if the retrofit ordinance proposal is to move forward. Obviously the ability to adopt and/or amend a more restrictive fire sprinkler ordinance within your community is the single most important barrier to resolve. Those states with a “Mini/Max” state Building and/or Fire Code will have to confer with your legal counsel and state officials to determine if there is a need statewide to modify the Code(s).

Other barriers, such as staffing levels to implement and enforce these new retrofit regulations must be accounted for and justification clearly noted in the presentation documents. One question, which must be addressed, is what happens to these additional staff members when the retrofit program is completed in 3-, 5-, or 10-years? Will the need exist to maintain these additional staff members, will they be reassigned, and/or will they be used to infill those staff

members who retire or move on in their careers? And finally, will the additional salaries and benefits be offset by permit fees/inspection fees charged as a result of this new ordinance?

Now, from the building owners vantage point; “What impact will the implementation of this ordinance have on his/her business?” The economic impacts must be addressed, which include and not limited to simply the permits, design, installation, and repairs/ remodeling associated with the retrofitting of the building(s). Business interruption, productivity, visual/esthetics issues will all become barriers to recognize and try to resolve. These issues may not surface until the day/night of the public hearings, so be prepared to address them.

Then comes the real “dollar-sign barriers”, Insurance Costs and Asbestos Abatement Costs. It is difficult, if not impossible to get solid numbers on the insurance savings for an existing building, which is then retrofitted with automatic fire sprinklers. The common answer is that while the fire insurance is reduced, the “water damage” insurance is increased. What is important to note here is that in comparison, these increases/ decreases are not proportional. That is to say that while the Water Damage Coverage may increase minimally, a nickel (\$.05) to a quarter (\$.25) per hundred dollars of insured value, the decrease of the Fire Coverage will be significant, from anywhere from one- to two-dollars (\$1.00-\$2.00) per hundred dollars of insured value.

The “Asbestos Abatement” (see Appendix Q for more information) problem is one of those issues that should be addressed in two (2) parts. The first part is that the asbestos is an existing condition within the building and should a fire occur, the “hazardous materials” clean up could be greater than the actual fire damage itself. One example of this was the deadly Dupont Plaza Hotel Fire, in San Juan, PR (December 31, 1986) where 96-fire deaths occurred in this 20-story high-rise building. Because of the asbestos, contained in the structure, fire-investigators and construction workers were prohibited from entering the burned out building for upwards of 6-months after the fire. Similar stories have been document, but non as dramatic as the Dupont Plaza Fire.

When the asbestos issue first surfaced in the early 1970’s the approach was to remove any and all asbestos found to exist within a building; however, within 10-years (1980’s) it was felt that “spot-abatement” was adequate in those circumstances where the existing conditions did not pose a health hazard. Today, fire sprinkler systems can be installed utilizing spot abatement in those areas where a pipe hanger or brace is to be installed, thus saving considerable monies in the overall installation costs.

### \_\_\_\_\_ **Pursue Code Adoption:**

A review of currently adopted Building and/or Fire Codes can often verify if there are provisions already laid out in the current state or locally adopted code that allows for the retrofit provisions you are anticipating to amend. For this reason, it is essential that a thorough review be undertaken to insure that a code provision does not already exist. A good start is the Code Index, followed by reviewing the specific requirements/allowances for the targeted buildings that are under consideration for retrofitting.

“If”, during the code review (analysis) process you find that the jurisdiction has not adopted the current Building and/or Fire Code which would provide the greatest benefit in moving forward with the adoption of a retrofit fire sprinkler ordinance for the targeted building(s), then it may be necessary to step back, review and develop a document which would justify the adoption of the

latest and most effective Building and/or Fire Code. In many areas of the country, Building and/or Fire Codes are adopted on a tri-annual basis (every 3-years), as this is typically the “code cycle” for new modified language and/or sections within these Codes.

The method of adopting and modifying these Building and/or Fire Codes varies greatly from one state to another and from one jurisdiction to another. There are also legal and philosophical differences in what a jurisdiction can or cannot adopt and/or amend. An example of this was a classic case in California some years ago in which a Fire Protection District amended the Building Code to require fire sprinklers in a certain occupancy of a certain size and/or height. The building contractor challenged the district before, during and after the building(s) were being constructed and upon completion filed suit in court to the validity of the fire sprinkler requirements.

The “Findings” (decision) of the court was that the Fire Protection District (FPD) did not have legal authority to amend the Building Code, as this was the area of responsibility reserved for the County Building Official (Department) and that while it (FPD) could adopt/amend the Fire Code, it had no jurisdiction adopting/amending the Building Code. (*See: Danville Fire Protection District v. Duffel Financial & Construction Company (1976) 58 Cal.App.3d 241*)

The bottom-line is that when undertaking a retrofit fire sprinkler ordinance, or any ordinance for that matter, it is important that one looks at the process as a team effort of both the Building Department, Fire Department, City Attorney/County Counsel, and others to work together within the area of responsibility to insure that in the quest to create a safer environment where people live, work, and play, that the process is consistent with all the rules and regulations governing such adoptions/amendments.

#### \_\_\_\_ Pursue Legislative Mandate:

“If” your jurisdiction has adopted a Building and/or Fire Code, which does not address the retrofit of fire sprinklers within the given area and/or targeted building(s), then a document, typically an Ordinance, must be developed which will address the scope and nature of the provisions being required of these existing buildings. Again, the specific format, language and related issues varies greatly from one state to another and from one jurisdiction to another. There are also legal and philosophical differences in what a jurisdiction can or cannot adopt and/or amend.

It is important to know and understand the ordinance philosophy of your jurisdiction, and to be as specific as practical in describing the nature of the retrofit fire sprinkler requirements; from the geographical area (*Downtown Historical Business District – Boundaries from First Street – North, Fourth Street South, Main Street – East to Center Street – West*) that it will impact, to the targeted building(s) and/or occupancy(s) and the Standard(s) to be utilized for design and installation criteria (*NFPA 13, Standard for the Installation of Sprinkler Systems, 1999/2002-Edition*).

Creating the “Code Language” is important to insure that the new retrofit requirements do not conflict with other code sections, and to provide for a clear understanding of just what is to be expected. One of the first decisions is which code the retrofit provisions will be placed. As talked about earlier, if the jurisdiction is the Fire Department, the code amendments will typically be included as part of the Fire Code. If the Fire Department is part of a City/Town government, it may also be adopted in the Building Code, by the Building Department.

It is important to keep in mind as one writes the “code language” that what you are attempting to convey is the issue of “RETROFITTING” Buildings, which are currently constructed and/or in use. It is important to have a clear understanding of what the word “Retrofit” means:

According to Merriam-Webster’s On-line Dictionary:

Word: Retrofit  
 (Function: Transitive Verb)

- 
- (1) *To furnish with new or modified parts or equipment not available or considered necessary at the time of manufacture (construction).*
  - (2) *To install (new or modified parts or equipment) in something previously manufactured or constructed.*

Therefore, as one searches for the Code and Section(s) to be modified, it is important to have in your mind that we have an existing building/structure, which at the time of construction was not required to have automatic fire sprinklers installed (for whatever reason), and that the technology of fire sprinklers was available in most buildings built within the past 135-years, thus this new requirement will mandate that these same buildings shall be retrofitted with this proactive fire protection system.

\_\_\_\_\_ **Adopt Code/Mandate:**

The typical adoption process takes a considerable amount of time to perform the research, identify those buildings which will be impacted by the retrofit requirements, complete the presentation package, prepare the ordinance and supportive documentation, establish the staffing levels and paperwork process, and hold the public hearings before the Board of Supervisors, City Council, District Board etc. A fire sprinkler ordinance will typically not be considered an “emergency ordinance” thus there will usually be more than one public hearing. Thus there would be the public notice phase, the first reading, the second reading, and the 30- to 60-days appeals process before it would take affect.

As you will see through this Guideline Booklet, there are many tasks, which must be undertaken to insure the success of the adoption of a retrofit fire sprinkler ordinance. It cannot be stressed enough that by taking shortcuts, you will most likely fail.

“TAKE YOUR TIME AND DO YOUR HOMEWORK.”

\_\_\_\_\_ **Enforce Code/Mandate:**

“If” a provision has been found within the adopted Building and/or Fire Code, which addresses the retrofitting of the targeted buildings, and the jurisdiction has not enforced those provisions to date, it is imperative that some type of public notice be developed, with concurrence of the jurisdictional legal (City Attorney and/or County Counsel) and political entity (City Council, Board of Supervisors, Board Member, etc.) to insure that they are aware of the provisions, and the intent to enforce those provisions.

As with any legal document (such as in the case of an Ordinance) it is essential that the retrofit ordinance be clear as to time limits for certain elements to be completed, such as notification (in writing) of the building owner by the jurisdiction, timeframe for plans and specifications to be filed, time limits for compliance, etc. and the prioritizing of buildings when appropriate.

The implementation phase may sound like you have completed the task at hand, but keep in mind that the work has just begun. Issues will surface on a daily basis, and the system you create will reflect on just how many issues (problems) surface as the real ramifications of the retrofit ordinance takes affect.

Count on addressing initial issues (problems) that surface in the first few weeks/months of the program in a very formal manner and address them as if every future applicant will have the same problem. Your staff must be prepared for applicant that are frustrated from the moment they receive the formal notice, and have a working atmosphere (office/work area) which is conducive to the situations which will surface on a regular basis.

The bottom-line to the retrofit fire sprinkler ordinance is that you are creating a proactive fire protection defense system within each targeted building, as opposed to having an existing building that is protected by a reactive fire protection system. The installation of a fire sprinkler system will be disruptive to the building owner and his/her tenants for a few weeks to a few months, but the result will be a safer living/work environment for the occupants as well as to the firefighters who may be called to the scene of a fire in those buildings.

And finally, as the retrofit fire sprinkler ordinance proceeds through the implementation sequence of events, it is very (VERY) important to provide Status Reports to the Board of Supervisors, City Council, and/or Board Members giving them the statistical recap on the progress (and problems) of their adoption of the retrofit ordinance package. They need to hear from you (their fire protection expert) on the progress of the plan to mitigate an identified fire potential.

### **Defining the Impact (by numbers of buildings – Inventory/Listing):**

One of the “keys to success” in the process of adopting a retrofit fire sprinkler requirement is to have solid data early on in the process, and to insure that you have more data then will your opposition. To accomplish that, you will need to do your research, and do it well.

If you are proposing a specific area of the city to be impacted by the retrofit requirements, you need to know just how many buildings you are going to affect, how many businesses will be affected, and just how many business/building owners will be required to spend their money (\$\$\$\$) to meet the new retrofit requirements.

Data needs to be collected on each and every building in the defined area of the retrofit proposal, reflecting:

- \_\_\_\_\_ Listing of each building by street address
- \_\_\_\_\_ Height of each building (basement, 1<sup>st</sup> floor, 2<sup>nd</sup> floor, 3<sup>rd</sup> floor, 4<sup>th</sup> floor, mezzanines)
- \_\_\_\_\_ Square footage of each building (broken down by floor)
- \_\_\_\_\_ Use and Occupancy Classification (single or mixed uses [%])
- \_\_\_\_\_ Fire-flow demand for each building

You may even want to have several different listings reflecting the demographic make-up of the area to be impacted. You might also want to show the current “Fire-Flow” demands, based on the ISO Fire-Flow Formula (type of construction and square footage). This type of information will be helpful when you are trying to show the credits given to buildings, which are protected by automatic fire sprinklers, and the fact that the Insurance Industry as well as the Building Codes recognize the advantages of fire sprinklers and do give credits (in fire-flow demands) for their installation.

In developing a retrofit fire sprinkler mandate/ordinance, as a general rule the buildings height (both in feet and stories), aggregate floor area, number(s) of occupants, type of construction, and occupancy classification are typically identified in a listing of affected buildings. An example of criteria to be considered for researching and listing (by Occupancy Classification) might include:

\_\_\_\_\_ **All “existing occupancies”**

- \_\_\_\_\_ Listing of /Buildings
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Type of Construction
  - \_\_\_\_\_ By Year Built (age)

\_\_\_\_\_ **Assembly occupancies**

- \_\_\_\_\_ Listing of Public Assemblage Buildings
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Type of Construction
  - \_\_\_\_\_ By Year Built (age)
- \_\_\_\_\_ Listing of “Maximum” Occupant Loads  
(What is the legally posted occupant loads?)

\_\_\_\_\_ **Educational occupancies**

- \_\_\_\_\_ Listing of Campuses/Buildings
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Type of Construction
  - \_\_\_\_\_ By Year Built (age)
- \_\_\_\_\_ Listing of Numbers of Students
- \_\_\_\_\_ Listing of “Maximum” Occupant Loads (by campus)
- \_\_\_\_\_ Listing by Age Group of the Students

\_\_\_\_\_ **Day Care**

- \_\_\_\_\_ Listing of Buildings
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Type of Construction
  - \_\_\_\_\_ By Year Built (age)
- \_\_\_\_\_ Listing of Numbers of Children (and/or Adults)
- \_\_\_\_\_ Listing of “Maximum” Occupant Loads (by building)
- \_\_\_\_\_ Listing by Age Group of Children and/or Adults
- \_\_\_\_\_ Special Information (24-hour Operation)

\_\_\_\_\_ **Health Care**

- \_\_\_\_\_ Listing of Facilities/Centers
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Year Built (age)
- \_\_\_\_\_ Listing by Type of Construction
- \_\_\_\_\_ Number of Patients
- \_\_\_\_\_ Listing of Age Group and Abilities of Patients
  - \_\_\_\_\_ Number of Ambulatory/Non-Ambulatory/Bedridden Patients
  - \_\_\_\_\_ Number of Staff Personnel
- \_\_\_\_\_ Special Information (24-hour Operation)

\_\_\_\_\_ **Residential Board and Care**

- \_\_\_\_\_ Listing of Facilities/Centers
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Year Built (age)
- \_\_\_\_\_ Listing by Type of Construction
- \_\_\_\_\_ Listing of Age Group and Abilities of Patients
  - \_\_\_\_\_ Number of Patients
  - \_\_\_\_\_ Typical Ages of Patients
  - \_\_\_\_\_ Number of Ambulatory/Non-Ambulatory/Bedridden Patients
  - \_\_\_\_\_ Number of Staff Personnel
- \_\_\_\_\_ Special Information (24-hour Operation)

\_\_\_\_\_ **Ambulatory Health Care Centers**

- \_\_\_\_\_ Listing of Facilities/Centers
  - \_\_\_\_\_ By Street and Address
  - \_\_\_\_\_ By Height of Buildings
- \_\_\_\_\_ Listing by Year Built (age)
- \_\_\_\_\_ Listing by Type of Construction
- \_\_\_\_\_ Listing of Age Group and Abilities of Patients
  - \_\_\_\_\_ Number of Patients
  - \_\_\_\_\_ Typical Ages of Patients
  - \_\_\_\_\_ Number of Ambulatory/Non-Ambulatory/Bedridden Patients
  - \_\_\_\_\_ Number of Staff Personnel
- \_\_\_\_\_ Special Information (24-hour Operation)

*(Note: It is essential that the jurisdiction proposing the retrofit fire sprinkler mandate/ordinance have in mind the states definitions of what is Ambulatory, Non-Ambulatory, and/or Bedridden. These criteria change from state to state.)*

\_\_\_\_\_ **Detention and Correction**

- \_\_\_\_\_ Listing of Facilities/Centers
  - \_\_\_\_\_ Listing by Year Built (age)
  - \_\_\_\_\_ Listing by Type of Construction
  - \_\_\_\_\_ Level of Confinement (Maximum/Minimum or 1, 2, 3, 4)
- \_\_\_\_\_ Number of Inmates
  - \_\_\_\_\_ Typical Ages of Inmates

- Number of Staff Personnel
- Special Information (24-hour Operation)

**Hotels**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)
- Listing of Numbers of Hotel/Dorm Rooms
- Listing of "Maximum" Occupant Loads (by building)  
(200 rooms x 2-persons = 400 guests)

**Dormitories (Including Fraternity and Sorority Houses)**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)
- Listing of Numbers of Hotel/Dorm Rooms
- Listing of "Maximum" Occupant Loads (by building)  
(200 rooms x 2-persons = 400 guests)

**Apartment Buildings**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings (number of stories)
- Listing by Type of Construction
  - By Year Built (age)
- Listing of Numbers of Apartments
- Listing of "Maximum" Occupant Loads (by building)  
(200 rooms x 2-persons = 400 guests)

**Lodging and Rooming Houses**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)
- Listing of Numbers of Rooms
- Listing of "Maximum" Occupant Loads (by building)  
(200 rooms x 2-persons = 400 guests)

**Mercantile**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)



**Business**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)

**Industrial**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)
- Listing by Special Hazards and/or Processes

**Storage**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)
- Listing by Special Hazards and/or Processes

**Special Structures**

- Listing of Special Structures
  - By Street and Address
  - By Height of Buildings
- Listing by Type of Construction
  - By Year Built (age)
- Define the Special Hazards related to these Structures

**High-rise Buildings**

- Listing of "**ALL**" High-rise Buildings in Jurisdiction
  - Listing of those Currently Sprinklered
  - Listing of those Currently "**PARTIALLY**" Sprinklered
  - Listing of those "**NOT**" Sprinklered
- Listing of "Not" Sprinklered High-Rise
  - Listing by Street Address and Name on Building
  - Listing by Height (stories/feet)
  - Listing by Year Built (age)
  - Listing by Type of Construction
  - Listing of "Occupant Loads"
    - Listing by Occupancy Classification/Use  
(Public Assemblage, Apartments, Hotel, etc.)

**Underground/Windowless**

- Listing of Buildings
  - By Street and Address
  - By Height of Buildings

\_\_\_\_\_ By Year Built (age)

\_\_\_\_\_ **Historical Buildings**

- \_\_\_\_\_ Identify Historical Significance
  - \_\_\_\_\_ Federal Historical Registry
  - \_\_\_\_\_ State Historical Registry
  - \_\_\_\_\_ County/City Historical Registry
  - \_\_\_\_\_ Community Heritage
- \_\_\_\_\_ Define the Number of Buildings
  - \_\_\_\_\_ Names of Buildings
- \_\_\_\_\_ Listing by Street and Address
- \_\_\_\_\_ Listing by Year Built (i.e. 1776)

\_\_\_\_\_ **An Area/District (specific)**

- \_\_\_\_\_ Define the Boundaries of the Area/District
- \_\_\_\_\_ Define the Number of Buildings affected
  - \_\_\_\_\_ Listing by Street and Address
  - \_\_\_\_\_ Listing by Property Owner (multiple ownership)
- \_\_\_\_\_ Determine (estimate) Square Footage

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## Part II Conducting A Code Analysis

### Researching the Building and Fire Codes

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The section of the Code (Building and/or Fire Code) must be appropriate for the requirements being imposed, and would typically be found in the Fire Protection Systems Section of the Codes as follows:

### Building Code

#### International Building Code (IBC/ICC):

<u>Chapter/Section</u>	<u>Occupancy Classification</u>
Chapter 9, Section 903.....	Automatic Sprinkler Systems (Where Requires: 903.2 thru 903.2.13)
Chapter 34, Section 3410.6.17 .....	Existing Buildings

#### Building Construction and Safety Code (NFPA 5000):

<u>Chapter/Section</u>	<u>Occupancy Classification</u>
Chapter 15, Section 15.9.4.12 .....	Historical Bldgs. (Alternative)
Chapter 16, Section 16.3.5 .....	Assembly Occupancies
Chapter 17, Section 17.3.5 .....	Educational Occupancies
Chapter 18, Section 18.3.5 .....	Day-Care Occupancies
Chapter 19, Section 19.3.5 .....	Health Care Occupancies
Chapter 20, Section 20.3.5 .....	Ambulatory Health Care Occupancies
Chapter 21, Section 21.3.5 .....	Detention and Correctional Occupancies
Chapter 22, Section 22.3.5 .....	One- and Two-Family Dwellings
Chapter 23, Section 23.3.5 .....	Lodging or Rooming House Occupancies
Chapter 24, Section 24.3.5 .....	Hotels and Dormitory Occupancies
Chapter 25, Section 25.3.5 .....	Apartment Buildings
Chapter 26, Section 26.3.5 .....	Residential Board and Care Occupancies
Chapter 27, Section 27.3.5 .....	Mercantile Occupancies
Chapter 28, Section 28.3.5 .....	Business Occupancies
Chapter 29, Section 29.3.5 .....	Industrial Occupancies
Chapter 30, Section 30.3.5 .....	Storage Occupancies
Chapter 31, Section 31.3.5 .....	Occupancies in Special Structures
Chapter 32, Section 32.3.5 .....	Special Construction
Chapter 33, Section 33.2.2 .....	High-Rise Buildings

## Fire Code

### International Fire Code (IFC/ICC):

<u>Chapter/Section</u>	<u>Occupancy Classification</u>
Chapter 9, Section 903	Automatic Sprinkler Systems (Where Requires: 903.2 thru 903.2.13)

### Uniform Fire Code (NFPA 1):

<u>Chapter/Section</u>	<u>Occupancy Classification</u>
Chapter 13, Section 13.3	Automatic Sprinklers (General)
13.3.2.5	Existing Assembly Occupancies
13.3.2.7	Existing Educational Occupancies
13.3.2.9	Existing Health Care Occupancies
13.3.2.11	Existing Detention and Correctional Facilities
13.3.2.13	Existing Hotels and Dormitories
13.3.2.15	Existing Apartment Buildings
13.3.2.16	Lodging and Rooming Houses
13.3.2.18	Existing Residential Board and Care Facilities
13.3.2.20	Existing Mercantile Occupancies
13.3.2.22	High-Rise Buildings
13.3.2.23	Storage Occupancies
13.3.2.24	New and Existing Day Care Bldgs.

## Existing Building Code/Life Safety Code

### International Existing Building Code (IEBC/ICC):

<u>Chapter/Section</u>	<u>Occupancy Classification</u>
Chapter 5, Section 504	Alterations – Level 1 (“Maintains the level of fire protection”)
Chapter 6, Section 604	Alterations – Level 2 .....(“Limited to area or floor on which the work areas are located”)
Chapter 7, Section 704	Alterations – Level 3 .....(“Sprinklers in accordance with Section .....604.2 shall be provided in all work areas”)
Chapter 8, Section 804	Change of Occupancy ..... (Where Requires: 812.1 thru 812.6)
Chapter 9, New Section 907	Additions .....(Would require new Section [907])
Chapter 10, Section 1003.12	Historical Buildings .....(Buildings that cannot be made to conform)

**Life Safety Code (NFPA 101):**

<b><u>Chapter/Section</u></b>	<b><u>Occupancy Classification</u></b>
Chapter 10, Section 11.1 .....	Special Structures and High-Rise Bldg.
11.2 .....	Open Structures
11.3.....	Towers
11.4.....	Water-Surrounded Structures
11.5.....	Piers
11.6.....	Vehicles and Vessels (immobile)
11.7.....	Underground and Limited Access Structures
11.8.....	High-Rise Buildings
11.9.....	Permanent Membrane Structures
11.10.....	Temporary Membrane Structures
11.11.....	Tents
Chapter 13, Section 13.3.5 .....	Extinguishment Requirements
13.4.4 .....	High-rise Buildings w/Assembly Occupancies
13.4.5.10 .....	Fire Protection (stages)
13.4.7.2 .....	Special Amusement Buildings
13.7.4.3.7.1 ...	Exhibit Booths
13.7.4.3.7.2 ...	Exhibit Booths
Chapter 15, Section 15.3.5.....	Extinguishment Requirements
Chapter 17, Section 17.3.5.....	Existing Day-Care Occupancies
Chapter 19, Section 19.3.5.....	Existing Health Care Occupancies
Chapter 21, Section 21.3.5.....	Existing Ambulatory Health Care Occupancies
Chapter 23, Section 23.3.5.....	Existing Detention and Correctional Occupancies
Chapter 26, Section 26.3.5.....	Lodging or Rooming Houses
Chapter 29, Section 29.3.5.....	Existing Hotels and Dormitories
Chapter 31, Section 31.3.5.....	Existing Apartment Buildings
Chapter 33, Section 33.2.3.5.....	Existing Residential Board and Care Occupancies
33.3.3.5 .....	Extinguishing Requirements
Chapter 37, Section 37.3.5.....	Existing Mercantile Occupancies
Chapter 39, Section 39.3.5.....	Existing Business Occupancies
39.4.2.1 .....	High-Rise Buildings
Chapter 42, Section 42.3.5.....	Storage Occupancies

**Special Note:** *It should be pointed out that the respective Building and/or Fire Code Chapters and Sections refer to specific occupancy classifications and/or uses and would only be amended based on what target buildings/occupancies are being considered for retrofitting with automatic fire sprinklers.*

## Occupancy Classification (Code Matrix)

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In order to base the retrofit requirements on a firm base of information, a quick review of the current “Code” requirements must be accomplished, in order to document to the decision makers (City Council, Board Members, etc.) just what is currently required by those Building and Fire Codes adopted by the jurisdiction.

To assist you in this review, a “Code Matrix” has been developed which defines the various Occupancy Classifications, and indicates if the represented Codes/Standards currently require these occupancies to be equipped with an automatic fire sprinkler system. This “Code Matrix” defines the Occupancy Classifications by both the Building Construction and Safety Code (NFPA 5000) – 2003 Edition and the International Building Code (ICC) – 2003 Edition. In addition, the “Code Matrix” also utilizes the companion Fire Codes for each of these two Building Codes; Uniform Fire Code (NFPA 1) – 2003 Edition and the International Fire Code (ICC-IFC) – 2003 Edition. And finally, to complete the “Code Matrix”, the two Building Codes also refer to their companion existing building codes for clarification on code regulations that safeguard the public health and safety in such buildings; the Life Safety Code (NFPA 101) – 2003 Edition and the International Existing Building Code (ICC-IEBC) – 2003 Edition.

**Note:** *It should be pointed out that beneath each of the responses to whether the specific code (NFPA 1, NFPA 101, IFC, or IEBC) is the referenced code section which defines whether (YES) or not (NO) the code requires these existing occupancies to be protected by automatic fire sprinklers.*

## **Fire Sprinkler Retrofit Code Requirement Guide (Code Matrix)**

<b><u>NFPA Classification</u></b>	<b><u>(NFPA 1)</u></b>	<b><u>(NFPA 101)</u></b>	<b><u>ICC Classification</u></b>	<b><u>(IFC)</u></b>	<b><u>(IEBC)</u></b>
<b>Assembly</b>	<b>YES</b> [13.3.2.5]	<b>YES</b> [13.3.5/TIA03-3]	<b>Assembly</b>	No [101.3]	[see *1]
<b>Educational</b>	<b>YES</b> [13.3.2.7.1]	<b>YES</b> [15.3.5]	<b>Educational</b>	No [101.3]	[see *2]
<b>Day Care</b>	<b>YES</b> [13.3.2.24]	<b>YES</b> [17.3.5]	<b>Institutional</b>	No [101.3]	[see *3]
<b>Health Care</b>	<b>YES</b> [13.3.2.9.1]	<b>YES</b> [19.3.5]	“ “	No [101.3]	[see *4]
<b>Residential Board and Care</b>	<b>YES</b> [13.3.2.18.1.1]	<b>YES</b> [33.3.3.5]	“ “	No [101.3]	[see *5]
<b>Ambulatory Health Care Centers</b>	No [20.6.1]	No [21.3.5]	“ “	No [101.3]	[see *6]
<b>Detention/Correction</b>	<b>YES</b> [13.3.2.11.1]	<b>YES</b> [23.3.5]	“ “	No [101.3]	[see *7]
<b>Hotels and Dormitories</b>	No [13.3.2.13.1]	No [29.3.5]	<b>Residential</b>	No [101.3]	[see *8]
<b>Apartment Buildings</b>	No [13.3.2.15.1]	<b>YES</b> [31.3.5]	“ “	No [101.3]	[see *9]
<b>Lodging and Rooming Houses</b>	No [13.3.2.16.3.6]	No [26.3.5.1]	“ “	No [101.3]	[see *10]
<b>Mercantile</b>	<b>YES</b> [13.3.2.20.1]	<b>YES</b> [37.3.5]	<b>Mercantile</b>	No [101.3]	[see *11]
<b>Business</b>	No [20.13.1]	No [39.3.5]	<b>Business</b>	No [101.3]	No [see *12]
<b>Industrial</b>	No [20.14.1]	No [40.3.5]	<b>High Hazard/ Factory</b>	No [101.3]	[see *13]
<b>Storage</b>	<b>YES</b> [13.3.2.23.2]	No [42.8.3.5]	<b>Storage</b>	No [101.3]	[see *14]
<b>Special Structures</b>	No [20.16.1]	<b>YES</b> [11.2.3]	<b>-0-</b>	-0-	-0-
<b>High-rise Buildings</b>	<b>YES</b> [13.3.2.22.2]	<b>YES</b> [9.7.1.1(1)]	<b>High-rise</b>	No [101.3]	<b>YES</b> [604.2.1]
<b>Historic Buildings</b>	No [20.17.1]	No [4.6.3]	<b>Historic Buildings</b>	No [102.5]	<b>YES</b> [1003.2]
<b>Underground/ Windowless Bldgs.</b>	<b>YES</b> [13.3.2.21]	<b>YES</b> [11.7.3.4]	<b>Utility &amp; Miscellaneous</b>	No [101.3]	[see *15]

**International Existing Building Code (2003 Edition)**

<b><u>ICC Classification</u></b>	<b><u>Alterations Level 1</u></b>	<b><u>Alterations Level 2</u></b>	<b><u>Alterations Level 3</u></b>
<b>Assembly (*1)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Educational (*2)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Institutional (*3)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
“ (*4)	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
“ (*5)	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
“ (*6)	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
“ (*7)	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Residential (*8)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
“ (*9)	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
“ (*10)	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Mercantile (*11)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Business (*12)</b>	No [504.1]	No [604.2.2]	No [704.1]
<b>High Hazard Factory (*13)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Storage (*14)</b>	No [504.1]	<b>YES</b> [604.2.2]	<b>YES</b> [704.1]
<b>Utility &amp; Miscellaneous (*15)</b>	No [504.1]	No [604.2.2]	No [704.1]

**Special Notes:**

**Alteration – Level 1 (Section 303)**

303.1 Scope. Level 1 alterations include the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose.

**Alteration – Level 2 (Section 304)**

304.1 Scope. Level 2 alterations include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

**Alteration – Level 3 (Section 305)**

305.1 Scope. Level 3 alterations apply where the work area exceeds 50-percent of the aggregate area of the building.



## Existing Buildings Relevant to Code Adoptions:

Each of the “model” Building and/or Fire Codes contain specific language in regard to the applicability of the newly adopted code as it relates to existing structures. A quick review of these Codes would reflect the following language:

International Building Code, 2003 Edition  
(Section 102.6, page 2)

***“102.6 Existing structures. The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Property Maintenance Code or the International Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.”***

International Fire Code, 2003 Edition  
(Section 101.2.3, page 1)

***“101.3 Intent. The purpose of this code is to establish the minimum requirements consistent with nationally recognized good practices for providing a reasonable level of life safety and property protection from the hazards of fire, explosion or dangerous conditions in new and existing buildings, structures and premises and to provide safety to fire fighters and emergency responders during emergency operations.”***

International Existing Building Code, 2003 Edition  
(Section 101.4, page 1)

***“101.4 Existing structures. The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Fire Code or the International Property Maintenance Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.”***

Building and Construction Safety Code (NFPA 5000), 2003 Edition  
(Section 1.3.4, page 5000-22)

***“1.3.4 Existing Buildings and Structures. The provisions of this Code shall apply to existing buildings where any one of the following conditions applies:***

- (1) A change of use or occupancy classification occurs.***
- (2) A repair, renovation, modification, reconstruction, or addition is made.***
- (3) The building or structure is relocated.***
- (4) The building is considered an unsafe building or a fire hazard.”***

(Section 1.7.5.2.2, page 5000-24)

***“1.7.5.2.2 Existing Installations. Buildings in existence at the time of the adoption of this Code shall be permitted to have their existing use or occupancy continued if such use or occupancy was legal at the time of the adoption of this Code, provided such continued use is not dangerous to life.”***

\_\_\_\_ Uniform Fire Code (NFPA 1), 2003 Edition  
(Section 10.3.1, page 1-47)

***“10.3.1 No new construction or existing building shall be occupied in whole or in part in violation of the provisions of this Code.”***

(Section 10.3.2, page 1-47)

***“10.3.2 Existing buildings that are occupied at the time of adoption of this Code shall remain in use provided that the following conditions are met:***

- (1) The occupancy classification remains the same.***
- (2) No condition deemed hazardous to life or property exists that would constitute an imminent danger.”***

**# # # #**

## Part III Identifying Barriers

### Applicable Code is Adopted

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A review of currently adopted Building and/or Fire Codes can often verify if there are provisions already laid out in the current state or locally adopted code that allows for the retrofit provisions you are anticipating to amend. For this reason, it is essential that a thorough review be undertaken to insure that a code provision does not already exist. A good start is the Code Index, followed by reviewing the specific requirements/allowances for the targeted buildings that are under consideration for retrofitting.

### Applicable Code is Not Adopted (Pursue adoption)

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#### Adopt Code:

“If”, during the code review (analysis) process you find that the jurisdiction has not adopted the current Building and/or Fire Code which would provide the greatest benefit in moving forward with the adoption of a retrofit fire sprinkler ordinance for the targeted building(s), then it may be necessary to step back, review and develop a document which would justify the adoption of the latest and most effective Building and/or Fire Code. In many if not most areas of the country, Building and/or Fire Codes are adopted on a tri-annual basis (every 3-years), as this is typically the “code cycle” for new modified language and/or sections within these Codes.

The method of adopting and modifying these Building and/or Fire Codes varies greatly from one state to another and from one jurisdiction to another. There are also legal and philosophical differences in what a jurisdiction can or cannot adopt and/or amend.

An example of this was a classic case in California some years ago in which a Fire Protection District amended the Building Code to require fire sprinklers in a certain occupancy of a certain size and/or height. The building contractor challenged the district before, during and after the building(s) were being constructed and upon completion filed suit in court to the validity of the fire sprinkler requirements.

The “Findings” (decision) of the court was that the Fire Protection District did not have legal authority to amend the Building Code, as this was the area of responsibility reserved for the County Building Official (Department) and that while it (FPD) could adopt/amend the Fire Code, it had no jurisdiction adopting/amending the Building Code. (*See: Danville Fire Protection District v. Duffel Financial & Construction Company (1976) 58 Cal.App.3d 241*)

The bottom-line is that when undertaking a retrofit fire sprinkler ordinance, or any ordinance for that matter, it is important that one looks at the process as a team effort of both the Building Department, Fire Department, City Attorney/County Counsel, and others to work together within the area of responsibility to insure that in the quest to create a safer environment where people live, work, and play, that the process is consistent with all the rules and regulations governing such adoptions/amendments.

## Legislative Mandate (Pursue Adoption of Prescriptive Legislation)

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“If” your jurisdiction has adopted a Building and/or Fire Code, which does not address the retrofit of fire sprinklers within the given area and/or targeted building(s), then a document, typically an Ordinance, must be developed which will address the scope and nature of the provisions being required of these existing buildings. Again, the specific format, language and related issues varies greatly from one state to another and from one jurisdiction to another. There are also legal and philosophical differences in what a jurisdiction can or cannot adopt and/or amend.

It is important to know and understand the ordinance philosophy of your jurisdiction, and to be as specific as practical in describing the nature of the retrofit fire sprinkler requirements; from the geographical area (*Downtown Historical Business District – Boundaries from First Street – North, Fourth Street South, Main Street – East to Center Street – West*) of that it will impact, to the targeted building(s) and/or occupancy(s) and the Standard(s) to be utilized for design and installation criteria (*NFPA 13, Standard for the Installation of Sprinkler Systems, 1999/2002-Edition*).

As with any legal document (such as in the case of an Ordinance) it is essential that retrofit ordinance be clear as to time limits for certain elements to be completed, such as notification (in writing) of the building owner by the jurisdiction, timeframe for plans and specifications to be filed, time limits for compliance, etc. and the prioritizing of buildings when appropriate. (See Appendix S & Appendix T)

**Note:** *In certain cases, such as a high-rise retrofit fire sprinkler ordinance, it may be necessary to stagger the compliance dates based on height of buildings (up to and including 9-stories: 5-years, up to and including 14-stories: 6-years, over 14-stories: 8-years). This reflects consideration for not only the size and number of the high-rise buildings, but also gives consideration to the jurisdictions ability to keep up with the anticipated increase workloads generated by the adoption of the retrofit ordinance. (This type of staggered approach proved to be very effective in the City of Louisville, Kentucky when they proposed their High-rise Building Sprinkler retrofit Ordinance in September 1992.)*

**Special Note:** The “key word” here is:

**“REASONABLE”**

*(Note: Webster’s Dictionary defines reasonable as “not excessive”, “just”, “fair”, and “wise”. These terms should be clearly recognized and taken into consideration.)*

**\_\_\_\_\_ Sample/Model Ordinance For Adoption:**

It should also be pointed out that each of the “model” Building and Fire Codes contains Sample Ordinances which can be utilized in the adoption of the respective code(s) in the jurisdiction wishing to adopt that Code. The following is a listing of where they may be found in the individual Codes:

_____ Uniform Fire Code (NFPA 1)	Annex C (page 1-420)
_____ Building Construction and Safety Code (NFPA 5000)	Not Applicable (none given)
_____ International Fire Code (ICC)	Preface/Ordinance (page v)
_____ International Building Code (ICC)	Preface/Ordinance (page v)
_____ International Existing Building Code (ICC)	Preface/Ordinance (page v)
_____ Life Safety Code (NFPA 101)	Not Applicable (none given)

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## Political Agenda's vs. Public Safety

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During the adoption process you may (most likely) be confronted with direct and/or indirect opposition raised in regards to the proposal, which would address a "public safety" problem. The Fire Chief and his/her staff was hired as the fire professional with expertise on how to best manage the fire emergencies that may be present in the community he/she serves. It is essential that you address the problems raised as a professional and keep clear of the political games that may surface during the various forums. Stay focused on the goal to adopt a retrofit fire sprinkler ordinance, and use facts, not fiction, to respond to these issues being raised.

Installing an automatic fire sprinkler system in the various existing buildings targeted by the ordinance package throughout your jurisdiction/community is like placing individual firefighters (sprinklers) in the ceilings of these buildings.

- \_\_\_\_\_ Accountability (Personnel, Fire Department, Government, and Community)
- \_\_\_\_\_ Transfer of Responsibility from the Public Sector (Fire Department) to the Private Sector (Building Owner)

## Economics

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Whenever a governmental agency deliberates to adopt a requirement that will cost the general public and/or a specific group of business or building owners money, it is more likely than not that there will be opposition expressed by various groups of the general public, business and/or building owners. That is a given. In addressing the economics of adopting a retrofit fire sprinkler ordinance, it may be necessary to define the costs associated with the retrofitting of fire sprinklers, as well as showing the benefits of performing such installations by doing a cost/benefit analysis. As a typical rule, Fire Chiefs and/or Fire Marshals are not economists, and as such it is important that in doing a cost/benefit analysis, that the accounting methodology be thorough and accurate.

A number of studies have been developed over the years in which the cost – benefit of installing automatic fire sprinklers has been defined; expressed in Insurance Rates (Insurance Services Office [ISO]), Income Tax Incentives (depreciation allowances for the value of the system), Interest on the Loan, Qualified Rehabilitation Tax Credit, Federal Legislation (Hotel and Motel Fire Safety Act of 1990, Americans with Disabilities Act [ADA], Liability Avoidance, and Business Interruption. Each has been used successfully to educate and promote the retrofit installation of fire sprinklers in hundreds and/or thousands of buildings over the years. (See Appendix D)

Over the years, some Fire Agencies have used the old \$1.50 to \$3.00 per square foot figures which have been thrown around the nation as the cost for installing fire sprinklers, while others have added a factor (25% to 33%) when the fire sprinklers are being retrofitted into an existing building (occupied or not). In recent years this tactic has not worked. Has the elected official and/or general public gotten smarter? Or could it be that the answer is much more complicated than a simple dollar figures.....

**Example:** In March 1989 a Fire Marshal made the following comments in Memorandum to Architects, Engineers, Developers, and Owners:

*“It is often noted that the codes do not require installation of sprinklers in all buildings. It should be remembered that the codes are minimum requirements. We in the United States have the worst fire safety record of any industrialized country in the world. Each large loss of life or property fire results in legislation mandating sprinkler installations. This has happened in Las Vegas, Boston, Baltimore, San Juan, Puerto Rico, and most recently in Los Angeles.*

*With the advent of the current sprinkler technology, the \_\_\_\_\_ Fire Department recommends that automatic sprinklers be installed in all new and existing buildings of all use groups.*

*In weighing the costs and benefits one cannot overlook the potential liability for the owner, developer and design professional when:*

- *A building is designed, built and occupied and the decision is made not to incorporate state of the art fire protection because the code in effect at the time does not require it.*
- *The fire protection authority recommends that state of the art fire protection be installed at an incremental cost of between 3% and 6%.*
- *A fire occurs and an occupant is injured or killed (240 persons were killed and 1,050 persons were injured by fire in \_\_\_\_\_ in 1987.*

*Was this event foreseeable? Preventable? At a reasonable cost?”*

It should be noted that the economic issue will most likely be one of the most important and intense areas to consider and be prepared to address, in the written Report to your political entity (City Council, Board of Supervisor, Board Members, etc.). Do your homework and be prepared.

### **Sprinkler Alternatives (Equivalent Level of Safety)**

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In some cases an alternative to a sprinkler system may be suggested. These alternatives will not be an equivalent level of safety as that provided by a sprinkler system unless three conditions are met.

1. Prevent flashover in the room of fire origin
2. Limit fire size to no more than 1 megawatt (950 Btu/sec)
3. Prevent flames from leaving the room of origin

*“The term ‘equivalent level of safety’ means an alternative design or system (which may include automatic sprinkler systems), based upon fire protection engineering analysis, which achieves a level of safety equal to or greater than that provided by automatic sprinkler systems.”*

*Source: Public Law 102-522-OCT. 26, 1992*

“A second alternative is applicable for typical office and residential scenarios. In these situations, complete sprinkler protection can be expected to prevent flashover in the room of fire origin, limit fire size to no more than 1 megawatt (950 Btu/sec), and prevent flames from leaving the room of origin.”

*Source: General Services Administration, 41 CFR Part 101-6 [FPMR Amendment A]*

The economics of the alternatives to a sprinkler system are often more expensive than the sprinkler system itself. See appendix D for information on the economics of Retrofitting sprinklers.

The following is a partial list of Life Safety Evaluations which could be used in evaluating alternative fire protection features in existing buildings. These evaluations will identify the most unsafe existing buildings in your jurisdiction. They might not include sprinkler systems for all of the existing building but the evaluations should mandate sprinkler systems for the most unsafe buildings.

- NFPA 101 Assembly Occupancies
- NFPA 101A
- IBC Chapter 3
- NFPA 5000

### Identifying “TRUE” Costs

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In order to identify the “true” costs associated with the retrofitting on an existing building, you will need to be innovative in the approach. Putting yourself in the shoes of the building owner is a first step toward finding these numbers. Therefore, take your uniform and/or badge off and start looking at the cost elements:

It should be obvious that “money does not grow on trees”, unless of course you are selling trees for a living. Seriously, it will more likely than not be the case where the building owner will need to secure a loan for a lending institution in order to have the monies available to pay for the work. What is the interest rate and cost for the loan?

#### **In theory for example:**

\$100,000 @ 7% for 5-years would be \$118,807.20

- Monthly payments: \$1,980.12
- Total Interest Paid: \$18,807.20
- Loan Fee (2%) would be: \$2,000

\$100,000 @ 7% for 10-years would be \$139,330.80

- Monthly payments: \$1,161.09
- Total Interest Paid: \$39,330.80
- Loan Fee (2%) would be: \$2,000

The hardship of business interruption must also be figured in the cost of retrofitting a building, which is occupied, and especially sensitive when that building has a “residential occupancy usage, such as a hotel, motel, dormitory, apartment, etc. In doing the math in these types of



occupancies, it is important to know and understand the “vacancy factors” and whether the rooms will be available to the contractor without additional arrangements being made.

**Note:** According to information from The Marriott Corporation representative, Marriott retrofitted approximately 38 hotels across the country and their cost for retrofitting ranged from \$800 to \$1,200 per hotel room unit with an average being \$1,000 per room.

Another source for obtaining information is from Fire Protection/Sprinkler Contractors from actual retrofit jobs performed in your area. Having these “local” dollar figures will help you to present your case. Obtaining these numbers “IN-WRITING” can be a challenge in some cases, but this is the only kind of documentation, which can be considered valid.

**Note:** Using the hotel scenario once again, one fire sprinkler contractor retrofitted several hotels and the cost ranged from \$2.00 to \$2.25 per sq ft for multi-story hotels, and \$1.75 to \$1.85 per sq ft for one- and two-story hotels.

### **Putting Retrofit Costs into Perspective**

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Before presenting a Retrofit Ordinance/Regulation to your governing body, it is essential that you research and understand the true costs of these requirements to the Building Owner, Corporation, Association, Tennant, and/or end user. Using numbers such as \$1.50 - \$3.00 per square foot, or \$150,000.00 to \$300,000.00 (100,000 sq ft x \$3.00 = \$300,000.00) may not provide the answers to the questions being asked. It is essential that when putting cost figures together that you have current and accurate numbers that relate to your area of the country and reflect the Real world. The worst thing that one can do is to “low-ball” the dollars it will cost. These numbers will support and/or haunt your efforts.

Considering the cost of retrofitting a high-rise building should be defined in terms of installation criteria, starting with the location, existing water supply, design of the underground/overhead piping, valves, asbestos abatement (spot of total), alarm system (wiring), fees/charges, permitting, inspections, etc.

To assist you in collecting these dollar figures, the following outline of costs has been developed so that you can collect estimates from local Fire Sprinkler Contractors who typically work in your jurisdiction and have a solid understanding/basis of the “true costs” associated with retrofit projects.

#### \_\_\_\_\_ Permits:

- Plan Review Costs
  - Initial Plan Review
  - Back-checks
  - Change Order Reviews
  - Plan Retention Fee

- Construction Permits
  - Underground Service (Water Purveyor)
  - Service Tap/Connection (Water Purveyor)
  - Street Opening (Public Works)
  - Overhead Piping (Building/Fire Department)
  - Electrical (Building Department)

\_\_\_\_\_ Fees/Charges:

- Plan Review Fees (Building/Fire Department)
- Permit Fees (Building/Fire Department)
- Inspection Fees (Building/Fire Department)
- Service Connection Fee (Water Purveyor)
- Backflow/Cross Connection Fee (County/City Health Department)
- Service Tap Charge (Water Purveyor)
- Street Opening Permit (Public Works)
- Monthly Standby Charge (Water Purveyor)
- Monitoring Fee (Central Station monitoring)
- Telephone Line (Local Telephone Company)

\_\_\_\_\_ Inspections:

- Street Opening (Public Works)
- Service Tap (Water Purveyor)
- Overhead Piping (Building/Fire Department)

\_\_\_\_\_ Underground Piping:

- Saw Cuts
- Trenching (backhoe)
- Piping, Fittings, Valves
- Cross Connection/Backflow Device
- Backfill (materials)
- Pavement/Street and Concrete/Sidewalk

\_\_\_\_\_ Overhead Piping:

- Coring (Walls, Floors, Stairwells, etc.)
- Risers (Piping, Valves, Hangers/Bracing, Fittings, Gages, etc.)
- Mains, Cross-mains, Branch-lines, Fittings, Sprinklers, Hangers, Bracing)
- Caulking Material
- Flow/Tamper Alarm Components

\_\_\_\_\_ Fire Pumps:

- Fire Pump(s) (Diesel/Electric)
- Fuel Storage Tank (Diesel)
- Control Panel(s)
- Fire Pump Room
- Monitoring (Run, Trouble, Out-of-Service Alarm)

\_\_\_\_\_ Secondary Water Storage:

- Onsite Water Storage
- Level Monitoring

\_\_\_\_\_ Fire Alarm System:

- Fire Alarm (Flow/Tamper) Wiring
- Fire Alarm (Flow/Tamper) Panels
- Fire Alarm Monitoring/Supervision
  - Onsite
  - Offsite
- Fire Pump/Onsite Water Storage Monitoring

\_\_\_\_\_ Monitoring Costs:

- Monthly Monitoring Charges
- Quarterly Testing/Annual Servicing Charges

\_\_\_\_\_ Maintenance, Service & Testing Costs

- Quarterly Service
- Annual Service & Maintenance
- 5-Year Service, Maintenance & Testing

**Comparing “Apples-to-Apples” verses “Apples-to-Oranges”**

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Whenever you are dealing with costs, code requirements, and/or a retrofit fire sprinkler ordinance, it is important that you are dealing with similar buildings, situations, costs, etc. in addressing issues. Using the installation cost figures for a high-rise office building currently under construction in your area would not be appropriate for an existing high-rise building, which would be required to be retrofitted.

Likewise, using the retrofit costs for an existing high-rise hotel would not be comparable to the retrofit costs for an existing high-rise office building. The hotel might have the option of having a complete floor vacated during the retrofit process; whereas, the office building may not have that option.

The other factor which enters into the “apples to oranges” comparisons is the fact that one building owner may have five or ten buildings which are impacted by the retrofit mandate, while the single building owner would have less work for the fire protection/sprinkler contractor, thus a significant negotiation element for the multiple building owners pricing.

**Stakeholders (Advocates and Adversaries)**

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During the preparation and presentation phases of the retrofit fire sprinkler ordinance development process you will quickly find many groups of people/organizations who are in favor/support, as well as many groups of people/organizations who will be in opposition to the adoption of a retrofit mandate/requirement.

**Example:** *As an example, your jurisdiction is looking to develop and adopt a “Residential Board & Care” Retrofit Ordinance, which would require “ALL” existing Residential Board & Care Homes to be retrofitted with automatic fire sprinklers within 5-years from the date of passage.*

**Question:** *In considering your community, who would be in support (Advocate) and who would be in opposition (Adversary) to such a requirement?*

<u>Advocates Groups</u>	<u>Adversary Groups</u>
<u>Supporters</u>	<u>Opposition</u>
_____ Councilman/Supervisor _____	
_____ City Manager/Administrator _____	
_____ Fire Chief _____	
_____ Firefighters _____	
_____ Firefighters Assn./Organization _____	
_____ Fire Prevention Bureau _____	
_____ Other Local Fire Departments _____	
_____ General Public _____	
_____ Building Industry Assn. _____	
_____ General Bldg. Contractors _____	
_____ Fire Sprinkler Contractors _____	
_____ Architects _____	
_____ Developers _____	
_____ Water Purveyors _____	
_____ Insurance Companies _____	
_____ Insurance Brokers _____	
_____ Finance/Revenue Div./Dept. _____	
_____ Planning Department _____	
_____ Control/Slow Growth Groups _____	
_____ Fire Protection Engineers _____	
_____ Professional Engineers _____	
_____ Consulting Engineers _____	
_____ Interior Designers _____	

The support/opposition factions will also be evident within the Fire Department itself. The questions that will arise may focus on current staffing levels and if through the adoption of the retrofit mandate, will the staffing levels will decrease or increased in order to address the perceived decrease/increased workloads (processing, plan review, field inspection, fire fighting, responses, etc.)?

It is important to recognize that the increase workload of the Fire Prevention Bureau (FPB) for processing, plan reviews, field inspections, etc. will be limited to the timeframes established for the implementation and completion of the retrofit program(s) and that once that has been accomplished, it may be necessary to reassign and/or reduce staffing levels with the FPB.

### **Establishing a Realistic Timeframe for Compliance:**

It is essential that you consider and recognize the issues surrounding a “Realistic” timeframe for compliance by a building owner to the mandates of a retrofit fire sprinkler ordinance/law. It is important to recognize not only the practical abilities of a building owner to have a fire sprinkler system installed, while the building is occupied, but also the financial implications as well.

The retrofit provisions must, therefore, be realistic as to compliance timeframes, whether that be 1-year, 5-years, or 8- to 10-years down the road. Often there are established benchmarks by which certain elements must be completed to show progress; letters of notification/agreements, plan submittals, basic piping system (risers), common areas, and in the case of residential occupancies the living area.

It is important to point out that unlike a commercial building which typically would have occupants in it during regular business hours, a residential building is assumed to be occupied 24-hours a day, 7-days a week, 365-days a year. Retrofitting a residential high-rise building takes careful planning and working in very defined and regimented restrictions as to not have a negative impact on the occupants. Drilling holes, cutting and hanging pipe, etc in the evening hours may work for a commercial building (which is unoccupied); however, in a residential building this would not be acceptable, nor tolerated.

Often, listening to the tenants and managers of these buildings can be very informative. It might be that the timeframe for a residential high-rise retro-fit would entail wording such as:

- “within a timeframe of 5-years”, or
- “when units become available due to vacancy and/or sale”, or
- “upon change in ownership”, or
- “within the timeframe of 5-years or when the tenant requests, or
- “floors above the 15<sup>th</sup> floor within 2-years, above the 10<sup>th</sup> floor within 3-years, above the 5<sup>th</sup> floor within 5-years, and above the 1<sup>st</sup> floor within 7-years”.

It is important to work with the building owners and tenant associations to create a spirit of support and cooperation, rather than a feeling of resentment and obstructionism. Be open to opportunities to support each other’s position.

### **Lack of Knowledge and Understanding (Addressing the “MYTHS” about Automatic Fire Sprinklers)**

It is interesting that the misconceptions related to fire sprinklers continues to spread mistrust and perceptions about fire sprinkler protection. These fictitious stories reflect a lack of understanding and knowledge on the operation of fire sprinklers in general and has probably caused many lives have been lost because political decisions were made based on these non-truths. While we have heard them before, it is essential that any proposal must address these fictitious statements and to educate the general public, stakeholders, and elected officials before embarking on the effort to consider the adoption of a fire sprinkler ordinance for residential occupancies.

**Fire Sprinklers May Go Off Accidentally.**

**WRONG...** Loss records from Factory Mutual Research showed that the probability of a fire sprinkler accidentally discharging due to a manufacturing defect is only 1 in 16-million sprinklers per year in service.

**If One Fire Sprinkler Goes Off, They All Go Off.**

**WRONG...** Fire Sprinklers are manufactured to react to temperatures in each room individually. Normally, only the fire sprinkler nearest the fire will activate. Data shows that in residential fire scenarios, usually a single fire sprinkler will control a developing fire.

**Fire Sprinklers Cause Excessive Water Damage.**

**WRONG...** Consider this: a single firefighter using a normal 1-1/2” fire hose can be applying between 175-400 gallons of water per minute when attempting to extinguish a fire. On the other hand, a single fire sprinkler will be flowing between 18-40 gallons of water per minute. Do the math: (given a 5-minute fire scenario)

Fire-fighter with 1-1/2” hose:

175 x 5 = 875 gallons of water  
 400 x 5 = 2,000 gallons of water

Fire sprinkler system:

18 x 5 = 90 gallons of water  
 40 x 5 = 200 gallons of water

**Note:** As a general rule, 1/10<sup>th</sup> the water is discharged (directly onto the fire origin) when automatic fire sprinklers are activated (by heat) to control/extinguish the fire. ([www.homefiresprinkler.org](http://www.homefiresprinkler.org) - Fire Sprinkler Facts)

**Fire Sprinklers Are Just Too Expensive To Install.**

**WRONG...** Studies have proven that the cost of installing fire sprinklers has actually decreased over the past 5-10 years. The cost of installing fire sprinklers depends, to a large part, on five factors: 1) THE SIZE OF THE BUILDING, 2) THE CONSTRUCTION LIMITATIONS/RESTRAINTS, 3) THE AVAILABLE WATER SUPPLY, 4) THE PIPING MATERIALS BEING USED, AND 5) THE LAYOUT (DESIGN) OF THE FIRE SPRINKLER SYSTEM.

In most instances the cost of fire sprinklers systems parallels the cost of the floor coverings in the home. Obviously, the “quality” of the floor covering or carpeting will be reflected in the cost of that covering. Consider the cost of carpeting:

**“StainMaster Carpeting”** in a recent weekly newspaper insert advertised for \$19.99 per square yard. That computes to \$2.22 per square foot, because there are 9 square feet in a square yard.

In that same advertisement, **“Karastan Carpeting”** was being sold for \$29.99 per square yard. That calculates to \$3.33 per square foot, because once again there are 9 square feet in a square yard.

Therefore, if the building is average, the cost to retrofit will be average, while in an upscale building, the fire sprinkler installation will typically reflect the upgrade of the buildings surroundings.

# # # #

## Part IV Preparing the Necessary Documents

### Statistical Data Collection and Utilization:

For fire protection decisions to be supported, they must be based upon sound engineering practices, and information, which are true and current statistical data. To that end, it is essential that during the preliminary stage of research that a systematic approach be undertaken to collect that data which is pertinent to the issues that will be discussed and raised. The old axiom “garbage in – garbage out” is especially true when it comes to what data can and will be utilized for your justification and future presentation.

As the model codes move towards the performance-based models for the design of buildings and their component systems, this premise will become even more essential. Statistics and Studies must be current (5-years or less preferred).

What Fire Data Reporting System does your agency utilize, and does it have the statistics you will be able to utilize?

- National Data
  - National Fire Incident Reporting System (NFIRS)
  - Fire Data Management System (FDMS)
- State/Regional Data
  - [Example:] California Fire Incident Reporting System (CFIRS)
- Local/Area Data
  - Individual Agency Data Collection Systems

Local fire agencies often collect a comprehensive and very thorough statistics, which are utilized in Department Annual Reports. These statistics are easily obtained and can reflect trends in the sheer number of responses over the past several years. Consider the number of responses (calls) your department/agency made just ten (10) years ago, in comparison to today. This can be used very effectively to show your elected officials the past and current workloads.

Ten-Year History of Responses (example):



**XZY Fire Department/Agency**  
(Number of Actual Responses)

Month	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991
Jan.	178	186	197	207	159	102	76	78	64	38	80
Feb.	144	147	167	164	143	112	66	65	60	46	53
Mar.	192	168	172	169	127	96	92	76	65	65	77
Apr.	172	165	178	187	159	109	84	63	63	72	70
May	163	184	199	169	162	93	89	83	62	73	58
June	203	192	180	187	167	106	119	83	66	91	69
July	221	221	178	169	180	117	105	76	89	86	76
Aug.		177	190	187	170	114	110	84	68	73	68
Sept.		154	189	165	182	103	72	75	58	74	92
Oct.		205	198	196	204	122	88	89	83	69	71
Nov.		206	214	179	161	155	79	76	80	73	63
Dec.		200	189	187	165	156	82	92	71	86	57
Totals:		2,205	2,251	2,166	1,979	1,385	1,062	940	829	846	834

When using this type of graph of the responses which reflect a ten (10) year span of time, it must also be clearly defined in your presentation document “if” additional Fire Stations have been added, additional Staffing has been added, and above all, if additional lands have been added to the Department/Agency during that same timeframe. If additional Services, such as Emergency Medical Services (EMS) Hazardous Materials Services (HazMat), or Medical Transport has been initiated.

In addition to this recap of the Department/Agency Response Chart, it is important to define the “actual fires” which have occurred within the past year to eighteen (18) months. This can also be very effective in re-enforcing the facts, which may have been forgotten and/or initiated the fire sprinkler concept. Consider the following format:

**XYZ Fire Department/Agency**  
(Structure Fire Listing: January to Date)

<u>Date</u>	<u>Report No.</u>	<u>Address</u>	<u>Type of Building</u>	<u>Nature of Fire Origin</u>
00/00/00	04-000025	123 Fire Ln.	SFD	Electrical

Depending on the valuations of these above listed fires, you may wish to include a column that indicated the dollar value lost; however, this could be a separate chart, showing valuations over the past several years.

The City of Scottsdale, Arizona has been unique opportunity to study a rapidly growing community, and utilizing the fire sprinkler technology for both commercial and residential construction. In July of 1985 the City of Scottsdale passed Ordinance #1709, which, when the city finally reaches its full growth potential, it is estimated that it will be a community with over 300,000 residents and more than 65% of the residential homes and 85% of the commercial property will be protected by automatic fire sprinkler systems.

The impact and installation costs have been reduced dramatically, from \$1.14 per square foot to \$0.59 per square foot. The average fire loss per sprinklered incident was only \$1,945, compared to a non-sprinklered loss of \$17,067. According to the Automatic Sprinklers – A 10 Year Study (A detailed history of the effects of the automatic sprinkler code in Scottsdale, Arizona (1997 – by Assistant Chief Jim Ford – Rural/Metro Fire Department, Scottsdale, Arizona) “Automatic protection had a direct role in saving eight (8) lives. Additionally, the study reflected that one or two fire sprinklers controlled or extinguished the fire 92% of the time, with the majority of the exceptions a result of flammable liquid fire incidents.

These statistics taken from the Scottsdale AZ 10-Year Study (and just released additional 5-Year Study) are not unusual. To read this impressive 10- and 15-Year Study visit the Home Fire Sprinkler Coalition website: [www.homefiresprinkler.org](http://www.homefiresprinkler.org) and simply type in ResourcesScottsdale.htm. You can download this Report in PDF File Format (5.3mb).

# # # #

## Part V The Adoption Process

### Strategies to Winning Adoption/Approval:

Preparation is the “KEY” to success, and when proceeding with the development and adoption of a retrofit fire sprinkler ordinance, it is essential to have your proposal both user friendly (for the presenter) and clearly defined (for the political decision makers). With the planning, research and analysis accomplished (Parts I, II, III, and IV) it is now time to focus on the presentation. The following considerations must be clearly known and defined regarding the presentation:

Who will be making the presentation before the Council, Fire Board, or Board of Supervisors/Commission?

- City Manager/County Administrator
- Fire Chief
- Fire Marshal
- Building Official
- Community Development Director

What will be the format for the presentation?

- Memorandum
- Report
- Verbal Presentation
- Overhead Charts & Graphs
- Slide Program
- PowerPoint Presentation
- Video Tape(s)
- Combination of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

**Note:** *Video tapes such as “Count down to Disaster”, “Fire Power”, etc. could prove effective in educating all parties in understanding the concept and functional operation of automatic fire sprinklers; however, they are somewhat lengthy and might best accomplish this educational process if given to the Councilmen, Board Members to review in the comfort of their homes/office.*

What type of forum will the presentation be made to?

- Media – Editorial (Print/Broadcast)
- Regular Scheduled Meeting (Agenda Item)
- Special Session
- Study Session
- Joint Meeting of the Council and Planning Commission
- In conjunction with the adoption of other “Codes/Regulations”

How much time will be allocated to the presentation?

- Will the time be limited?
  - Do not go over the allocated time limit
  - The limit is \_\_\_\_\_-minutes
- Will the audience be allowed to speak?

What is the Political Process (timeframes) of “Public Hearings”?

- Draft Ordinance/Legislation
- Identify Sponsor to Introduce Ordinance/Legislation
- Place on Agenda
- First Reading of the Ordinance at Public Hearing
- Waiting Period between 1<sup>st</sup> and 2<sup>nd</sup> Reading (2-weeks/30-days?)
- Second Reading of the Ordinance at Public Hearing
- Waiting Period before Ordinance goes into affect
  - Emergency Ordinance (immediate)
- Appeals Process
  - If someone appeals between 1<sup>st</sup> and 2<sup>nd</sup> Reading, or after 2<sup>nd</sup> Reading, what is the process to be undertaken?

How many copies of materials will be required?

- Number of copies \_\_\_\_\_-copies
- Who will be responsible for the printing/distribution?
- When should the masters be submitted to be in the packets?

**Note:** Consider the lead-time necessary to insure your materials are on time and have the highest quality.

**Presentation must be of the “Highest Quality”:**

The “Document” (Report, Memorandum, Presentation Package) must be of the highest quality and must fit the format typically used by the agency. It may be necessary to review documents from other Departments to insure that the presentation is consistent with the organizational culture. Another element of the document preparation is to recognize that people in a technical field; such as fire protection, need to express their ideas clearly and limit the use of engineering, scientific, and/or highly technical terms.

The following is a typical format for a “Staff Report” which is often used to present a proposed change to an organization:

Heading Section

To: (Mayor and Members of the City Council)

Via: (City Manager)

From: (Department Head)

Date: (Date of Council Meeting)

Subj: (Topic to be Presented)

Body Section

- RECOMMENDATION:** *(This section would simply state the staff Recommendations)*
- EXECUTIVE SUMMARY:** *(This section would be a short, 1-4 sentence summary or purpose of the staff report)*
- BACKGROUND:** *(This section would provide historical information up to the point where the analysis of the situation or issue would begin. Examples would include:*
- *Past staff reports*
  - *Surveys and studies*
  - *Prior decisions or policies*
- ANALYSIS:** *(This section would analyze the situation or issue from the current perspective and may include some or all of the following items:*
- *Environmental Impacts*
  - *Financial Impacts*
  - *Scheduling/Timing*
  - *Pros and Cons/Controversies*
  - *Evaluation of data/proposal/statistics*
  - *Legal considerations*
- ALTERNATIVES:** *(This section would define any viable alternatives to the proposal or issue which could receive consideration.*
- Attachments:** *(List of supportive documents, by title.)*

An alternative format, sometimes used would reflect the following elements:

\_\_\_\_ Heading Section

*To: (Mayor and Members of the City Council)*

*From: (Department Head)*

*Date: (Date of Council Meeting)*

*Subj: (Topic to be Presented)*

\_\_\_\_ Body Section

**EXECUTIVE SUMMARY:**

**RECOMMENDATIONS:**

\_\_\_\_ *Requested Action/Listing of Action Items*

**BACKGROUND:**

**HISTORICAL OVERVIEW:**

**DISCUSSION:**

**REFERENCES:**

**APPENDICES:**

It can not be stressed enough that it is not the amount of material and paper that is presented, but rather the quality of the information needed to can best state the necessity for the sprinkler ordinance. The Staff Report should be limited and that where possible, charts and critical data

are easily understood at a glance. Considering the huge amount of paper/reports being reviewed by elected officials, getting to the point quickly is often more effective.

**Developing Materials which Can be Effectively Used During the Presentation:**

During the Planning, Research, and Analysis Phase of a retrofit fire sprinkler proposal, a list or materials is suggested. Now is the time (from the start) to organize that material as you prepare for your presentation. Consider these elements:

- \_\_\_\_\_ Utilizing the “Binder Concept”
  - \_\_\_\_\_ Information at your fingertips
  - \_\_\_\_\_ Dividers for easy retrieval of Supportive Data and Information
- \_\_\_\_\_ The “Ordinance” (Resolutions and Guidelines)
  - \_\_\_\_\_ Written in accordance with State law

***Note:*** *Be prepared to know if your state statutes are “minimum”, “maximum”, and/or “minimum/maximum” laws which allow or prohibit a local agency from being more restrictive than state law.*

- \_\_\_\_\_ The “Ordinance” (Resolutions and Guidelines)
  - \_\_\_\_\_ Written in accordance with organizational policy

***Note:*** *Make certain that the fire sprinkler regulations being proposed do not create conflict with Building and/or Fire Codes.*

**Discussion of the “Proactive” verses “Reactive” Elements of Fire Protection:**

As great as a fire department may be in responding to a fire emergency, or any emergency for that matter, it must be said that it can only respond to the alarm once it has been called in and/or dispatched. Until arrival at the scene of an emergency, there is little that can be accomplished to control and extinguish a fire. Both the fire-fighter and the automatic fire sprinkler work a “24-7-365” schedule (24-hours, 7-days a week, 365-days a year). The difference is that a fire sprinkler is located directly over the area of fire origin and can operate as soon as the temperature in that area reaches the activation temperature (which in the case of a residential fire sprinkler is 135-170-degrees F).

Similarly, an automatic fire alarm system works a “24-7-365” schedule but can only detect and alert the fire department or occupants in the event of a fire. While the need for detection and notification is essential, through the use and installation of smoke detectors, for a balanced fire protection design, it must also be recognized that fire detection proactively control the growth of a fire, while the automatic fire sprinkler system designed and installed in accordance with NFPA 13 (Standard for the Installation of Sprinkler Systems) is to provide a reasonable degree of protection for life and property from fire.

**Special Note:** It is worthy of noting that a fire sprinkler, designed and installed in accordance with the standard (NFPA 13R – Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height and/or NFPA 13D – Standard for the

Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes)“is expected to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated.”  
(Section 1-2 of NFPA 13R and Section 1-2 of NFPA 13D, 2002 Editions)

The above Sections are referenced only to clarify a pitfall that often results from the miss-use and/or misgivings of those who would require a system, installed in accordance with NFPA 13R and/or 13D based on that system being used for not only “Life Safety, but also for Property Protection. While many fires have been controlled and extinguished as a result of the activation of fire sprinklers in a residential occupancy protected by an NFPA 13R and/or 13D System, they have not been designed for that purpose.

A residential fire sprinkler system is designed as a fast-response sprinkler making the time of temperature activation much less than that of a conventional sprinkler. Additionally, the discharge characteristics are required to throw water within 28” of the ceiling, thus a high-wall wetting pattern, along with the fast-response criteria helps the residential sprinkler system control or suppress typical residential fires with (water) flows much lower than the standard sprinklers.

In comparing a residential fire sprinkler system designed in accordance with NFPA 13R and NFPA 13D, to a conventional fire sprinkler system (NFPA 13) typically found in a commercial building, the following differences should be pointed out:

\_\_\_\_\_ **NFPA 13, 2002 Edition**

- (Standard for the Installation of Sprinkler Systems)
  - 331-pages of installation criteria
  - Four (4) operating sprinkler criteria (residential) [11.2.3.5.1]
  - Water Supply – capable of providing the required flow and pressure for the required duration [15.1.2]

\_\_\_\_\_ **NFPA 13R, 2002 Edition**

- (Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height)
  - 24-pages of installation criteria
  - Up to a maximum of four (4) sprinklers operating sprinkler criteria [6.7.1.2]
  - Water Supply – domestic supply (preferably) [A.6.5.3]

\_\_\_\_\_ **NFPA 13D, 2002 Edition**

- (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes)
  - 26-pages of installation criteria
  - Two (2) operating sprinkler criteria [8.1.2]
  - Water Supply – domestic supply (preferably) [A.6.3]

\_\_\_\_\_ Performance of current technology (quick response):

\_\_\_\_\_ Automatic Fire Sprinkler Technology as an element of a  
“Systems Approach to Fire and Life Safety”

\_\_\_\_\_ Fire Research as it relates to “Built-In” Protection (See Appendix Item “B”)

**Property Protection vs. Life Safety Protection:**

Typically, when discussing fire sprinkler protection the issue is raised as to whether a residential fire sprinkler system is a “Life Safety System” or also designed for property protection. When addressing this issue it must be pointed out that the design criteria is established “*to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated*” (NFPA 13R and NFPA 13D) and therefore must be considered a “life safety system”; however, a benefit of the system is that in being designed “*to prevent flashover (total involvement) in the room of fire origin*” the system will reduce the property damage resulting from a fire.

While you may develop additional benefits, here is a start to what a residential fire sprinkler system can accomplish:

- \_\_\_\_\_ Fire Sprinklers protect building occupants
- \_\_\_\_\_ Fire Sprinklers protect buildings and property
- \_\_\_\_\_ Fire Sprinklers protect Fire Fighters who are asked to perform entry for search and rescue and then to extinguish fires in buildings.

# # # #



## Part VI Implementation and Customer Service

### Considerations Related to “Customer Service”:

Before defining what elements need to be developed, modified and/or added to your current Application, Review, Permit Issuance, Inspection and Final Inspection procedures and processes, it is essential to first define and have clearly in mind who your intended “**Customers**” are.

When considering the adoption or having adopted a retrofit fire sprinkler ordinance (whether it is exclusively residential and/or in general in scope), it is critical that you identify the target audience, thus the customers who will be impacted by the requirements. The list of customers could include:

1. Building Owner
  - Onsite and/or Absentee
2. Building Tenants
  - Demographic Information
3. Tenant Groups/Association(s)
  - Real Estate Sales Groups
  - Condominium Associations
  - City/County Housing Authorities
4. Business Association(s)
  - Control Growth Groups
  - Slow Growth Groups
  - Chamber of Commerce
  - Insurance Companies
  - Insurance Brokers
5. Fire Protection Contractor
  - Sprinkler Fitters Unions/Associations
6. General Building Contractor
  - Home Builders (NHBA, CBIA, BIA Chapters)
7. Fire Protection Engineer
  - Local Chapters of Society of Fire Protection Engineers
8. Architect
  - Interior Designers
9. Developers
  - Local, State and National
10. Water Purveyor(s)
  - Public (typically regulated by a Public Utilities Commission)
  - Private (typically regulated by a State or County Health Agency)
11. Consultant(s)
12. Councilmen/Supervisors/Board Members
13. City Manager/Administrator
14. General Public

- 15. Fire Department
  - Firefighters
  - Firefighter Associations
  - Fire Prevention Bureau Staff
  - Other Fire Departments/Agencies
- 16. Planning Department
  - General Plan Provisions
- 17. News Media
  - Printed (newspapers, periodicals, etc.)
  - Broadcast (radio, television, etc.)
- 18. Others (be specific)

As you can tell from looking at the list of potential customers, each will have a different level of knowledge and understanding of construction law, building regulations, permit processing and plans and specifications and each will have a different vested interest in the retrofit ordinance and/or its implication(s). To address each group of individuals could prove to be complex and a single document could be lengthy; however, addressing the issues and process in a systematic approach could help to reduce the number of questions each might have, while creating a system which promoted uniformity and helps to speed up the application/inspection process.

**Developing a Strategy to Assist the Customer(s):**

- \_\_\_\_\_ Establishing the philosophy of “Customer Service”
  - \_\_\_\_\_ Define the “Concept” as it relates to your particular agency.
  - \_\_\_\_\_ Define the general issues that will need to be addressed.
- \_\_\_\_\_ Identifying the necessary information that must be conveyed from your agency to the customer.
- \_\_\_\_\_ Create a listing of the criteria for use by the “Customer” which discusses the retrofit requirements and outlines the various Codes/Standards being utilized for the various Occupancy Classifications.

**Example #1:**

Apartment Buildings: (4-stories or less in height)  
 Installation Standard to be used: NFPA 13R, 2002 Edition

**Note:** *Be specific as to the provisions in Section 6.8 (Locations of Sprinklers)*

**Example #1-a:**

Apartment Buildings:  
 (5-stories or more in height)  
 Installation Standard to be used: NFPA 13, 2002 Edition

**Note:** *Be specific as to the provisions in Section 11.2.3.5 (Residential Sprinklers) as to the design area, and to the criteria outside the “dwelling unit” and clarify the provisions outlined in Section 8.14.8 (Dwelling Units) as they relate to the coverage in bathrooms and clothes closets, linen closets and pantries.*

- \_\_\_\_\_ Defining criteria needed to accomplish the tasks:
  - \_\_\_\_\_ Number of Plans/Calculations to be submitted
  - \_\_\_\_\_ Detail listing of what needs to be shown on the plans
  
- \_\_\_\_\_ Defining the “Process/Procedures”:
  - \_\_\_\_\_ Turn-Around times
    - Example: (5-working days, 2-weeks, etc.)
  - \_\_\_\_\_ Pre-Submittal Reviews (optional)
  - \_\_\_\_\_ Initial Plan Review
  - \_\_\_\_\_ Back-Check
  - \_\_\_\_\_ Change Order Plan Reviews
  - \_\_\_\_\_ As-Built Drawings
  
- \_\_\_\_\_ Collection of Fees and Charges:
  - \_\_\_\_\_ Plan-check Fees
  - \_\_\_\_\_ Permit Fees
  - \_\_\_\_\_ Inspection Fees
  - \_\_\_\_\_ Penalty Inspection Charges/Fees (not ready, 2<sup>nd</sup> or 3<sup>rd</sup> re-inspection)
  - \_\_\_\_\_ Additional Charges/Fees (Back-Check, Change or As-Built Reviews)
  - \_\_\_\_\_ Plan Achieve Fees (per set or per page)
  
- \_\_\_\_\_ Anticipating the common questions raised by the customer(s):
  - \_\_\_\_\_ (Put yourself in the customers shoes and ask the basic/complex questions)
  
- \_\_\_\_\_ Recognize the Customers Needs:
  - \_\_\_\_\_ Don’t overwhelm the customer with “bureaucratic” procedures and/or language. (write in plain English)
  - \_\_\_\_\_ Try to avoid technical words which are often used by the Fire Service and/or Fire Protection Industry, but may mean nothing to the general public.
  
- \_\_\_\_\_ Informing the Architects/Engineers/Contractors:
  - \_\_\_\_\_ If a question was raised even once by one applicant, the answer could/should be published for any current/future applicant.
  
- \_\_\_\_\_ No Surprises, No Problems:
  - \_\_\_\_\_ Have the criteria outlined in a handout before the adoption process so that you can show the governing Board/Council that the adoption was well thought out and well planned.

**Special Note:** Don’t change the process/procedures after the adoption. The best way to create a forum for a challenge is to change the process/procedures for inspections, request for inspections, scheduling, re-inspections, corrections, etc. after the fact.

### **Creating and Utilizing Charts and Matrix to show the Process/Procedures:**

One of the best ways to inform your customer(s) on how to prepare, submit, and have a clearer understanding of your agencies processing/procedures for obtaining a permit and/or inspection is to document the system under which you are working. To accomplish this consider utilizing a flow-chart and/or matrix form of describing your organizational requirements. To accomplish this task you will need to clearly understand not only your organization/agency, but also the other Departments/Divisions you coordinate your efforts with (Planning/Community Development, Building Inspection Services, Public Works and the Water Purveyor). In many communities there is a combination of the above services in one or more Departments/Divisions.

### **Organizational Chart/Matrix:**

*(See Appendices "E" for Example)*

It is important for your organization and for the potential customer to have a clear understanding of where and how the Fire Prevention Bureau relates to the other Departments/Divisions within and outside of your governmental entity. When developing the Organizational Chart/Matrix, make certain that the position is clearly defined with respect to depth (level) within the organization (Agency, Council, Manager, Department, Division). This will help if a customer wishes to appeal a decision to the higher level.

\_\_\_\_\_ This Organizational Chart/Matrix quickly becomes the "Chart of Appeals" by which a customer knows who has authority above the Fire Prevention Bureau (Fire Marshal)

\_\_\_\_\_ Recognize that everyone has a boss and the right to appeal a decision is a normal right of a customer, given the "true" facts of the challenge.

\_\_\_\_\_ While City and County Fire Departments are fairly simple to define, Special Districts and other multi-agency Fire Departments can become more complex.

\_\_\_\_\_ The key Departments and Divisions that need to be clearly defined include the Fire Department/Fire Prevention Bureau, Community Development/Building Inspection Division, and Public Works/Water Division.

### **Plan Review Process Chart/Matrix:**

*(See Appendices "F" for Example)*

The Community Development (Planning) Department Plan Review Process is extremely helpful to educate the Architect, Developer Engineer and to a lesser degree the Contractor understand the layered approach to reviewing large and/or complex projects. These preliminary reviews help to outline the agencies general requirements and to help steer the proposed project in a positive direction. While specific code requirements and formal plan reviews are not accomplished at this level, these preliminary reviews and study sessions help to define what will be expected when the plans are finally submitted for review to the Building Department/Division and Fire Department/Prevention Bureau.

- \_\_\_\_\_ Utilize the Planning Review Process to inform the applicants of Fire Department conditions and requirements:
  - \_\_\_\_\_ Accessibility Issues
  - \_\_\_\_\_ Water Supply Issues
  - \_\_\_\_\_ Fire Sprinkler Requirements
  - \_\_\_\_\_ Plan Review Requirements
  - \_\_\_\_\_ Permit Issues

- \_\_\_\_\_ Formalization of the Fire Department requirements within the City/County “General Plan” and to insure that it is current and being administered by both the City/County as well as the Fire Agency is an ongoing issue.
  - \_\_\_\_\_ Review the current General Plan with emphasis on the Fire Department criteria.
  - \_\_\_\_\_ Revise as deemed necessary any out-dated and/or necessary additional requirements.

**Special Note:** The “General Plan” of a community is the cornerstone of the planning and development future and is reviewed and revised periodically by the Planning Department. This is often an overlooked document to the Fire Service, but can hold the key to many progressive and innovative construction features that can enhance the fire protection of the community.

**Building Permit Process/Matrix:**  
*(See Appendices “G” for Example)*

Most (if not all) applicants who are required (or voluntarily wish) to install a fire sprinkler system simply want to know what the process is for submitting an application, plans and supportive data, and to have a clear understanding of what the turn-around time will be. The “Building Permit” Process Chart/Matrix, whether administered by the Building Inspection Department/Division and/or the Fire Department is an effective tool to show (outline) the process under which they will be required to follow.

- \_\_\_\_\_ When developing the Chart/Matrix, place yourself in the applicants shoes and diagram, step by step, the process.
  - \_\_\_\_\_ Be as specific as possible.
  - \_\_\_\_\_ Check with other Departments/Divisions to insure that you have the correct terms and location on the diagram where they are involved.
- \_\_\_\_\_ Remember that with any business; the “Fees/Chargers” paid become a significant element, which must be identified and defined.

**Inspection Sequence Chart/Matrix:**  
*(See Appendices “H” for Example)*

The Inspection Sequence Chart/Matrix is critical internally as well as externally to insure that the Agency’s Staff as well as the Customer knows when to have certain inspections. All too often it is assumed, by the local authority having jurisdiction (AHJ), that everyone knows when to call for, and when to perform certain inspections.

**Note:** Working closely with your Building Official this Chart/Matrix can be developed in a relatively short period of time, but can have lasting impact of workload and efficiency.

\_\_\_\_\_ Starting with the Building Code (2000 Edition - International Building Code, Section 109 or 2003 Edition of the NFPA 5000, Section 1.8.6.6) the sequence of inspections can be developed.

\_\_\_\_\_ It is essential that the Building Inspection and Fire Department Inspections be somewhat consistent so that the construction industry is not confused.

\_\_\_\_\_ Defining as many detailed inspections as possible will help to support the effort, thus creating a consistency between multiple inspectors from the same agency.

**Fire Prevention Bureau Plan Review Process (Codes/Elements):**

*(See Appendices "I" for Example)*

The "Plan Review Process Chart/Matrix" helps to clarify as many of the Codes and Standards, which will be utilized during the plan review process, and will highlight many of the elements that will be evaluated during the plan review process. These elements become "red flags" for architects, contractors and owners to recognize as they prepare their plans.

\_\_\_\_\_ When listing Codes and Standards, attempt to prioritize based on the highest level of authority; State Law, followed by Locally Adopted, and followed by "nationally recognized" Standards and so-forth.

\_\_\_\_\_ This listing does not need to get into the detail of the various NFPA Standards at this point.

\_\_\_\_\_ When listing the "elements" keep in mind that as you list each, you should have a guideline (handout) which would be written detailing each of these issues (fire apparatus access, water supply, etc.).

\_\_\_\_\_ These "Guidelines" (handouts) become effective tools to give to the customers who are required to address these elements during the development of their project.

**Strategies to be used to insure "TRUE" Customer Service:**

\_\_\_\_\_ Consider the customer whenever you are developing a procedure, guideline, adoption of a requirement, or changing an existing requirement.

\_\_\_\_\_ Put yourself in the applicant's position.

\_\_\_\_\_ Discuss conceptual ideas with various customers (Owner-Builders, Architects, Developers, Contractors, Water Purveyors,).

- \_\_\_\_\_ Take an objective look at the Plan Review Process and see if adequate information has been provided to clarify what you are requiring.
  - \_\_\_\_\_ Is your staff technically ready to implement a new program?
    - \_\_\_\_\_ Will the level of training and education of staff members be required prior to implementation?
    - \_\_\_\_\_ Does the reference library your staff utilizes have adequate and current publications (books, etc.) necessary for them to perform their function?

**Effective Customer Service:**

Developing the Guidelines (handouts) before you adopt a fire sprinkler ordinance can save you time, effort and headaches over the long haul. Getting it in the hands of the local active Architects, Developers, Engineers, Fire Protection Contractors and Home Building Contractors can be the difference between success and failure. Being prepared, and service oriented can prove very effective and a prudent expenditure of time and effort.

Being aware of your customers is essential.

- \_\_\_\_\_ Develop a mailing list of Actively working Architects, Developers, Engineers, Fire Protection Contractors, Building Contractors, and Business Owner Association(s).
  - \_\_\_\_\_ Use this mailing list to distribute useful information that can make their business and your agency work together as a team.

**Developing a Department Guideline (handout) for your “Fire Sprinkler” Customer:**

The purpose of this handout is to create a document which can be given to an Architect, Fire Protection Contractor, Developer, Owner-Builder, or Tenant/Renter that will assist the individual/firm in preparing, submitting, installing and obtaining the necessary inspections. The document will be a vehicle by which the applicant will know what is required and how to obtain the necessary approvals.

**Special Note:** While the handout being described covers both commercial (NFPA 13) and residential fire sprinkler systems (NFPA 13, NFPA 13R, and NFPA 13D) you should consider developing two separate handouts that target the two different, yet similar audiences. This will reduce confusion and will assist the Construction Professionals (Architect, Contractor, Developer) and/or Business Owner (Building Owner, Tenant, etc.).

**Criteria to be included in Guidelines:**

**Section I - Codes and Standards:**

- \_\_\_\_\_ Building Code (Edition) currently adopted.
  - \_\_\_\_\_ Ordinance No. \_\_\_\_\_
- \_\_\_\_\_ Fire Code (Edition) currently adopted.
  - \_\_\_\_\_ Ordinance No. \_\_\_\_\_
- \_\_\_\_\_ Standards (be specific as to which ones) currently adopted.

\_\_\_\_\_ Ordinance No. \_\_\_\_\_  
 \_\_\_\_\_ By Reference?

**Section II – Plan Review Procedure:**

\_\_\_\_\_ Drawings and supportive calculations shall be submitted to:

- \_\_\_\_\_ Name of Agency
- \_\_\_\_\_ Address
- \_\_\_\_\_ City, State, Zip
- \_\_\_\_\_ Phone Number
- \_\_\_\_\_ Fax Number
- \_\_\_\_\_ E-Mail Address
- \_\_\_\_\_ Office Hours (MTWTF)
  - \_\_\_\_\_ 8:00 a.m. to 12:00 (noon)
  - \_\_\_\_\_ 1:00 p.m. to 5:00 p.m.

\_\_\_\_\_ Minimum number of drawings and supportive calculations

\_\_\_\_\_ Details on Drawings shall include:

- \_\_\_\_\_ NFPA 13, 2002 Edition (Chapter 14, Section 14.1.3)
  - \_\_\_\_\_ Review and outline the 44 items listed to insure that your agency accepts at least these criteria.
  - \_\_\_\_\_ Add to the listing any changes and/or additional requirements.
    - \_\_\_\_\_ Be specific and make certain that it stands out from the original 44 items required by NFPA 13.
- \_\_\_\_\_ NFPA 13R, 2002 Edition (Chapter 6, Section 6.1.7)
  - \_\_\_\_\_ Review and outline the 25 items listed to insure that your agency accepts at least these criteria.
  - \_\_\_\_\_ Add to the listing any changes and/or additional requirements.
    - \_\_\_\_\_ Be specific and make certain that it stands out from the original 25 items required by NFPA 13R.
- \_\_\_\_\_ NFPA 13D, 2002 Edition (Plans not required by document.)

**Special Note:** Most authorities having jurisdiction (AHJ) will require plans and calculations to be submitted; however, NFPA 13D does not outline what those plans should contain. The following is a listing of what might be considered a minimum set of criteria for these systems:

Plans are prepared basically for two purposes:

- I. Installation Instructions
- II. Submittals for approval by the AHJ

- A site plan showing the footprint of the structure, any access roads, nearest fire hydrant(s) and size and location of the water supply.
- A reflected ceiling plan showing sprinkler head location in relation to walls, beams, and other obstructions that may affect the fire sprinkler spray.
- A piping plan, which includes pipe size, type and center-to-center dimensions if not “cut length” dimensions.



- The piping plan may be shown as part of the reflected ceiling plan, provided it does not make the drawing too confusing.
- Show type and location of hangers or have a general notation regarding hangers. (Copy of cut-sheet/specification sheet of hangers to be used highly recommended.)
- Show hydraulic reference points.
- Show the model of all fire sprinklers that are to be used. (Copy of cut-sheet/specification sheet of each model of fire sprinkler to be used highly recommended.)
- Alarm equipment type and location must be shown.
- The piping plan must show riser detail including all valves, fittings, and other equipment. (Copy of cut-sheet/specification sheet of all valves [backflow/ cross-connection, etc.] flow-switches and other equipment to be used highly recommended.)
- Any building that has other than flat smooth ceilings throughout should include sectional drawings that show the head location in relationship to the “heat traps” or other obstruction features.
- Include hydraulic calculations that can easily be related to the piping plan. The isometric drawing (common to plumbing plans) is one of the best styles of which can be used to relate calculations to piping.
- Include copies of all technical data sheets of the materials that are used in the system.
- All plan submittals shall be prints made from an original drawing; “**NO**”\_cut and paste, or marked-up blue prints should be accepted.
- All plans must be complete to the water supply.
- All plans must include in the title-block the name of the property, the point of compass, and the scale of the drawing.
- All plans must include the title block, the name, address, and phone number of the designer and/or the installer.

**Guidelines should define any deviations from the Standard(s) – NFPA 13, 13R, 13D:**

It is essential that the authority having jurisdiction is clear on what it will and will not accept. It is not uncommon to find a jurisdiction that, based on local conditions (topographical, climatic, and/or geological), will require an increased level of protection for the fire sprinkler system being designed and/or installed. The following are but a few issues, which would fall into this category:

\_\_\_\_\_ (**example**) A jurisdiction will limit the installation of an NFPA 13D fire sprinkler system in a single-family dwelling to under 5,000 square feet in aggregate floor area.

- \_\_\_\_\_ **(example)** A jurisdiction will require that a single-family dwelling, constructed in a “High Fire Danger” or “Wildland Interface” Area, to have its residential fire sprinkler system designed to a higher level to protect not just the occupants (as defined in the “Purpose” sections of NFPA 13R and NFPA 13D) but rather to protect the property and contain/extinguish the fire in accordance with NFPA 13 criteria.
  
- \_\_\_\_\_ **(example)** A jurisdiction will require the single-family dwelling to have fire sprinklers installed in the garage and by doing so will require the system to be designed to a four-head design criteria of NFPA 13 due to the fact that the garage has four fire sprinklers installed within the compartment/area.
  
- \_\_\_\_\_ **(example)** A jurisdiction will require the attic area of a single-family dwelling to have fire sprinklers installed throughout, and due to the fact that there are 4, 5, 6, or more fire sprinklers in this confined space, the fire sprinkler system shall be designed to a 4, 5, 6 or more sprinkler design.

**Section III – Applicants should recognize the timeframes:**

The timeframe for providing certain services varies widely from agency to agency, given staffing levels, seasonal demands, and any number of factors which changes from time to time; however, the fundamental criteria established by the agency should be somewhat consistent. The customer; whether that is an Architect or a Homeowner, a Fire Sprinkler Contractor or an Owner-Builder, deserves to know the approximate scheduling of submitting, and receiving a permit to proceed. A Guideline is a great place to inform the customer what to expect.

- \_\_\_\_\_ The plancheck fee is to be paid at the time plans are submitted for review/approval.
  - \_\_\_\_\_ If the fee is to be paid in another office (such as the Revenue/Finance/Building Inspection Division, etc.) you should note this in the Guidelines.
  
- \_\_\_\_\_ The customer deserves to know how long the plan review process will take; two- to three-weeks or ten- to fifteen working days (MTWTF).
  - \_\_\_\_\_ Be clear so that you reduce the anxiety and frustration of having the daily telephone inquiries by the customer checking on the status of his/her plans.

**Note:** If the agency sends the plans out to a private consultant/plancheck service to perform the plan review service, indicate so (but do not indicate who or where they are sent as the customer will then proceed to call the individual trying to expedite his/her own plans).

- \_\_\_\_\_ Any and all items identified in the initial and/or subsequent plan reviews must be completely and clearly addressed and corrected on the drawings prior to re-submittal for the backcheck.
  - \_\_\_\_\_ “Redline” drawings (corrections made in red and/or pen/pencil) on the original drawings should be discouraged as the field inspector in the field may not be able to determine/establish which changes were made during the formal plan review and which were done after the fact.
  
- \_\_\_\_\_ Upon re-submittal, the items noted in the original plan review will be checked and if found to be corrected, the drawings and calculations (every sheet) will be stamped with the official agency approval stamp.
  - \_\_\_\_\_ This will greatly aid the field inspector who will be checking the actual installation against the “approved” drawings.
  
- \_\_\_\_\_ “If” a fee (**penalty charge**) is levied against a re-submitted set of drawings/calculations which have ignored being corrected, the agency should define the policy and authority under which this action is taken.
  - \_\_\_\_\_ A “WARNING” in writing (such as these Guidelines) is priceless when you are being challenged.
  
- \_\_\_\_\_ A policy by which inspections must be made utilizing the “APPROVED” (stamped) drawings is essential to complete the circle of the systematic approach to design, review, installation, and inspection of a system.
  - \_\_\_\_\_ Without matching the installation to the approved drawings, the field inspector is simply guessing.
  
- \_\_\_\_\_ A copy of the “approved/stamped” set of the drawings and calculations (including any and all cutsheets) shall be maintained in the Fire Prevention Bureau for the life of the structure. These construction documents are valuable references to the fire safety system installed.

#### **Section IV – Water Supply Information (Fire Flow Data):**

The Water Supply Data, used to design the hydraulically designed fire sprinkler system is the single most important factor to consider when reviewing and approving a fire sprinkler system. The old saying “**Garbage In – Garbage Out**” was never more precise than when it comes to hydraulically calculated fire sprinkler systems. If the flow data is wrong on the front end of the system design, then the error is only multiplied at the other end where the water will be needed. Too many agencies rely on outdated and/or unreliable water supply data.

- \_\_\_ Considering the customer, where should he/she be directed in order to obtain current and accurate water supply information?
- \_\_\_ Give the same criteria you would need if you were trying to obtain this data:
- \_\_\_ Water Agency Name
  - \_\_\_ Water Agency Address
  - \_\_\_ Water Agency City, State, Zip
  - \_\_\_ Water Agency Telephone Number
  - \_\_\_ Water Agency Fax Number
  - \_\_\_ Water Agency E-Mail Address
  - \_\_\_ Water Agency Contact Person (if known)
  - \_\_\_ Water Agency Office Hours:
    - \_\_\_ 8:00 a.m. to 12:00 (noon)
    - \_\_\_ 1:00 p.m. to 5:00 p.m. (MTWTF)

- \_\_\_ Does your agency (or should your agency) require the water data to be confirmed by either a form, letter or telephone verification?
- \_\_\_ Consider being a little more formal than simply a verbal confirmation.
- \_\_\_ **DO NOT** accept simply a notation on the drawings indicating static, residual, and pitot readings with observed flows of \_\_\_ GPM.

- \_\_\_ How current is the data that your agency will accept?
- \_\_\_ 6-months
  - \_\_\_ 1-year
  - \_\_\_ 18-months
  - \_\_\_ No limited timeframe?

**Note:** It is highly desirable to sit down with your water purveyor(s) and to define some working criteria whereby your agency gets what it needs (accurate and current water supply data) and to formalize the working relationship between your agency and the Water Purveyor.

**Section V – Modifications to Existing Fire Sprinkler Systems:**

- \_\_\_ Permit required for fire sprinkler modifications
- \_\_\_ Refer contractor to Plan Review Procedure.
- \_\_\_ Placing fire sprinkler system “out-of-service”:
- \_\_\_ Notification required:
- \_\_\_ Telephone Number
  - \_\_\_ Questions to be addressed:
    - \_\_\_ Address of system/Name of business?
    - \_\_\_ Name of Contractor?
    - \_\_\_ Telephone Number of Contractor?
    - \_\_\_ Nature of work and if permit issued?
    - \_\_\_ Inspection required?
    - \_\_\_ Monitoring company notified?

- \_\_\_\_\_ Unless otherwise authorized (in writing) by permit, the fire sprinkler system is expected to be placed back into service as soon as possible, and/or by 5:00 p.m. of the same day.
  - \_\_\_\_\_ Will fire-watch be required, based on occupancy classification?
- \_\_\_\_\_ Identify the policy for testing the modified piping and/or the entire system.
  - \_\_\_\_\_ Is there a 10, 15, or 20-head rule for hydrostatic test?
    - \_\_\_\_\_ In accordance with NFPA 13, 2002 Edition  
(See Sections 16.2.1.4 and 16.2.1.5)

**Section VI – Fire Sprinkler Inspection Criteria:**

It is essential that the “Inspection Policy” for fire sprinkler systems being installed be clear and consistent with the “nationally recognized” standards (NFPA 13, 13R, 13D, and/or 24). It is also necessary to make the customer aware of how a request for inspection is to be made. While most agencies require a telephone request at least 24-hours prior to the time/date of the inspection being requested, some agencies allow for a faxed and/or e-mail request to initiate the request.

It is important to indicate that the customer must confirm with the agency and/or inspector that the requested time/date is acceptable and that unless otherwise cancelled the inspection will be performed and the system will be ready for the inspection requested.

Specific Inspections should be outlined:

- \_\_\_\_\_ Underground piping flush
  - \_\_\_\_\_ In accordance with NFPA 13, 2002 Edition (Section 10.10.2.1)
  - \_\_\_\_\_ In accordance with NFPA 13R, 2002 Edition (Section 6.3.1)
- \_\_\_\_\_ Underground piping hydrostatic test
  - \_\_\_\_\_ In accordance with NFPA 13, 2002 Edition (Section 10.10.2.2 and 16.2.1)  
Backfilled between joints to prevent movement during test.
  - \_\_\_\_\_ In accordance with NFPA 13R, 2002 Edition (Section 6.3.2)
- \_\_\_\_\_ Overhead piping walk-thru inspection prior to “ANY” portion being covered over by insulation and/or sheetrock.
  - \_\_\_\_\_ In accordance with NFPA 13, 2002 Edition (Chapter 16)
  - \_\_\_\_\_ In accordance with NFPA 13R, 2002 Edition (Chapter 6)
- \_\_\_\_\_ Overhead piping hydrostatic test
  - \_\_\_\_\_ In accordance with NFPA 13, 2002 Edition (Section 10.10.2.2 and 16.2.1)
  - \_\_\_\_\_ In accordance with NFPA 13R, 2002 Edition (Section 6.3.2)
  - \_\_\_\_\_ In accordance with NFPA 13D, 2002 Edition (Section 4.3)
- \_\_\_\_\_ Final Inspection walk-thru prior to occupancy of the building or space
  - \_\_\_\_\_ In accordance with NFPA 13, 2002 Edition (Section 16.1)
  - \_\_\_\_\_ In accordance with NFPA 13R, 2002 Edition (Section 6.2)

\_\_\_\_\_ Fire Sprinkler System Alarm Test

\_\_\_\_\_ In accordance with NFPA 13, 2002 Edition (Section 16.2.3.1)

\_\_\_\_\_ In accordance with NFPA 13R, 2002 Edition (Section 6.4.3)

\_\_\_\_\_ Flow alarm test

\_\_\_\_\_ Tamper switch(es) test

\_\_\_\_\_ Central Station Monitoring alarm test

**Special Note:** As you read through the text of NFPA 13D you will find that with the exception of the hydrostatic test, as outlined in Section 4.3 there is no real Final Inspection Criteria outlined, and therefore the criteria you enforce in your jurisdiction will need to be spelled out in detail.

# # # #

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**Listing of Additional Resources:***Appendix A***1) National Fire Sprinkler Association:**

(<http://www.nfsa.org>)

**Videos/CD's:**

- a) Look Up For Safety
- b) Graduation: Fatally Denied
- c) Videos on NFSA Website

**Printed Materials:**

- a) Fire Sprinklers Save Lives and Money... The Economics of Retrofit  
(by: Ken Isman, P.E.) – January 1995
- b) Sprinkler Protection for Warehouse & Storage Occupancies
- c) The Sprinkler Guide
- d) The MIC (Microbiologically Influenced Corrosion) Report
- e) NFSA Time vs. Products of Combustion Curve

**Training & Educational Programs:**

- a) One- and Two-Day Seminars

**2) Campus Firewatch:**

(<http://www.campus-firewatch.com>)

**Videos:**

- a) Graduation: Fatally Denied

**Studies/Reports:**

- a) Pennsylvania Campus Fire Safety Study
- b) Connecticut Dormitory Study
- c) New York Governor's Task Force Report
- d) Harvard College 1999 Campus Alcohol Study
- e) College Administrator Survey
- f) Establishing a Relationship between Alcohol and Casualties of Fire
- g) Hotel/Motel Fire Safety Act
- h) Fire Facts (Fact Sheet prepared by USFA)
- i) Final Report-College Fire Safety Forum
- j) Fire Safe Student Housing – A Guide for Campus Housing Administrators
- k) Fire Safety 101: A Fact Sheet for Colleges and Universities (Prepared by USFA)
- l) NFPA Fire Investigation Reports (Summaries of three reports; Chapel Hill, Franklin, and Berkeley)
- m) College Fire Safety Forum – Final Report (September 24, 1999)  
(Prepared by USFA/NFPA)

**Brochures:**

- a) Get Out and Stay Alive Brochures



**Ordinances and Enacted Legislation:**

- a) Chapel Hill, North Carolina
- b) Boulder, Colorado
- c) New Jersey Legislation
- d) Pennsylvania Legislation
- e) Wisconsin Dormitory Sprinkler law
- f) Financial Estimates
- g) Legislative Matrix (Matrix of federal and state legislation)
- h) Chicago, Illinois (Source: N.I.F.S.A.B.)

**3) National Fire Academy (NFA)**

(<http://www.usfa.fema.gov/nfa>)

**Learning Resource Center:**

- a) Library of reference materials

**Executive Fire Officers Research Papers:**

- a) Unlimited topics

**4) National Fire Data Center (NFDC)**

(<http://www.usfa.fema.gov/nfdc>)

**Technical Reports:**

- a) High-Rise Office Building Fire – One Meridian Plaza, Philadelphia, PA (TR-049)
- b) World Trade Center Bombing Report & Analysis (TR-076)
- c) Interstate Bank Building Fire, Los Angeles, CA (TR-22)
- d) Apartment Building Fire East 50<sup>th</sup> Street, New York, NY (TR-19)
- e) St. George Hotel Complex – 16 Alarm Fire, Brooklyn, NY (TR-108)
- f) Four Firefighters Die in Seattle Warehouse Fire, Seattle, WA (TR-077)
- g) \$15-Million Sight and Sound Theater Fire and Building Collapse, Lancaster County, PA (TR-097)
- h) Chicken Processing Plant Fires; Hamlet, NC, and North Little Rock, AR (TR-057)
- i) College Dormitory Fires in Dover, Delaware and Farmville, VA (TR-006)
- j) Schomberg Plaza Fire, New York, (Harlem) NY (TR-004)
- k) Sprinklered Records Storage Facility, Chicago, IL (TR-106)
- l) Hospital Fire Kills Four Patients, Southside regional Medical Center, Petersburg, VA (TR-080)
- m) Sprinklers Control Arson Fires in Rack-Storage Warehouse, Mt. Prospect, IL (TR-030)
- n) Operational Considerations for High-Rise Firefighting – Special Report (TR-082)
- o) Sherwin-Williams Paint Warehouse Fire, Dayton, OH (TR-009) with Supplement on Sandoz Chemical Plant Fire, Basel, Switzerland
- p) New York City Bank Building Fire: Compartmentation vs. Sprinklers (TR-071)
- q) Five-Fatality High-Rise Office Building Fire, Atlanta, GA (TR-033)
- r) Doubletree Hotel Fire, New Orleans, LA (TR-008)

- s) Sixteen-Fatality Fire in High-Rise Residence for the Elderly, Johnson City, TN (TR-039)
- t) Kona Village Apartments Fire, Bremerton, WA (TR-121)
- u) Nine Elderly Fire Victims in Residential Hotel, Miami Beach, FL (TR-041)
- v) None-Fatality Mobile Home Fire, Maxton, NC (TR-037)
- w) Ten Elderly Victims From Intermediate Care Facility Fire, Colorado Springs, CO (TR-050)
- x) Twelve-Fatality Nursing Home Fire, Norfolk, VA (TR-034)
- y) Old Buckingham Station, Chesterfield, VA (TR-105)
- z) Santana Row Development Fire, San Jose, CA (TR-153)
- aa) Success Story at Retirement Home Fire, Sterling, VA (TR-040)

## 5) National Fire Protection Association (NFPA)

<http://www.nfpa.org>

### **Publications (Fire Analysis & Research Division):**

- a) High-Rise Building Fires (September 2001)
- b) U.S. Experience with Sprinklers (September 2001)
- c) The U.S. Fire Problem Overview Report  
(Leading Causes and Other Patterns and Trends)

### **Publications (One-Stop Data Shop):**

- a) Special Data Information Package (April 2002)  
(High-Rise Hotel & Motel Buildings)
- b) Special Data Information Package (April 2002)  
(High-Rise Apartment Buildings)
- c) Special Data Information Package (April 2002)  
(High-Rise Office Buildings)
- d) School, College, and University Dormitories, and  
Fraternity and Sorority House Fires (March 1999)

### **Reports (Fire Analysis & Research Division):**

- a) The Total Cost of Fire in the United States (June 2003)
- b) Fire Loss in the United States During 2002 (September 2003)

### **Technical Committee on Assembly Occupancies Report:**

- a) An Analysis to Establish Nightclub Sprinkler Threshold (April 9, 2003)

### **Miscellaneous:**

- a) High-Rise Building Fires and Fire Safety (SPP-18) – 1973

### **Videos:**

- a) Fire: Countdown to Disaster (16-minutes)

## 6) National Institute of Standards & Technology (NIST):

**Reports:**

- a) Evaluating Small Board and Care Homes:  
Sprinklers vs. Nonsprinklered Fire Protection (NISTIR-5302)

**7) American Fire Sprinkler Association (AFSA):**

(<http://www.firesprinkler.org>)

**Information Available:**

- a) Sprinkler Facts
- b) Technical Updates

**8) Miscellaneous Materials:**

**Reports:**

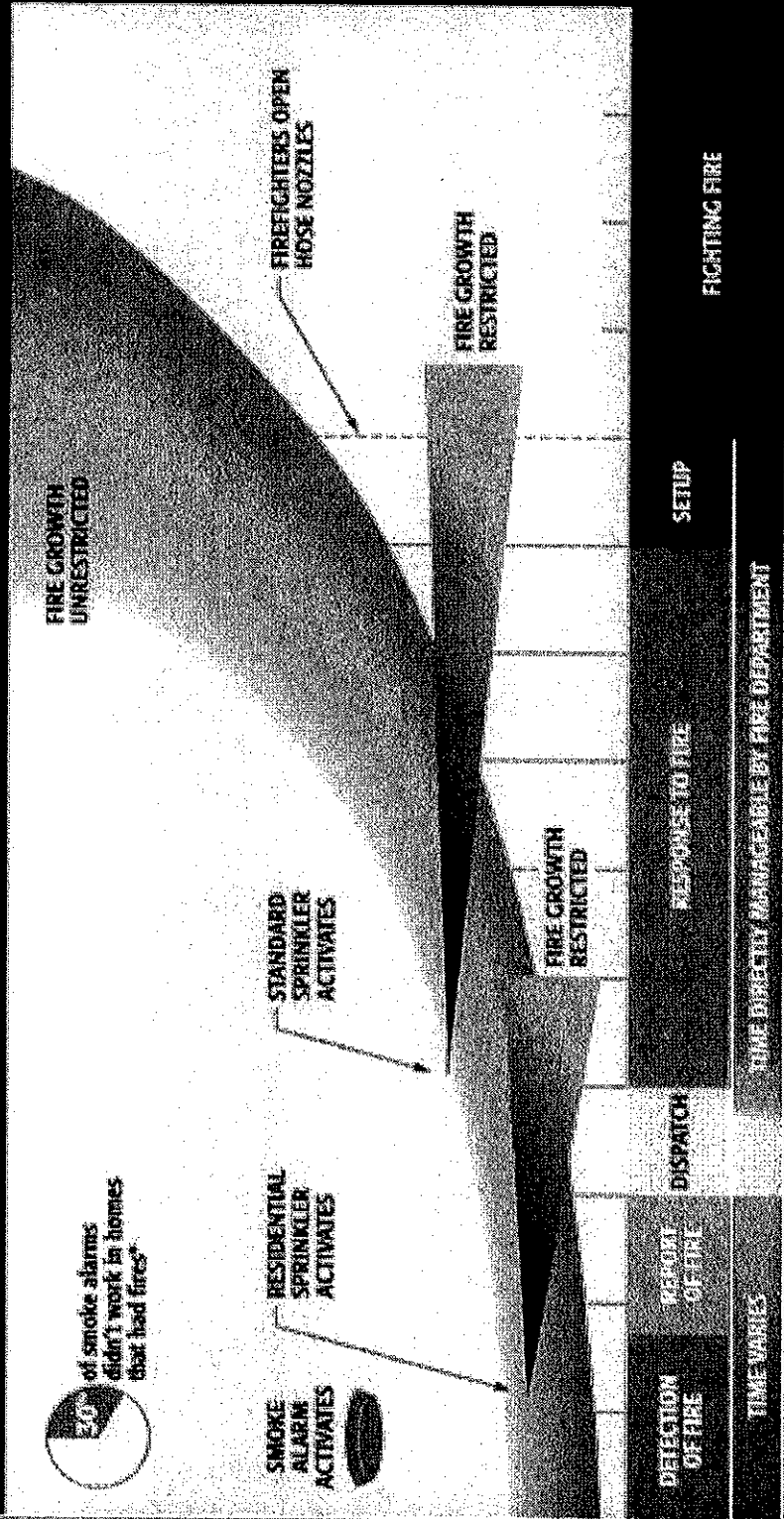
- a) Executive Summary, September 11, 2001 Attack on  
New York City's World Trade Center (FEMA/WTC, SEI/ASCE)
- b) High-Rise Fire Safety: Problems & Solutions (The Chicago High-Rise  
Safety Commission – February 1999)

# TIME VS. PRODUCTS OF COMBUSTION

## FLASHOVER

No one survives flashover

PRODUCTS OF COMBUSTION



20% of smoke alarms didn't work in homes that had fires\*

SMOKE ALARM ACTIVATES

RESIDENTIAL SPRINKLER ACTIVATES

STANDARD SPRINKLER ACTIVATES

FIREFIGHTERS OPEN HOSE NOZZLES

FIRE GROWTH RESTRICTED

FIRE GROWTH RESTRICTED

**ACTIONS BEFORE FIRE**  
 1) TEST SMOKE ALARMS  
 2) CONDUCT FIRE ESCAPE DRILLS

DETECTION OF FIRE  
 REPORT OF FIRE  
 DISPATCH  
 RESPONSE TO FIRE  
 SETUP  
 FIGHTING FIRE

TIME VARIES  
 TIME DIRECTLY MANAGEABLE BY FIRE DEPARTMENT

0 1 2 3 4 5 6 7 8 9 10 **TIME (in minutes)**  
 Based upon national averages



\*U.S. Experience With Smoke Alarms and Other Fire Alarms. NFPA, September 2001.  
 NOTE: See NFPA Fire Protection Handbook for time and temperature information.

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Stephen D. Hart, Consultant

**EXECUTIVE SUMMARY REPORT  
 ON THE 2003 CALIFORNIA  
 FIRE SPRINKLER ORDINANCE SURVEY  
 (The Fourth Such Survey Spanning 20-years)**

- - - Issued: September 1, 2003 - - -

On April 4, 2003 the National Automatic Sprinkler Industry Promotion (NAS-IP) mailed out 448 surveys to fire agencies throughout the State of California. On June 20, 2003 a second mailing was mailed to 104 fire agencies that had not yet responded to the 2003 Survey, although they had responded to the 1993 Survey and had indicated at that time (May 31, 1993) that their Agency did have a fire sprinkler ordinance.

**Note:** This is the fourth time over the past twenty (20) years that a statewide survey has been accomplished. The first was in 1984, the second in 1989, the third in 1993, and now the 2003 survey. Some comparisons with previous surveys will be made during the discussions to follow.

The 2003 Survey contained thirty (30) questions and/or a total of 114 different control responses to those questions. In all, more than 105,472 bytes of data were entered into the computer and the results will reflect those responses, in sequence of the questions asked in the Survey Questionnaire.

*In comparison, the 1993 Survey contained 31 questions and/or 112 different responses to those questions (950,000 bytes of data), the 1989 Survey contained 19 questions and/or 102 different responses to those questions (492,252 bytes), and the 1984 Survey contained 15 questions and/or a total of 81 different responses (275,805 bytes).*

A total of 215 completed surveys have been received to date. This reflects a 48% (47.99%) return of the original 448 surveys mailed. It should be recognized that while the State of California, Office of the State Fire Marshal, lists more than 958 Fire Agencies, many are very small Volunteer Fire Agencies, Water Districts and/or State and Private Fire Brigades which would not normally be expected to have fire sprinkler regulations.

*In comparison, the 1993 Survey resulted in 274 completed surveys returned (40.3% of those mailed), the 1989 Survey resulted in 254 completed surveys returned (23.7% of those mailed), and the 1984 Survey had 227 completed surveys returned (unknown how many surveys were actually mailed out).*

*“Fire Sprinklers Save Lives and Protect Property”*

The 215 completed surveys received represent an aggregate population of more than 23.1-million people (23,104,044). Based on a population estimate of 35,116,033 for the State of California (US Census 2002 Total), the 2003 Survey reflects 65.8% of the state population.

*In comparison, the 1993 Survey represented 26.7-million (26,767,310) or roughly 87.5% of the population of California, the 1989 Survey represented 23.5-million people (23,572,104) or roughly 89% of the population of California, and the 1984 Survey represented an aggregate population of 17.4-million (17,391,908).*

**Special Note:** There are several communities who are known (based on the 1993, 1989, and 1984 Surveys) to have fire sprinkler ordinance requirements that are not listed nor computed within the 2003 Survey database. The fifty-six (56) identified fire agencies that chose not to complete and return the 2003 Survey Questionnaire represent an aggregate population of more than 4.2-million (4,238,894) people (based on US Census 2002 Total) and indicated in the 1993 Survey that they did have a more restrictive ordinance.

One final point, which should be made before the actual data is presented, is that "every completed survey received has been checked and verified to be as it was submitted." The tabulation of the data is based "ONLY" on those surveys received between April 4 and August 30, 2003. The original survey has been filed and has been maintained to validate this Executive Summary Report as being true and accurate.

Likewise, the 274 Surveys received in 1993, the 254 Surveys received in 1989, and the 227 Surveys received in 1984 have been maintained for reference, should additional studies be undertaken. The 1993, 1989, and 1984 Surveys are maintained at the FSABSC that is currently located in Buena Park, CA.

## Now to the Findings:

Of the 215 surveys received, 182 (84.62%) indicated that their fire jurisdiction presently has a fire sprinkler ordinance for new construction, which is more restrictive than the Uniform Building/Fire Codes and/or the California Building/Fire Codes. The remaining 28 (15.38%) jurisdictions indicated that they did not.

When asked what factors the jurisdiction considered in adopting their respective fire sprinkler ordinance, they indicated the following:

Manpower .....	38 (20.9%)
G.P.M. (Fire-Flow) ...	43 (23.1%)
Height of Building ....	37 (20.1%)
Area of Building .....	102 (56.1%)
Other (Defined) .....	83 (45.6%)

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**Note:** It should be mentioned that multiple responses were made by many of the jurisdictions, and an average of at least 1.66 of these factors per response was established.

In regard to "Other (defined)" factors, a significant number identified their "Findings of Facts" conditions as the consideration. In California state law (*H&S Code Sections 17958, 17958.8, 17958.9 and specifically 17922*) defines criteria by which changes or modifications can be made by a city, county, or city and county, based on local climatic, geological, or topographical conditions. Other factors included:

- Life Safety
- Type of Construction
- Response Time
- Accessibility
- Occupancy Classification/Usage

The floor area (square footage) of a building was a significant consideration for jurisdictions, accounting for roughly one-third (33.7%) of the factors identified. The aggregate floor area of a building over 5,000 square feet was, by far, the most common threshold. A breakdown of the basic floor area(s) beyond which fire sprinklers were required is as follows:

<u>Square Footage</u>	<u>No. Responses</u>	<u>Square Footage</u>	<u>No. Responses</u>
10,000 sq ft	7 (4.5%)	3,000 sq ft	6 (3.8%)
7,500 sq ft	2 (1.2%)	2,000 sq ft	3 (1.9%)
7,000 sq ft	1 (0.1%)	1,500 sq ft	3 (1.9%)
6,200 sq ft	2 (1.2%)	1,000 sq ft	2 (1.2%)
6,000 sq ft	30 (19.3%)	750 sq ft	1 (0.1%)
5,500 sq ft	1 (0.1%)	500 sq ft	3 (1.9%)
5,000 sq ft	52 (33.5%)	200 sq ft	3 (1.9%)
4,000 sq ft	7 (4.5%)	120 sq ft	1 (0.1%)
3,600 sq ft	8 (5.1%)	0 sq ft	22 (14.2%)
3,500 sq ft	1 (0.1%)		

Of the 191 responses to the question of giving credit for "Area Separation Walls", 141 (73.8%) of the jurisdictions indicated that their ordinance "**DID NOT**" give credit for area separation walls, while 50 (26.2%) responded to giving credit for such protection.

*In comparison, the 1993 Survey results indicated that of the 240 responses, 173 (72.1%) indicated that no credit was given while 67 (27.9%) would give credit for area separation walls. In the 1989 Survey, of the 207 responses to the question, 125 (60%) indicated that no credit was given while 82 (39.9%) gave credit for area separation walls.*

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The 2003 Survey asked what edition of the Uniform Building/Fire Code and/or California Building/Fire Code the fire sprinkler ordinance was adopted as an amendment to. Of the 176 responses completing this question, there were three distinct groups of adoption processes identified and each group accounted for approximately one-third (1/3<sup>rd</sup>) of those agencies responding. The responses reflected that the fire sprinkler amendments were incorporated into the following codes/editions:

- California Building Code/California Fire Code .... 63 (35%)
  - 2001 Edition
- California Fire Code ..... 60 (33.3%)
  - 2001 Edition
- California Building Code ..... 10 (5.5%)
  - 2001 Edition
- California Fire Code/Uniform Fire Code ..... 10 (5.5%)
  - 2001 Edition/2000 Edition
- Uniform Fire Code ..... 12 (6.6%)
  - 2000 Edition
- California Building Code/California Fire Code ... 1 (0.5%)
  - 1998 Edition/1998 Edition
- Uniform Fire Code ..... 11 (6.1%)
  - 1997 Edition
- Uniform Building Code ..... 11 (6.1%)
  - 1997 Edition
- Uniform Fire Code ..... 1 (0.5%)
  - 1982 Edition
- Uniform Building Code/Uniform Fire Code and .. 1 (0.5%)  
California Building Code/California Fire Code
  - 2000 Edition/2000 Edition and  
2001 Edition/2001 Edition

It must be said that over the past three adoption cycles in California (1995, 1998, and 2001) there has been a growing uncertainty as to how local amendments are adopted and whether these amendments are best served when adopted into the California Building Code, California Fire Code, or the locally adopted Uniform Building Code and Uniform Fire Code. This point is obvious when one looks at the ten (10) forms by which these local amendments are adopted (as shown above) and the three distinct groups of adopting procedures.

**Note:** Another factor, which should be pointed out is that if the adoption was made by a Fire Protection District (FPD), normally the adoption of amendments is made under the “*Fire Codes*” (California Fire Code and/or Uniform Fire Code) verses a “*City Fire Department*” which normally adopts under the “*Building Code and/or Fire Code*” (California Building Code/California Fire Code and/or Uniform Building Code/Uniform Fire Code).

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The 2003 Survey asked if the fire sprinkler amendments/ordinance took into consideration the various occupancy classifications. A majority (110 or 60.7%) of the 181 responding agencies stated that their ordinance did take occupancy classification into account, while 71 (39.2%) stated that it was not a consideration.

***In comparison, the 1993 Survey resulted in 154 (63.9%) AHJ's who considered occupancy classifications, while 91 (36.1%) stated it was not a consideration. Similarly, the 1989 Survey resulted in 125 (62.5%) AHJ's who considered occupancy classifications, while 75 (37.5%) stated that it was not a consideration.***

With respect to height of building, of the 185 responding to this question, 59 (31.9%) indicated that height of building was a consideration for the ordinance amendments and 126 (68.1%) indicated that it was not a consideration. This was a dramatic change from the survey results of 1993 and 1989, as you will see below.

***In comparison, the 1993 Survey results showed that 142 (57.9%) considered height of building, while 103 (42.1%) did not. Similarly, the 1989 Survey results showed that 136 (54.3%) considered height of building, while 72 (34.6%) did not.***

The majority of those considering the height of building indicated that three (3) or more stories in height was a significant fire problem to warrant fire sprinklers. The question was stated in both numbers of stories as well as in height (feet). The results were similar:

- 2-stories ..... 5 (5.3%)
- 3-stories ..... 28 (29.8%)
- 4-stories ..... 10 (10.6%)
  
- 24-feet ..... 1 (1.1%)
- 30-feet ..... 5 (5.3%)
- 35-feet ..... 11 (11.7%)
- 40-feet ..... 1 (1.1%)
- 45-feet ..... 1 (1.1%)
- 55-feet ..... 24 (25.5%)
- 60-feet ..... 1 (1.1%)
- 75-feet ..... 7 (7.4%)

On the issue of “***Retroactive/Retrofit***” provisions, of the 185 responses to this question, 133 (71.9%) stated that their ordinance “**DID HAVE**” such requirements and 52 (28.1%) stated that their ordinance did not have retroactive or retrofit provisions within the adopted ordinance.

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***In comparison, the 1993 Survey results showed that of the 246 responses to a similar question, 146 (59.3%) stated that their ordinance did have such requirements and 100 (40.7%) stated that their ordinance did not. The 1989 Survey results showed that of the 206 responses to the question, 121 (58.7%) did not and 85 (41.3%) did have retroactive/retrofit provisions.***

Based on the 2003, 1993, and 1989 Survey responses, the retroactive/retrofit provisions have had a dramatic swing, from a low of 41.3% (1989) to a high of 59.3% (2003), which reflects nearly a twenty percent increase.

The retroactive/retrofit provisions were not limited to the traditional “*commercial/industrial*” buildings as noted in previous surveys, but were somewhat consistent across the usage spectrum. Of the 133 responses that indicated that their ordinance had some type of retroactive/retrofit provisions, the following breakdowns were noted:

- One/Two Family Dwellings ..... 89 (66.9%)  
(Including mobile homes)
- Apartment Houses, Motels/Hotels ... 112 (84.2%)
- Motels/Hotels ..... 1 (0.75%)
- Commercial Buildings ..... 122 (91.7%)
- Industrial Buildings ..... 116 (87.2%)

Another point, which reflects the trends with regard to retroactive/retrofit provisions, it must be pointed out that of the 133 responses that indicated that they did have such provisions, 81 (60.9%) of these provisions were across the board (One/Two Family Dwellings, Apartment Houses, Motel/Hotels, Commercial, and Industrial Buildings).

***In comparison, the 1993 Survey results showed that of the 146 responses to this question, 132 (90.4%) stated that these retroactive/retrofit provisions were in Commercial buildings, 122 (83.6%) in Industrial Buildings, and 97 (66.4%) in Apartment Houses, Motels/Hotels. Only 55 (37.7%) indicated that their retroactive/retrofit requirements were for One/Two Family Dwellings.***

With regard to retroactive/retrofit requirements, of the 167 responses recorded, 145 (86.8%) stated that floor area or other identifiable factors (such as percentage of improvement/valuation) triggered their ordinance, while 22 (13.2%) indicated that it was not a factor.

***In comparison, the 1993 Survey results reflected that 171 (78.8%) were based on floor area or other requirements, while 46 (21.2%) did not use such criteria. Likewise, the 1989 Survey results showed that 113 (66.9%) were based on floor area or other requirements, while 56 (33.2%) did not.***

Collecting permit fees for the processing and/or review, approval, and inspection(s) of automatic fire sprinkler systems was a question to which 170 (82.9%) of the 205 AHJ's responded that they did charge for such services, and 35 (17.1%) did not charge a fee.

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***In comparison, the 1993 Survey results indicated that of the 258 responses, 206 (79.8%) did charge permit fees and 52 (20.2%) did not. The 1989 Survey results reflected a similar trend with 114 (63.7%) of the 229 responses indicating that they did charge permit fees, while 65 (36.3%) noted that they did not.***

Of the 164 survey responses to the question of whether their ordinance had helped to identify a water deficiency problem, 70 (42.7%) stated that their ordinance had identified water deficiencies, while 94 (57.3%) indicated that the ordinance process had not.

***In comparison, the 1993 Survey results showed similar results from the 246 who responded, with 90 (36.6%) indicating it had identified a deficiency problem, and 156 (63.4%) indicating that it had not. A similar response was noted in the 1989 Survey with 211 responses, of which 76 (36.0%) identifying deficiencies, and 135 (64.0%) indicating that the ordinance had not identified water deficiency issues.***

The underground piping connection to the street main was identified as being tapped by the “*Local Water Company*” in a majority of the responses. Because of the multiple answers to the survey question, a true percentage could not be easily established. The following reflect the responses:

- Local Water Company ..... 125
- Sprinkler Contractor ..... 35
- Public Works Dept. .... 40
- Others ..... 17

A question was asked as to whether the “*Water Company*” charged a water connection fee for fire service connections. Of the 196 responding to this question, 163 (83.2%) indicated their water company did charge, while 33 (16.8%) stated that their water company did not charge a fee. This reflects a growing trend to charge as reflected in previous surveys (1993 and 1989).

***In comparison, the 1993 Survey results showed that of the 242 responses to this question, 192 (79.4%) did charge, while 50 (20.6%) did not charge. Similar results from the 1989 Survey showed that of the 225 responses, 174 (77.4%) charged, while 51 (22.6%) did not.***

A new question was added to the 2003 Survey, which asked if the water company connection fee for the “*Fire Service Connections*” (above) included labor and/or materials, (valves, tapping sleeves, etc.). Of the 173 responses to this question, 128 (73.9%) indicated that “**YES**”, it did include labor and/or materials, while 45 (26.1%) indicated that these fees did not include labor and/or materials.

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A similar question was asked with regard to water companies charging a “**Monthly Standby/Service Charge**”. Of the 181 responses to this question, 112 (61.9%) indicated that their water companies did charge a monthly standby/service fee, while 69 (38.1%) stated that their water companies did not charge these monthly standby/service fees.

***In comparison, the 1993 Survey indicated that 149 (66.8%) of the 223 responding to this question indicated that their water companies did charge a monthly standby/ service fee, while 75 (33.2%) did not. The 1989 Survey reflected similar percentage numbers with 124 (60.7%) of the 204 responses indicating that their water companies did charge, and 80 (39.3%) did not charge monthly standby/service fees.***

The question concerning water flow/tamper alarms connected to a monitoring services/stations revealed that 148 (77.5%) of the 191 responding required such monitoring, while 43 (22.5%) did not. With regard to whether the monitoring services/stations were required to be Underwriters Laboratories (U/L) listed, of the 154 who responded to this question, 109 (70.8%) indicated that they required U/L (listed) Central Station Monitoring, while 45 (29.2%) did not have a preference.

***In comparison, the 1993 Survey results showed that 142 (69.3%) required U/L (listed) Central Station monitoring, and 63 (30.7%) did not. The 1989 Survey had similar responses with 113 (64.9%) requiring U/L (listed) Central Station monitoring, and 61 (35.1%) not having a preference.***

With regard to the “**Residential**” requirements relative to fire sprinkler ordinance adoption, a general question was asked as to whether the ordinance required fire sprinkler protection in “**Residential Occupancies**”, which included One- and Two-Family Dwellings, Apartments, Condominiums, Townhouses, etc. Of the 206 who responded, 151 (73.3%) have residential fire sprinkler requirements, while 55 (26.7%) stated that they did not.

***In comparison, the 1993 Survey showed that of the 262 who responded to the same question, 189 (72.1%) stated that they did and 73 (27.9%) indicated no residential requirements. The 1989 Survey showed that of the 229 whom responded, 131 (57.2%) indicated that they did have residential requirements, while 98 (42.8%) did not.***

The 2003 Survey asked: “Does your fire jurisdiction have sprinkler requirements which require “**ALL newly constructed Single-Family Dwellings to be sprinklered?**” A total of 201 responded with 64 (31.8%) responding that their ordinance required sprinklers in all newly constructed SFD’s, while 127 (68.2%) had no such requirement.

***In comparison, the 1993 Survey (which saw this question added for the first time) showed that of the 258 responses to this question, 76 (29.4%) stated that their ordinance did require fire sprinklers in all newly constructed SFD’s, while 182 (70.6%) had no such requirement.***

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**Note:** It should be pointed out that eighteen (23.7%) of the 76 AHJ's who had responded "**YES**" to this question in the 1993 Survey had lost their Residential SFD's requirements between 1993 and 2003 for one reason or another, based on confirmed "**NO**" responses to the 2003 Survey, and that these agencies were replaced by 29 new communities who passed such requirements.

It must also be pointed out that of the original 76 confirmed AHJ's in the 1993 Survey, there are currently 23 AHJ's who have not yet responded to the 2003 Survey, plus the 18 AHJ's who have indicated that they no longer have a SFD fire sprinkler requirement, thus the difference.

$$(76 - 41 [18+23] = 35 \text{ or } 64 - 35 = 29)$$

It is known that many of the 23 AHJ's who have not yet responded to the 2003 Survey continue to have their SFD's fire sprinkler requirements, and efforts are now underway to obtain completed surveys. Given that understanding and recognizing that if they are found to have their SFD's ordinances, there could be as many as 87 communities in California who require every newly constructed SFD to be equipped with residential fire sprinklers.

Based on the responses of the 64 jurisdictions (above) as to what factors were identified which justified fire sprinklers in Single-Family Dwellings, the 2003 Survey revealed that the vast majority referred to the "**legal criteria**" as outlined in California State Law (Health and Safety Code Sections 17958, 17958.8, 17958.9 and specifically 17922). Commonly referred to as the "**Findings of Facts**" local amendments must be justified based on three conditions, unique to that jurisdiction; 1) Climatic, 2) Geological, and 3) Topographical.

It should be noted that a few responses identified "**other reasons**" such as; a) Urban/Wildland Interface, b) Travel Distance (3-5 miles from the nearest fire station), and c) Designated markers beyond urban limit lines. Factors that were identified by the 106 local AHJ's that justified sprinklers in Single-Family Dwellings were based on the following:

Access Problem	[67]	Inadequate Water Supply	[49]
Response Time in Excess of:	[33]	Floor Area in Excess of	[54]
3 minutes	[ ]	_____ sq. ft.	
3.5 minutes	[ 1]	<i>* See Details below.</i>	
4 minutes	[ 2]		
5 minutes	[11]	Height of Building	[26]
6 minutes	[ 1]	More than _____ stories	
7 minutes	[ 2]	<i>** See Details below.</i>	
10 minutes	[ 6]	Other Reasons:	[15]
Other	[ 3]	<i>*** See Details below.</i>	

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## Travel Distance:

1.5-miles	[ 1 ]
2.5-miles	[ 1 ]
3-miles	[ 1 ]

Details: \*

* 0 sq ft	[ 4 ]	* 200 sq ft	[ 1 ]	* 500 sq ft	[ 1 ]
* 1,500 sq ft	[ 1 ]	* 3,000 sq ft	[ 1 ]	* 3,500 sq ft	[ 3 ]
* 3,600 sq ft	[ 5 ]	* 3,800 sq ft	[ 1 ]	* 4,000 sq ft	[ 3 ]
* 5,000 sq ft	[24]	* 5,500 sq ft	[ 1 ]	* 6,000 sq ft	[ 2 ]
* 6,200 sq ft	[ 1 ]	* 10,000 sq ft	[ 2 ]		

Details: \*\*

**2-stories	[ 6 ]	** 34-feet	[ 1 ]
**3-stories	[13]	** 35-feet	[ 3 ]
**4-stories	[ 2 ]	** 40-feet	[ 1 ]
**5-stories	[ 1 ]	** 75-feet	[ 1 ]

Details: \*\*\*

- \*\*\* a) Urban/Wildland Interface
- \*\*\* b) Heritage Trees
- \*\*\* c) Hillside Construction
- \*\*\* d) Dead Ends > 600 feet
- \*\*\* e) Rural - No Fire Hydrants
- \*\*\* f) Hazardous Fire Area
- \*\*\* g) Distances from Fire Hydrants

Another question asked if their fire jurisdiction required "**ALL**" Group R, Division 1 Occupancies (defined as Hotels, Motels and Apartment Buildings of three or more units) to be sprinklered. The response of the 186 AHJ's in the 2003 Survey showed that 114 (61.3%) had such a requirement, while 72 (38.7%) did not. This was a significant increase from the results of the previous Survey (1993).

***In comparison, the 1993 Survey response of the 152 AHJ's showed a dead even response; 126 (50%) did and 126 (50%) did not have such a requirement in their ordinance.***

The agencies were asked if their jurisdiction allowed NFPA-13D sprinkler systems to be installed in other than One- and Two-Family Dwellings or Manufactured Homes. Of the 201 responses, 32 (15.9%) indicated that they allowed these systems, while 169 (84.1%) indicated that they would not allow such a use of the NFPA-13D sprinkler system.

***In comparison, the 1993 Survey results documented 65 (26.2%) would, while 183 (73.8%) would not permit such a use. The 1989 Survey reflected that 84 (37.7%) would, while 139 (62.3%) would not permit such a use.***

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Factors that were identified by the 32 jurisdictions who responded to justifying the use of NFPA-13D systems in other than One- and Two-Family Dwellings were:

Use of Building (Apartment vs. Condo vs. Dwelling Unit vs. Motel/Hotel, etc.)	[15] (15.9%)
Accessibility (for Fire Dept. Apparatus)	[11] (11.7%)
Height of Building	[ 8] (8.5%)
Identified Water Supply (Deficiency)	[ 8] (8.5%)
Type of Construction (Type V-N vs. V-One)	[ 7] (7.4%)
Dollar Issue (Incentive by Saving Dollars)	[ 2] (2.1%)
Interior Corridor Construction	[ 2] (2.1%)
Attic Area (Square Footage)	[ 1] (1.1%)
Response Time of Fire Dept. to Project	[ 1] (1.1%)
Other (Please Specify)	[ 5] (5.3%)
a) Alternate Methods & Materials	
b) All New Construction	
c) Based on Square Footage	
d) Staffing Levels	

**In comparison, the 1993 Survey results while consistent in most cases, reflected a significant change in regards to Response Time of F/D to Project (10.8% to 1.1%).**

With respect to having a separate ordinance for "*Residential*" occupancies, of the 169 responding to this question 17 (10.1%) stated that it was a separate ordinance, while 152 (89.9%) indicated that the residential requirements were contained within the general sprinkler ordinance.

***In comparison, the 1993 Survey results indicated that of the 214 responses, 49 (22.9%) stated that it was a separate ordinance, while 165 (77.1%) indicated that the residential requirements were within the general sprinkler ordinance. In the 1989 Survey, 37 (23.7%) indicated separate and 119 (76.3%) stated the requirements were contained within the general ordinance.***

And finally, the last question asked whether the Fire Agency provided fire protection services for other communities/areas who may have a different fire sprinkler ordinance than his/her own agency. Of the 202 responses, 48 (23.8%) indicated that their agency provided such protection, while 154 (76.2%) indicated that they did not.

***In comparison, the 1993 Survey results showed that of the 257 responses, 77 (29.9%) provided such protection, while 180 (70.1%) indicated that they did not.***

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## Analysis of Data:

With 182 sprinkler ordinances identified and depicted in this Survey, attempting to develop and/or compare these defined requirements is similar to finding two snowflakes that appear to be identical. The creative writing skills of the Fire Service is alive and well in California; however, there are some common themes and some uniform theories and factors worthy of noting. Based on the data collected, a City, County, or Fire Protection Agency would be most likely to:

1. Have a fire sprinkler ordinance or other document that would mandate the installation of automatic fire sprinklers, which is more restrictive (86.7%) than the model codes (Uniform Building Code/Uniform Fire Code) and/or State law (California Building Code/California Fire Code).
2. Have the fire sprinkler ordinance take into consideration such factors as:
  - a. Area of the building in excess of 5,000 sq. ft. (70.2%);
  - b. Height of the Building (3- or more stories in height);
  - c. Fire-flow (gallons per minute) capabilities available through the water distribution system;
  - d. Staffing Levels available for fire suppression operations.
3. Not recognize and/or give credit to “*Area Separation Walls*” (73.8%) as a means by which buildings could be compartmentized to eliminate the need for fire sprinklers.
4. Have the fire sprinkler requirements adopted in conjunction with the local adoption/amendments to the California Building Code, California Fire Code or both (73.8%).
5. Consider the various “*Occupancy Classifications*” of a building and to modify their fire sprinkler requirements in addressing each occupancy classification (60.8%).
6. Recognize and establish the installation criteria as outlined in NFPA-13 (44 – 25.6%), NFPA-13R (2 – 1.2%), NFPA-13D (3 – 1.7%), NFPA-13/13R (5 – 2.9%), NFPA-13/13D (9 – 5.2%), and NFPA-13/13R/13D (94 – 54.7%) and not on the Life Safety Code (NFPA-101) or the State Fire Marshal Guidelines (CSFM) or the Uniform Building Code (Chapter 38).
7. Adopt some type of retroactive/retrofit criteria for existing buildings, which would not otherwise be equipped with fire sprinklers.
  - a. More than two-thirds (71.9%) of the responses to the retroactive/retrofit question indicated that some sort of percentage (%) of alteration, improvement, change in use or occupancy, based on valuation or square footage, triggered the provisions of the ordinance to require fire sprinklers.

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- b. While the majority of the survey responses targeted Commercial Occupancies (91.7%) and Industrial Occupancies (87.2%), the Residential Type Occupancies (Apartments, Motels/Hotels) have gained in priority (84.2%), as did the One and Two-Family Dwellings (66.9%).
8. A majority (82.9%) of the Fire Agencies charge for some type of ***“permit fee”*** for the processing, review, approval, and inspection(s) of fire sprinkler systems.
9. Recognize that a majority of the water companies referenced by this survey perform the actual service connection/tap (76%) on their water supply mains for the fire protection service connection.
10. Know that a majority of the water companies (83.2%) referenced by this survey charge a ***“water connection fee”*** for the fire service connection.
11. Know also that most of the water companies (58.4%) referenced by this survey charge a ***“monthly standby/service charge”*** for the fire service.
12. Understand that there is a good possibility (42.7%) that a fire sprinkler ordinance adoption would identify a water deficiency problem within the community, as water supply design criteria is reviewed.
13. Note that a majority (77.5%) of the fire agencies that responded to the survey require monitoring of the water flow and tamper alarms by a service/central station.
14. Also note that a majority (70.8%) of those who require such monitoring mandate that monitoring of water flow and tamper alarms by a Underwriters Laboratory (U/L) Listed Central Station
15. Recognize that a majority (73.3%) of those responding to this survey had adopted provisions for requiring fire sprinklers in ***“Residential”*** Occupancies.
16. Recognize that a significant number (31.8%) of the AHJ’s who responded to this survey indicated that their communities have fire sprinkler requirements for ***“ALL newly constructed Singe-Family Dwellings”***.
17. And finally, recognize that a majority (61.3%) of those AHJ’s who responded to the survey indicated that their communities have fire sprinkler requirements for ***“ALL”*** newly constructed hotels, motels, and apartment buildings of three (3) or more units in size.

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## California Demographics:

The State of California covers an area of 163,707 square miles (155,973/land area and 7,734/water area) with 840-miles of coastline and 3,427-miles of shoreline and has an estimated population of 35,116,033 (based on US Census Totals for 2002). Based on the US Census figures there are 3.7-million aged 65 and older. There were 529,610 births and 234,012 deaths in 2002.

*In comparison, according to US Census statistics, the population of California in 2000 was 34,010,375, in 1990 the population was 29,758,213, and in 1980 the population was 23,667,765.*

California has fifty-eight (58) counties and more than 478 incorporated cities of which 107 are "**Charter Cities**" and 371 are "**General Law Cities**". There are 60 cities with a population of 100,000 or more, 93 cities with populations of 50,000 to 100,000, 99 cities with populations of 25,000 to 50,000, and 226 cities with populations less than 25,000.

With a population of 35.1-million (35,116,033) the local Authorities Having Jurisdiction (AHJ's) have found it necessary to adopt fire sprinkler requirements in record numbers. The response to the 2003 CA Fire Sprinkler Ordinance Survey reflected an aggregate population of 23.1-million (23,104,044).

The 2003 Survey has documented the fact that at least 20.2-million (20,258,296) citizens of California live within communities that have seen fit to adopt fire sprinkler ordinances. Based on the data, 86.7% who responded to the 2003 Survey had adopted fire sprinkler requirements. Said differently, if you are a resident in California, there is a better than 70% chance that you are living in a community which has adopted fire sprinkler regulations which are more restrictive than State Law (California Building/Fire Codes) and/or the adopted "**model codes**".

Geographically, California is often described in terms of Northern and Southern California, and sometimes even Central California. Depending on who you are discussing the division with, you will find different variations of the dividing lines.

For the purpose of this Report, California will be divided along a line as established by the California Fire Chief's Association, Fire Prevention Officers Section. In doing so it should be pointed out that this would establish ten (10) counties in the Southern Section (SoCal FPO's) and forty-eight (48) counties in the Northern Section (NorCal FPO's).

**Note:** The ten (10) counties defined as being "Southern California" include: Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, and San Diego, San Luis Obispo, Santa Barbara, and Ventura.

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In computing the number of fire sprinkler ordinances adopted in the Northern and Southern portion of the State of California, it is interesting to note that the number of ordinances in the southern ten (10) counties is just under 50% (48.9%) of the ordinances adopted in the state. The Survey reflected that 89 of the 182 responding, **"YES"** to having an ordinance were more restrictive than State law (CBC/CFC) and/or the model code (UBC/UFC).

***In comparison, while the percentages have stayed relatively even at 50%, it is worthy of noting that the 2003 Survey shows the differences as being Northern 48 counties at 93 (51.1%) and the Southern 10 counties at 89 (48.9%) while the 1993 Survey showed the difference being Northern at 116 (48.2%) and the Southern at 125 (51.8%).***

As one narrows the area down to only five counties (Los Angeles, Orange, Riverside, San Bernardino, and San Diego), these five (5) counties in and of themselves account for 81 ordinances of just over 44% (44.5%) of the ordinances adopted statewide.

***In comparison, the 1993 Survey results reflected a similar trend with these five counties accounting for 104 ordinances or just over 43% (43.2%) of the ordinances adopted statewide.***

Again, focusing on only Los Angeles and Orange counties, these two counties accounted for 59 (32.4%) of the ordinances adopted by communities statewide.

***In comparison, the 1993 Survey showed these two counties adopting 61 ordinances or just over 25% (25.3%) of the ordinances adopted statewide.***

With regard to **"All newly constructed Single-Family Dwellings"** fire sprinkler requirements (using the same scenarios as used above) in the ten (10) counties of Southern California, there are 29 ordinances which reflects just over 45% (45.3%) of the statewide total.

***In comparison, the 1993 Survey noted that these same ten counties had 42 ordinances or just over 55% (55.3%) of the statewide total. Part of this can be attributed to the nine (9) jurisdictions who responded to the 1993 Survey, but as of this date have not responded with a completed 2003 Survey.***

Again, focusing down to only five (5) counties (Los Angeles, Orange, Riverside, San Bernardino, and San Diego), these five (5) counties in of themselves accounted for 26 ordinances or 40.6% of such ordinances adopted statewide.

And finally, using Los Angeles and Orange County, the number of these adopted SFD Residential Ordinances is 18, which is nearly 30% (28.1%) of all such ordinances adopted statewide.

***"Fire Sprinklers Save Lives and Protect Property"***

***In comparison, the 1993 Survey results were similar with these two counties accounting for 22 such ordinances or nearly 30% (28.9%) of such ordinances adopted statewide.***

The retroactive/retrofit provisions of the various adoptive ordinances were also analyzed, using the same criteria. The ten (10) counties accounted for 66 or just under 50% (49.6%) of the retroactive/retrofit ordinance provisions adopted throughout the state. The five (5) counties (Los Angeles, Orange, Riverside, San Bernardino, and San Diego) accounted for 58 (43.6%) of the retroactive/retrofit ordinances adopted statewide, and the two (2) counties of Los Angeles and Orange accounted for 43 (32.3%) of those types of ordinance provisions adopted throughout the state.

In recapping, the comparison of fire sprinkler ordinance adoptions in Los Angeles County and Orange County fire agencies, it is clear that these two (2) counties are ***“the most aggressive areas of the state”*** by sheer numbers/percentages; a) 59 adopted ordinances (32.4%), b) 18 ***“ALL newly constructed SFD’s”*** (28.1%), and c) 43 retroactive/retrofit fire sprinkler ordinances (32.3%)

\* \* \* \* \*

I would like to take this opportunity to thank the National Fire Sprinkler Association (NFSA) for their assistance supporting this 4<sup>th</sup> Edition of the Ca Fire Sprinkler Ordinance Survey, and to the many members of the California Fire Service for their supportive efforts in this undertaking. Without the exceptional response by the Fire Chiefs, Fire Marshals, and Fire Prevention Officers/Inspectors, this Survey and Report could not have been accomplished.

Thank you, and enjoy your accomplishment.....

***“Fire Sprinklers Save Lives and Protect Property”***

# *Fire Sprinklers Save Lives and Money... The Economics of Retrofit*

by **Kenneth E. Isman, P.E.**  
*Director of Engineering Standards*  
*National Fire Sprinkler Association, Inc.*

Fire sprinkler systems have been required for years by local codes and ordinances because they provide relatively simple, extremely reliable, affordable fire protection. But because they have been mandated by law, many building owners, architects and specifying engineers see them as an "extra" in construction. They sometimes go to great lengths to avoid sprinkler protection.

In reality, sprinklers not only provide excellent fire protection, they also represent an excellent investment opportunity for building owners. This paper will look at sprinklers from a purely monetary perspective.

The examples in this paper are intended to be existing buildings which are retrofitted with fire sprinklers. The same type of analysis also applies to new construction. This paper will not attempt to deal with new construction options. Those are addressed in the NFSA publication, *The Fire Sprinkler Guide*.

There are at least six ways in which fire sprinklers help put money back in the pocket of a building owner: Insurance Savings, Income Tax Deductions, Life Safety Code Compliance, Federal Legislation, Liability Avoidance, and No Business Interruption.

# Insurance...

It is critical that we understand that the rates developed by ISO are used as the benchmark for that "specific" building by all member insurance companies. The rates established are considered manual rates. The next step in the process is most interesting when analyzing the COST elements involved with automatic sprinkler systems, from a building owner's outlook particularly. To illustrate this, we will study five different types of commercial buildings. The examples are listed below with the parameters used to develop SAMPLE rates for the building and contents.

1. **Condominium** - Five stories, 100,000 square feet, 10 years old, personal dwellings, joisted masonry construction
2. **Hotel** - Twenty stories, 257,000 square feet, 10 years old, dwelling, masonry construction - noncombustible
3. **Office Building** - Ten stories, 109,251 square feet, 10 years old, office utilization, masonry construction
4. **Food Processing Center** - One story, 20,000 square feet, food processing, noncombustible construction
5. **Warehouse** - One story, 40,000 square feet, storage facility, noncombustible storage

*Note - The examples illustrated are "average" buildings with normal occupancy and contents. There is not any high hazard material listed other than those normally associated with the inherent usage described.*

Assume now that we have requested the ISO Commercial Risk Services to establish base fire rates and contents rates for each building. Two requests were made for each property;

1. **Without** an automatic fire sprinkler system and,
2. **With** an automatic fire sprinkler system.

It must be noted that these illustrations are "estimated rates" (loss cost), promulgated on "average" fictional properties with usual contents and occupancy. A recap of the range of rates for each example is shown in Table 2-1. For illustration purposes, the low side of the "range" is used.

**Table 2-1  
ISO Sample Rates**

Sample Building	Building Rates*			Contents Rates		
	Nonsprinklered	Sprinklered	% Reduction	Nonsprinklered	Sprinklered	% Reduction
Condominium	.273	.103	63	.461	.200	57
Hotel	.257	.088	66	.512	.303	41
Office Building	.110	.059	47	.161	.092	43
Food Processing Plant	.553	.062	89	.949	.146	85
Warehouse	.369	.048	87	.599	.106	83

\* Building Rates for new and existing properties are identical.

The rate reduction for sprinklered buildings and contents are significant. All rates promulgated by ISO Commercial Risk Services, Inc. are multiples to values of \$100. For example, if the condominium was valued at \$4 million, we would multiply this value by the base rates (see Table 2-2).

**Table 2-2  
Building Premium Development**

\$4,000,000 Building Value	X	.273/\$100 Value Nonsprinklered Base Rate	=	\$10,920
		.103/\$100 Value Sprinklered Base Rate		Insurance Company Manual Premium <u>4,120</u>
				Premium Reduction \$6,800

The same criteria applies in determining the manual premium for Contents (Table 2-3).

**Table 2-3  
Contents Premium Development**

\$1,500,000 Contents Value	X	.461/\$100 Value Nonsprinklered Base Rate	=	\$6,915
		.200/\$100 Value Sprinklered Base Rate		Insurance Company Manual Premium <u>3,000</u>
				Premium Reduction \$3,915

The accumulated difference in "manual" premiums resulting from having an automatic fire sprinkler system installed, in this instance, would be \$10,715 per year.

HPR (Highly Protected Risk) properties enjoy even greater discounts and must be fully sprinklered. This paper will not use HPR rates, but the building owner should be made aware that sprinklers, in addition to other items, can achieve even greater savings.

# Income Tax...

Three types of income tax deductions are allowed for businesses which install fire sprinkler systems:

1. A depreciation allowance for the value of the system
2. The interest on a loan
3. Qualified Rehabilitation Tax Credit

The depreciation schedule varies depending on the type of building. For residential occupancies (apartments and condominiums) the schedule is 27.5 years, while it is 31.5 years for commercial occupancies.

The Qualified Rehabilitation Tax Credit applies to buildings which were built before 1936 (nonresidential only) or buildings which are designated as historic structures (residential or nonresidential). When buildings in either of these two categories undergo a major renovation which is greater than or equal to the value of the building immediately prior to the renovation, the building owner receives a dollar for dollar tax credit in the first tax year which the building is placed back in service. The amount of the tax credit is 20 percent of the rehabilitation expense for historic structures and 10 percent of the rehabilitation expense for buildings built before 1936.

Although retrofit of a sprinkler system alone is not normally enough to qualify for this credit, when other rehabilitation work is being done, fire sprinklers should be added as part of that rehabilitation. The remainder of the rehabilitation expenses should be depreciated using the 27.5 or 31.5 year schedule, whichever is appropriate.

# Life Safety Code...

The 1991 and 1994 editions of NFPA 101, *The Life Safety Code*, require all high-rise apartments, hotels, and office buildings to be fully sprinklered or have an engineered life safety system. An engineered life safety system is composed of some combination of standpipes, detectors, smoke control, exits, compartmentation, and partial sprinkler protection. While this may appear to be less expensive than sprinklers initially, often in the long run sprinklers will pay for themselves while an engineered life safety system will not. Insurance companies rarely give discounts for these engineered life safety systems.

# Federal Legislation...

On September 25, 1990, President Bush signed into law the *Hotel and Motel Fire Safety Act of 1990*. This bill requires that by 1996, 90 percent of all travel reimbursed by the Federal government for overnight stays be in fire safe hotels. The bill also requires that, beginning in 1994, all conferences sponsored with Federal money be in fire safe hotels. The bill states that in order to be fire safe, any hotel or motel more than three stories in height must be sprinklered.



If a hotel, motel, or conference center owner wished to get a share of the more than \$1.3 billion currently being spent by the Federal government in travel and conference expenses, it is clear that sprinklers will need to be installed. For a complete list of requirements of the *Hotel and Motel Fire Safety Act*, see the article on page 14 of the Summer 1991 issue of *Sprinkler Quarterly*.

Another piece of Federal legislation which will have a profound effect on the sprinkler industry is the *Americans with Disabilities Act* (ADA). Among its many complex requirements is the provision for an "area of refuge" for disabled people to go during a fire. There must be such an area on every floor of every building (new and existing) large enough to hold two wheelchairs and separated from the rest of the floor by a two-hour fire separation assembly. This area would also have to be in, or adjacent to, an exit or exit stairwell. However, the area of refuge does not have to be installed in fully sprinklered buildings. When sprinklered, the whole building effectively becomes an area of refuge. Additional Federal legislation has also been passed which requires sprinkler protection in most Federal buildings.

## **Liability Avoidance . . .**

It is now becoming increasingly important for building owners to provide fire sprinklers in many occupancies even if codes do not require them. Recent court decisions involving large life loss fires have stated that even though codes did not require fire sprinkler systems when the building was built, widespread use of these systems along with requirements for new buildings to have them has led to the public expecting sprinklers as a "reasonable level of care." These court decisions have required building owners to pay out more than \$1 million per life lost in a fire; millions of dollars which would never have been paid out had a sprinkler system been installed.

## **Business Interruption . . .**

Nobody ever plans on losing parts or all of a building. But a fire in an unsprinklered building will shut down major portions, if not the whole building. Loss in revenue to the owner takes many forms depending on the occupancy type. Owners no longer get rent, manufacturers lose space and products, hotels lose conference bookings and guests until the hotel can reopen.

The vast majority of companies which suffer major fires never again open their doors. Take the office building at One Meridian Plaza in Philadelphia, Pennsylvania, as an example. A fire on February 23, 1991, completely burned out the unsprinklered 22nd through 29th floors. Only the sprinkler system on the 30th floor saved the building. Unfortunately today, several years after the fire, the building is still closed. No one can enter, even on the lower floors, which were relatively undamaged by the fire. Could your business or community afford such a loss?

Fire sprinklers limit the fire and fire damage to a small area. After a fire, rooms can quickly be reoccupied minimizing losses in revenue.

## Example #1

The property is a hotel, 20 stories high, with a total of 257,000 square feet. It is estimated that to retrofit a sprinkler system in this building would cost \$449,750 ( $257,000 \times \$1.75$ ). According to Table 2-1, and assuming a value for the building and its contents, the insurance for the building in its current state, and if it were sprinklered, is shown in the following table:

<i>Annual Insurance Summary</i>		
<b>Insurance</b>	<b>Unsprinklered</b>	<b>Sprinklered</b>
Building	45,303	15,760
Contents	<u>19,737</u>	<u>11,680</u>
<b>Total</b>	<b>65,040</b>	<b>27,440</b>
<b>Savings</b>		<b>37,600</b>

As we can see, this owner will save \$37,600 a year in building and contents insurance by installing sprinklers. Even more will be saved in liability insurance, but since that is difficult to quantify, we will not include it in this analysis.

In addition to insurance, the owner also gets a depreciation allowance. Since this is a commercial building, the schedule is 31.5 years. The depreciation allowance is then  $449,750/31.5 = 14,278$ . In order to find how much the hotel owners saves, we multiply the allowance times the business tax rate. Most businesses have a tax rate of 34 percent. Therefore, the amount of money actually saved is  $14,278 \times 0.34 = \$4,854$ .

If the building owner actually had \$449,750 in cash that he wanted to invest, the sprinkler system would be an excellent investment. With the insurance and the tax savings, the sprinkler system yields \$42,454 ( $37,600 + 4,854$ ) each year. Compare that to another investment which yields 10 percent. The hotel would get \$44,975 in interest, but would have to pay \$15,291 in income tax on the interest. This investment would only yield \$29,684 for the hotel owner each year.

<i>Investment Comparison</i>	
<b>Sprinkler System</b>	
	$37,600 + 4,854 = 42,454$
<b>Other Investment (10 percent)</b>	
	$44,975 - 15,291 = 29,684$

## Example #2

Since most hotel owners don't have \$449,750 in cash for a sprinkler system, they must consider financing. In addition to the insurance and depreciation savings, the interest on a sprinkler system loan is also tax deductible.

If we take the same hotel and borrow the \$449,750 over 15 years at 7 percent interest, our annual payments would be \$48,516. The amount of these annual payments which is interest would vary from year to year, but would average \$18,533 ( $[(48,516 \times 15) - 449,750]/15$ ).

Again, the average interest amount would have to be multiplied by the tax rate to compute the money actually returned to the business. In this case, the owner averages \$6,301 ( $18,533 \times 0.34$ ) each year.

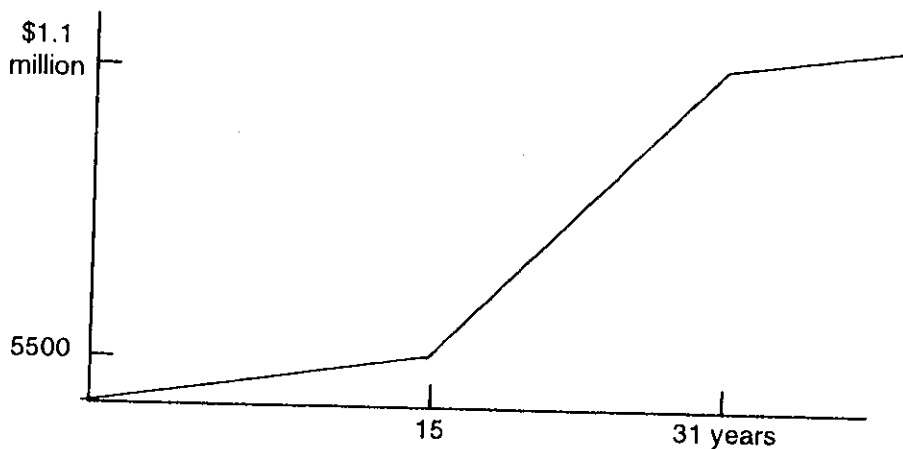
If we compare the cost of installing a sprinkler system each year to the benefits, we see that sprinklers easily pay for themselves.

*Annual Cost/Benefit Comparison*

<b>Cost</b>		<b>Benefits</b>	
Loan	48,516	Insurance	37,600
		Tax (interest)	6,301
		Tax (depreciation)	<u>4,854</u>
		<i>Total</i>	48,755

As we can see, this business will make \$239 each year by installing sprinkler systems. This may not sound like much, but after 15 years, the loan would be paid off and the business would still be making \$42,454 from insurance and depreciation. If this money were invested at 6 percent over the next 16 years, it would accumulate to more than one million dollars! Not a bad investment considering someone else's money was used.

*Cumulative Profit  
vs. Time for Hotel (6 percent)*



### Example #3

For our third example, let's consider a ten-story office building with a total area of 109,251 square feet. We will estimate the cost of retrofit of a sprinkler system at \$191,189 (109,251 x \$1.75).

The insurance savings would be as follows, assuming an amount for the building and contents:

*Annual Insurance Survey*

<b>Insurance</b>	<b>Unsprinklered</b>	<b>Sprinklered</b>
Building	8,696	4,664
Contents	<u>7,035</u>	<u>4,020</u>
<i>Total</i>	15,731	8,684
<b>Savings</b>		<b>7,047</b>

The depreciation allowance and income tax deduction can also be calculated as follows:

$$191,189/31.5 \times 0.34 = 2,064$$

If this system were also financed at 7 percent over 15 years, the annual payments would be \$20,605. The average annual interest and tax deduction would be:

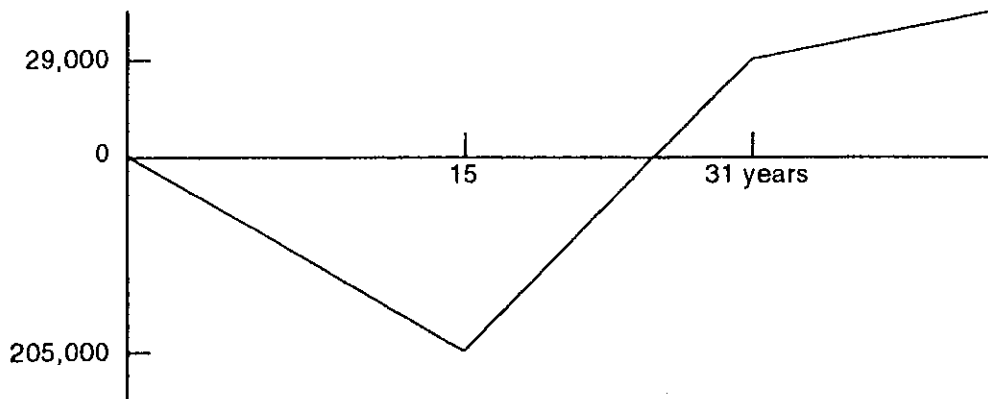
$$[(20,605 \times 15) - 191,189]/15 \times 0.34 = 2,672$$

A comparison of the cost and the benefits of installing a fire sprinkler system in this building is as follows:

<b>Cost</b>		<b>Benefits</b>	
<b>Loan</b>	20,605	Insurance	7,047
		Tax (interest)	2,672
		Tax (depreciation)	<u>2,064</u>
		<b>Total</b>	<u>11,783</u>

Most office building owners only go this far in their analysis. They need to be taken a few steps further. After the loan is paid off, the insurance and depreciation benefits still apply for the next 16 years. The sprinklers will still pay for themselves.

*Cumulative Profit  
vs. Time for Office (6 percent)*



As we stated before, new editions of the *Life Safety Code* and Federal legislation are going to force building owners to make changes to their buildings. Caution should be exercised by building owners. The solution, which looks cheaper in the beginning, may cost the owner much more in the long run.

Let's look at the cost of an engineered life safety system for our office building. According to the *Life Safety Code*, an engineered life safety system consists of some combination of standpipes, smoke or heat detectors, smoke control, exits, compartmentation, and partial sprinkler protection.

Assuming that the standpipe and exit systems are adequate, this office building would still need a smoke detection system, some smoke control, a two-hour fire separation on each floor, and sprinklers in hazardous areas. It is estimated that this engineered life safety system would cost \$113,000. Since it is approximately half the cost of a sprinkler system, this might look appealing to a building owner, but in the long run, it would be a mistake.

*Engineered Life Safety System*

Standpipe	Adequate
Smoke Detection	42,300
Smoke Control	35,000
Exits	Adequate
Compartments (two-hour separation)	27,700
Sprinklers (Hazardous areas)	<u>7,500</u>
<i>Total</i>	113,000

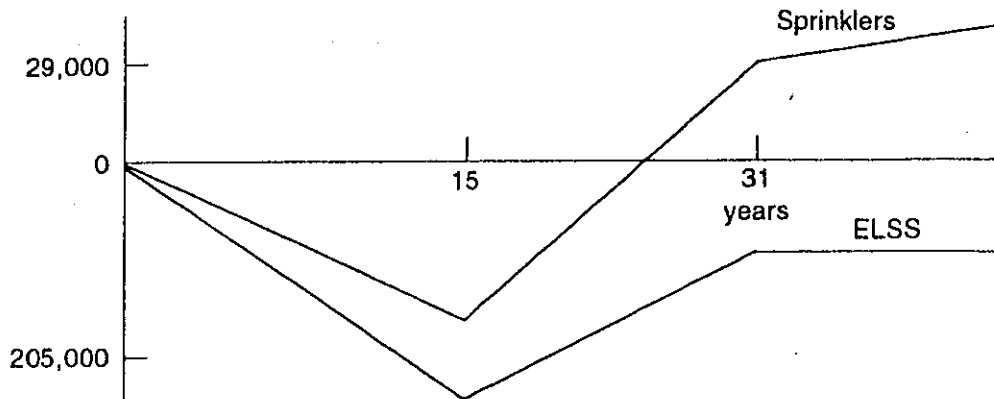
If the engineered life safety system was financed at 7 percent over the same term as the sprinkler system (15 years), the annual payments could be \$12,190. Tax deductions on interest (1,583) and depreciation (1,219) would total \$2,802. A comparison of the different types of upgrades to building safety is shown below.

*Comparison of Upgrades to Building Safety*

	<b>Sprinklers</b>	<b>Engineered Life Safety System</b>
Initial Annual Cost	20,605	12,190
<i>Tax Savings</i>		
Interest	-2,672	-1,583
Depreciation	-2,064	-1,219
Insurance Savings	<u>-7,047</u>	<u>0</u>
<i>Real Annual Cost</i>	8,822	9,388

As we can see, the sprinkler system is actually cheaper than the engineered life safety system. In addition, the sprinkler system will pay for itself while the engineered life safety system never will. Also, the sprinklers will help bring in Federal government business and help avoid liability claims and losses to business interruption.

*Cumulative Profit vs. Time for Office  
Sprinklers and Engineered  
Life Safety System (6 percent)*



**Example #4**

For this example, let's consider a five-story condominium which is 100,000 square feet in area. The sprinkler system is estimated to cost \$175,000 (100,000 x 1.75). Assuming a value for the building and contents, the insurance on the building (which is paid by the condo association) is as follows:

<i>Annual Insurance Summary</i>		
<b>Insurance</b>	<b>Unsprinklered</b>	<b>Sprinklered</b>
Building	16,473	6,215
Contents	<u>4,610</u>	<u>2,000</u>
<b>Total</b>	<b>21,083</b>	<b>8,215</b>
<b>Savings</b>		<b>12,868</b>

The depreciation on the system would apply to the condo association and would be:

$$175,000/27.5 \times 0.34 = 2,164$$

This would make the total savings to the condo association \$15,032 (12,868 + 2,164). These savings would be passed on to the individual owners in lower annual condominium common charges. If there were 50 owners in the building and they were all asked to come up with the money for a sprinkler system evenly, each owner would have to come up with \$3,500. If each owner took out a second mortgage against the equity in their condo, the interest would be tax deductible at their personal tax rate (28 percent for most people). Assuming that they borrowed the money at 8 percent and that they expect to pay it back in five years, their annual payments would be \$877. The average tax benefit would be:

$$[(877 \times 5) - 3,500]/5 \times 0.28 = \$50$$

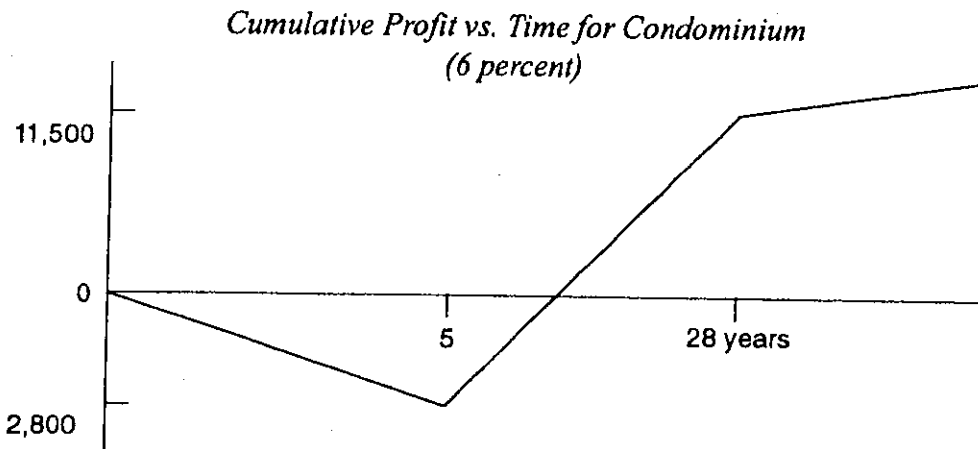
The individual condo owners would also save on their personal condominium owner's insurance. Although ISO currently recommends a 15 percent reduction on the total policy for sprinklers, most insurance companies are only giving 5 to 10 percent. For this exercise, we will choose an insurance company giving a 10 percent discount (if your company doesn't offer this discount, maybe you ought to change companies). This will save our owners another \$30 annually.

Let's put the cost and benefit together:

*Comparison of Annual Cost and Benefit to Individual Condominium Owners*

<b>Cost</b>		<b>Benefits</b>	
<b>Loan</b>	877	Lower common charges due to insurance and depreciation savings	301
		Income Tax Deduction (Personal)	50
		Condo Owner's Personal Insurance	30
		<i>Total</i>	<u>381</u>

So each individual condominium owner will be paying \$496 a year for complete sprinkler protection. A small price to pay. After the loan is paid back, the condominium owners continue to profit from lower insurance costs and from the depreciation allowance.



**Example #5**

For this example we will do a food processing plant which is one story high and 20,000 square feet. The sprinkler system is estimated to cost \$35,000 (20,000 x 1.75). Assuming a value for the building and contents, the insurance would be as follows:

*Annual Insurance Summary*

<b>Insurance</b>	<b>Unsprinklered</b>	<b>Sprinklered</b>
Building	3,277	367
Contents	<u>18,980</u>	<u>2,920</u>
<b>Total</b>	<u>22,257</u>	<u>3,287</u>
<b>Savings</b>		<b>18,970</b>

The depreciation allowance and tax deduction would be computed as follows:

$$35,000/31.5 \times 0.34 = 378$$

If the sprinkler system were financed at 8 percent over 10 years, the annual payments would be \$5,216. The tax deductions on the interest would be computed as follows:

$$[(5,216 \times 10) - 35,000]/10 \times 0.34 = 583$$

*Summary of Cost vs. Benefit for Food Plant*

<b>Cost</b>	<b>Benefits</b>
<b>Loan</b> 5,216	Insurance 18,970
	Tax (interest) 378
	Tax (depreciation) 583
	<u>Total</u> 19,931

How could this building owner afford *not* to put in a fire sprinkler system!

**Example #6**

For this example, we will do a one-story 40,000 square foot warehouse. The sprinkler system is estimated to cost \$70,000 (40,000 x 1.75).

*Annual Insurance Summary*

<b>Insurance</b>	<b>Unsprinklered</b>	<b>Sprinklered</b>
Building	4,006	521
Contents	<u>23,960</u>	<u>4,240</u>
<b>Total</b>	<b>27,966</b>	<b>4,761</b>
<b>Savings</b>		<b>23,205</b>

The depreciation tax deduction can be calculated as follows:

$$70,000/31.5 \times 0.34 = 755$$

If the system is financed at 8 percent over 10 years, the annual payments would be \$10,432. The average tax deduction on the interest would be:

$$[(10,432 \times 10) - 70,000]/10 \times 0.34 = 1167$$

*Comparison of Cost and Benefit for Warehouse*

<b>Cost</b>	<b>Benefits</b>
<b>Loan</b> 10,432	Insurance 23,205
	Tax (interest) 1,167
	Tax (depreciation) 755
	<u>Total</u> 25,127

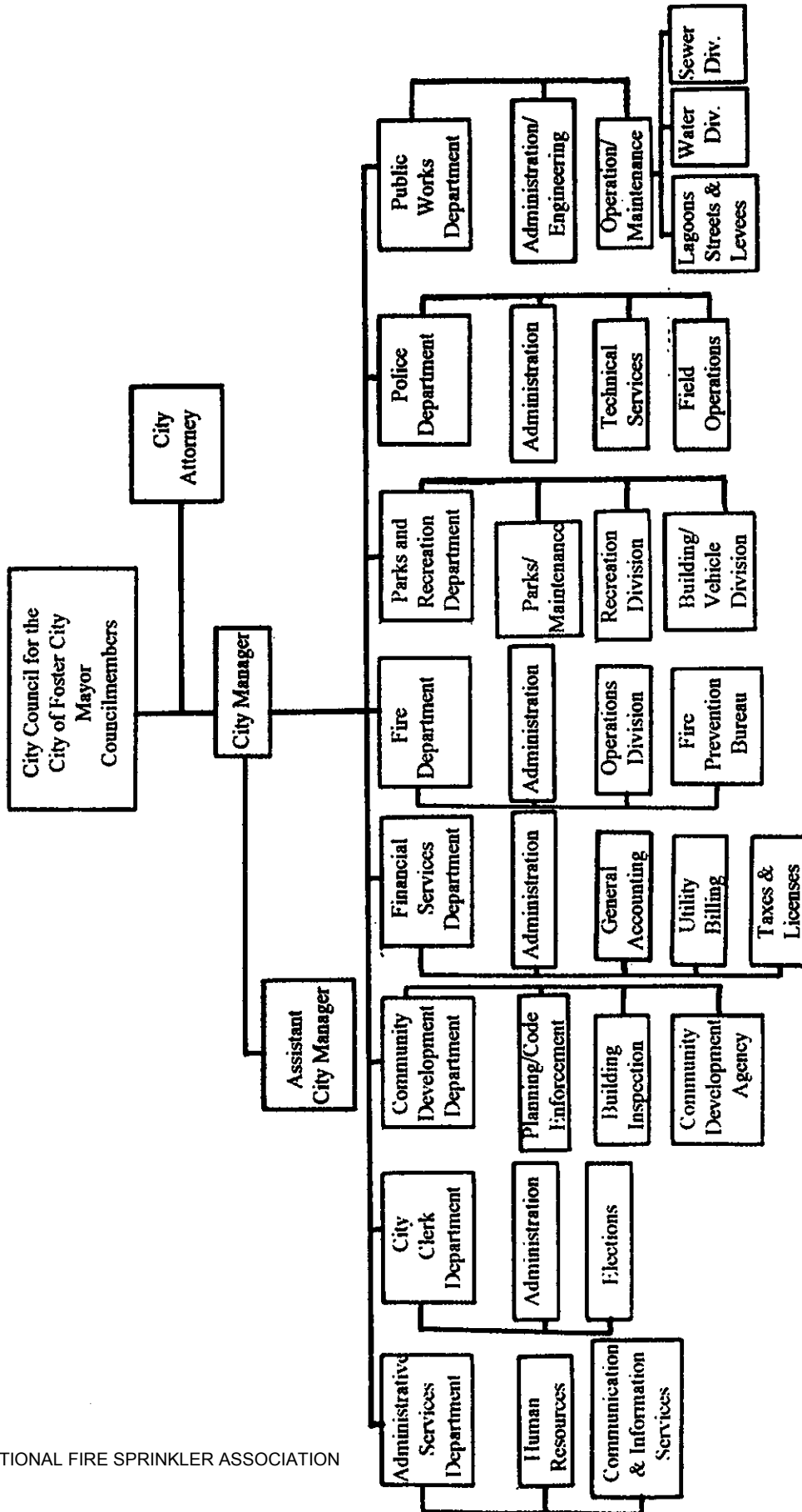
Again, this person can't afford *not* to install a sprinkler system.

## Conclusion . . .

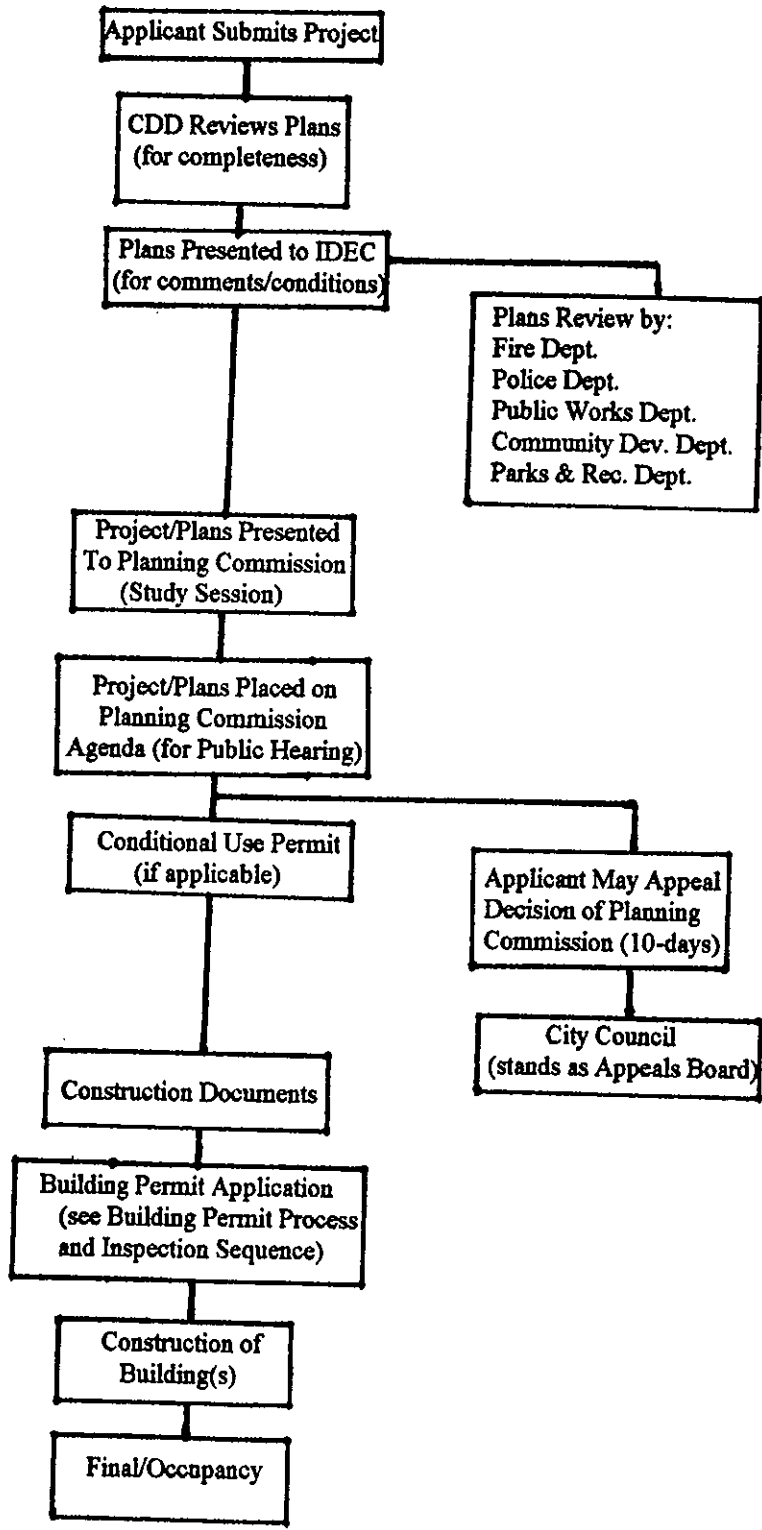
Retrofitting fire sprinklers into existing buildings, especially high-rise buildings, can be a cost effective proposition, and, as our examples have shown, fire sprinklers can also be a wise investment for all types of occupancies.



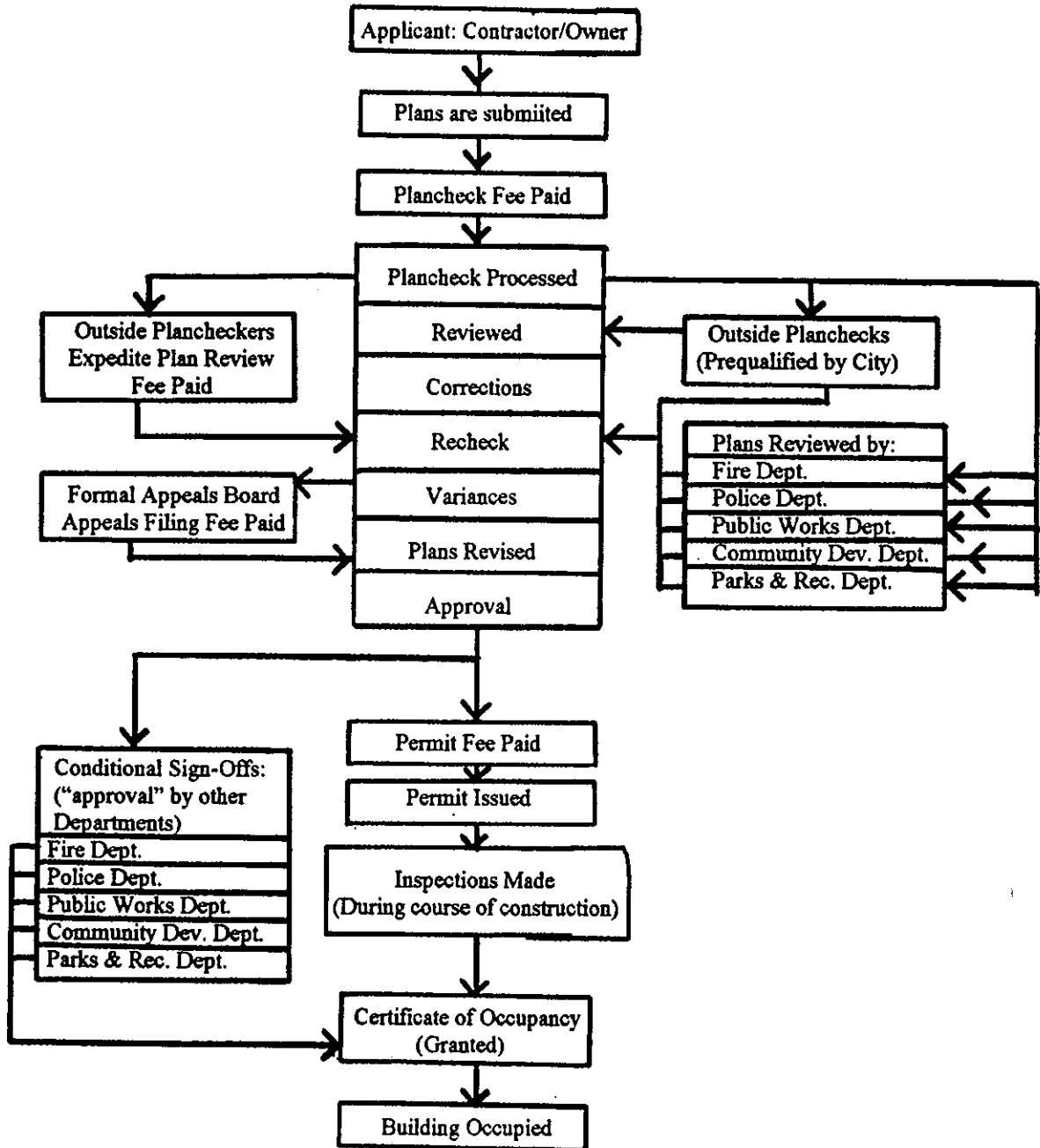
**CITY OF FOSTER CITY  
(Organizational Chart)  
09/25/97**



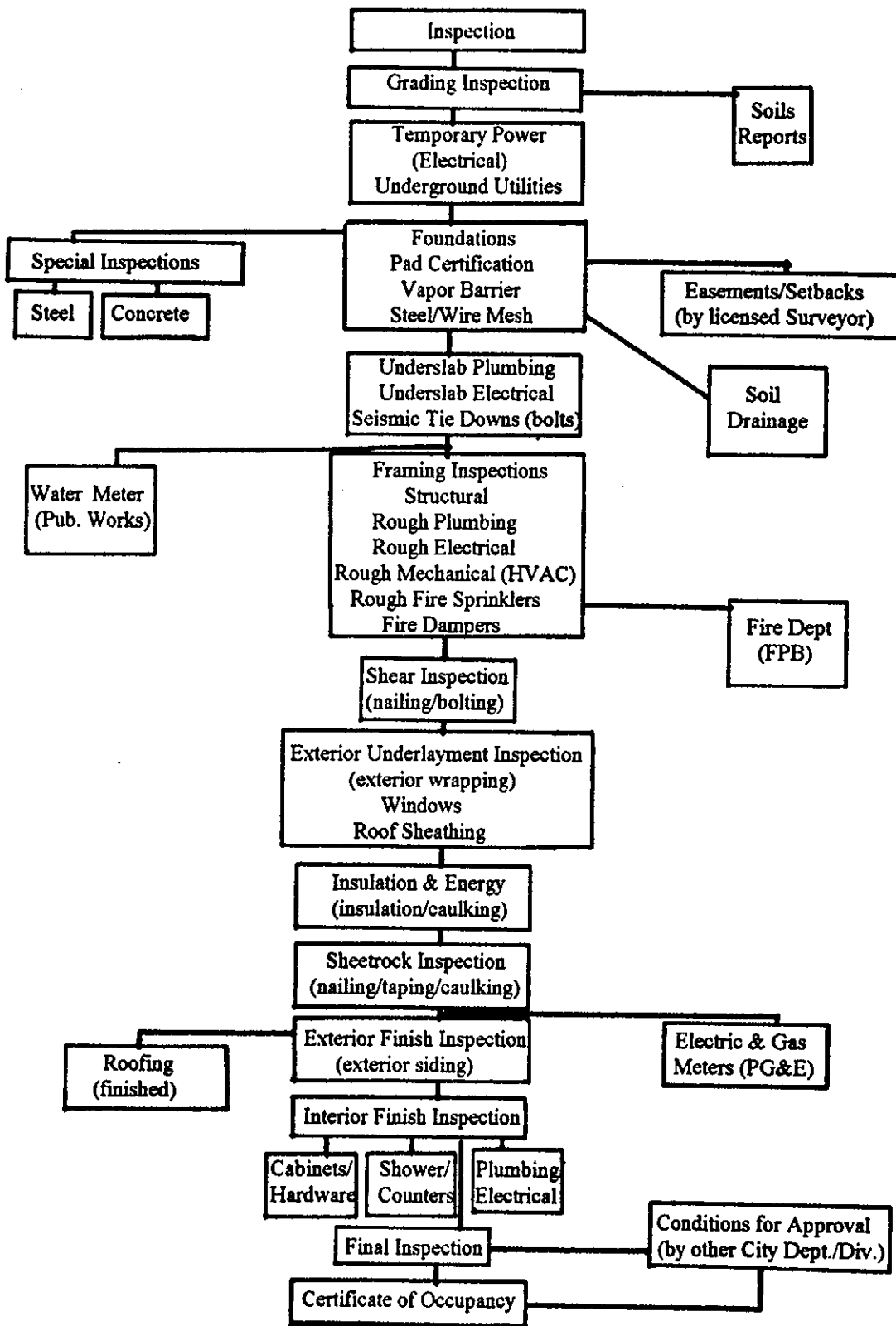
**CITY OF FOSTER CITY  
COMMUNITY DEVELOPMENT DEPARTMENT  
(Plan Review Process)  
(As of 09/25/97)**



**CITY OF FOSTER CITY  
(Building Permit Process)  
09/25/97**

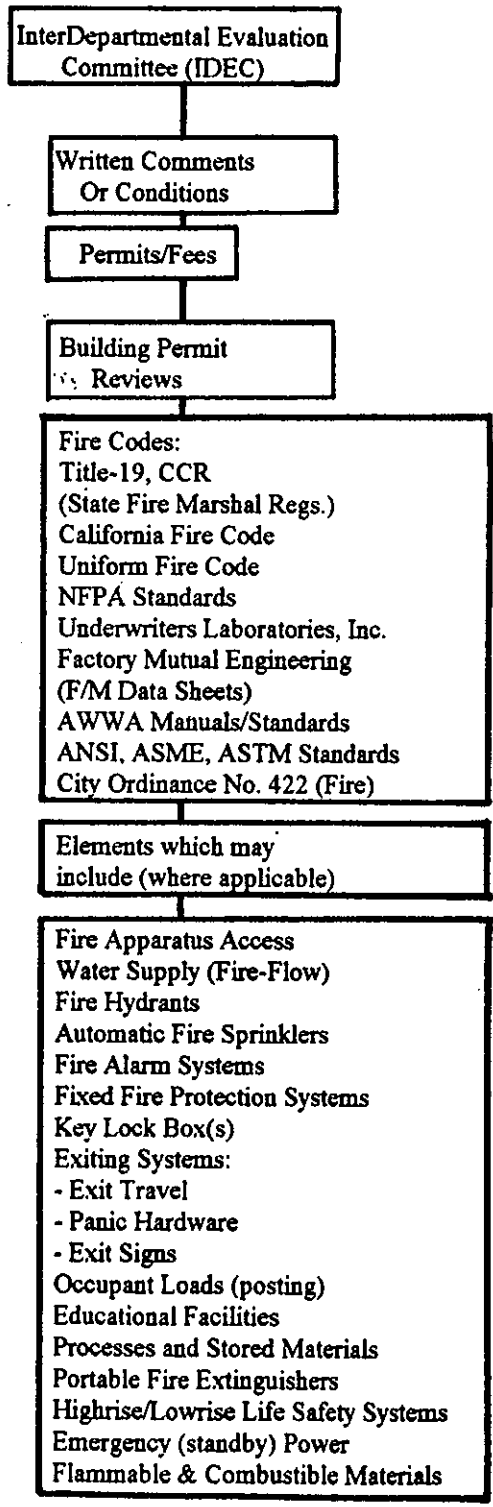


**CITY OF FOSTER CITY  
BUILDING INSPECTION DIVISION  
(Inspection Sequence)  
(As of 09/25/97)**

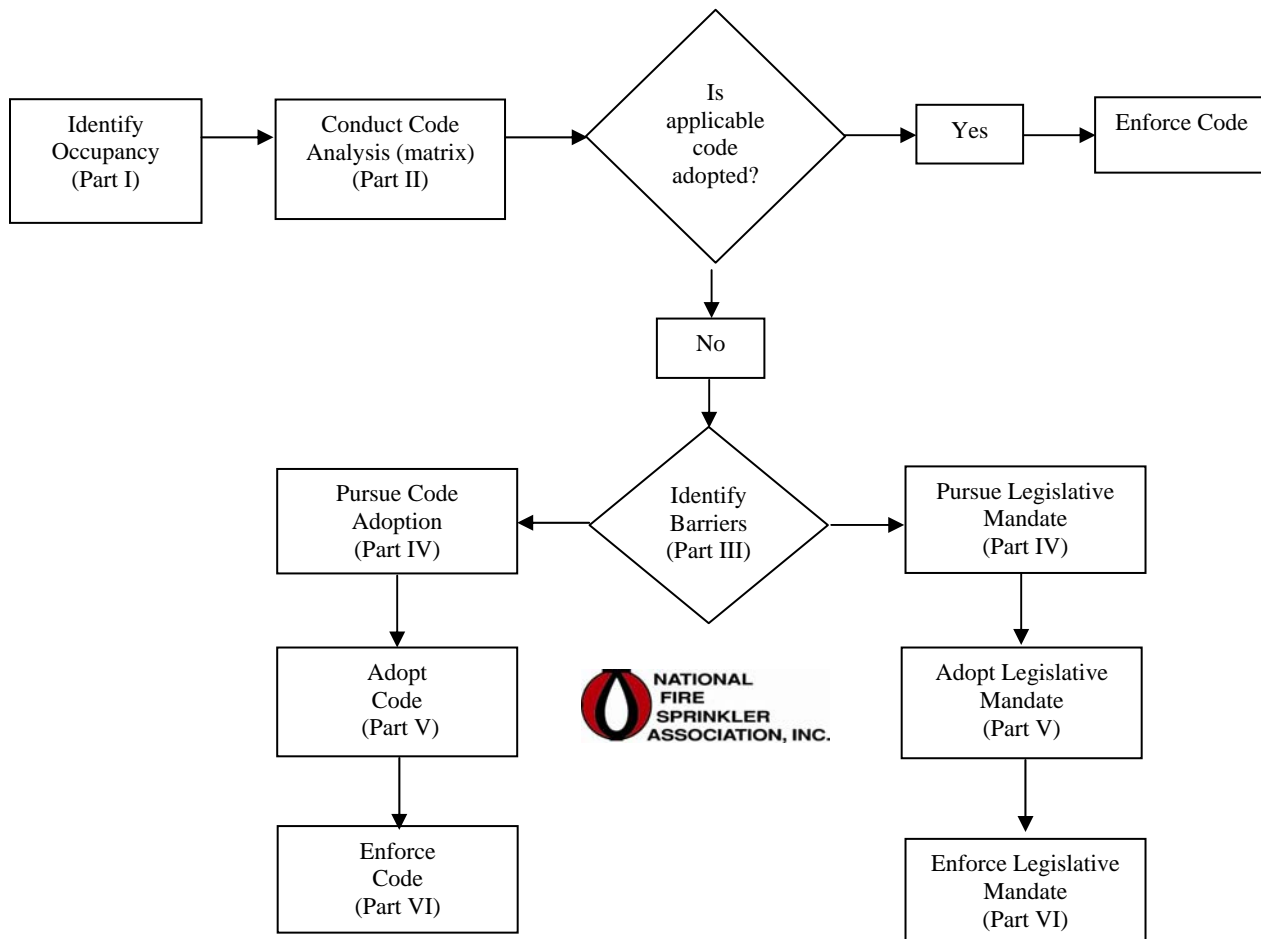


**CITY OF FOSTER CITY  
FIRE DEPARTMENT  
(Fire Prevention Bureau)**

**Plan Review Process**  
(as of 09/25/97)



# Fire Sprinkler Retrofit Decision Flow Chart



	Minimum or Maximum Requirements	Building Code (BC)	BC Edition	Fire Code (FC)	FC Edition	NFPA 101	NFPA 13	NFPA 25
Alabama	Minimum	IBC	2003	IFC	2003		1999	1998
Alaska	Minimum	IBC	2000	IFC	2000		1996	1998
Arizona	Minimum	By City	NA	UFC	1997			
Arkansas	Minimum	IBC	2000	IFC	2000		1996	1998
California	Minimum	UBC	1997	UFC	2000		1991	
Colorado	Minimum	IBC	2003	IBC	2003		1999	1998
Connecticut	Mini/Max	NBC	1996	NFPA 101	1997	1997	1996	1995
Delaware	Minimum	By County	NA	NFPA 101	2000	2000	1999	1998
Florida		IBC	2003	SFPC	1991		1999	1998
Georgia	Minimum	IBC	2000	IFC	2000		1996	1998
Hawaii	Minimum	By County	NA	UFC	1988			
Idaho	Minimum	IBC	2000	IFC	2000		1996	1998
Illinois	Minimum	By City	NA	NFPA 101	1991	1991	1989	
Indiana	Minimum	IBC	2000	IFC	2000		1996	1998
Iowa	Minimum	UBC	1994	NFPA 101	2000	2000	1999	1998
Kansas	Minimum	IBC	2000	NFPA 101	1997		1996	1998
Kentucky	Mini/Max	IBC	2000	NFPA 1	2000	1997	1996	1998
Louisiana	Minimum	IBC	2000	NFPA 1	2003		2002	2002
Maine	Minimum	IBC	2003	NFPA 101	1997	1997	1999	1995
Maryland	Minimum	IBC	2000	NFPA 1	2000	2000	1999	1998
Massachusetts	Minimum	IBC	2000	NBC	1993		1996	
Michigan	Mini/Max	IBC	2000	NFPA 101	1997	1997	1996	1995
Minnesota	Mini/Max	IBC	2000	IFC	2000		1996	1998
Mississippi	Minimum	Local adoption	NA	Local Adoption	NA			
Missouri		IBC	2000	NFPA 1	2000	2000	1999	1998
Montana	Minimum	IBC	2003	UFC	1994		1999	1989
Nebraska	Minimum	Local adoption	NA	NFPA 101	2000	2000	1999	1998
Nevada	Minimum	UBC	1997	UFC	1997	1994	1991	
New Hampshire	Minimum	IBC	2000	NFPA 1	2000	2000	1996	1998
New Jersey	Mini/Max	IBC	2000	NJUCC			1996	
New Mexico	Minimum	IBC	2003	UFC	1979		1999	
New York		IBC	2000	IFC	2000		1996	1998
North Carolina	Mini/Max	IBC	2000	IFC	2000		1996	1998
North Dakota	Minimum	IBC	2000	UFC	1997	1997	1996	
Ohio	Minimum	IBC	2000	NFPC	1999		1996	1998
Oklahoma	Minimum	IBC	2003	IFC	2003		1999	1998
Oregon	Mini/Max	UBC	1997	UFC	1997		1991	
Pennsylvania	Minimum	IBC	2003	IFC			1999	1998
Rhode Island	Minimum	IBC	2003	NFPA 1	1997	1997	1999	1995
South Carolina	Minimum	IBC	2000	IFC	2000		1996	1998
South Dakota	Minimum	UBC	1997	UFC	1997		1991	
Tennessee	Minimum	SBC	1999	NFPA 1	2000	2000	1996	1998
Texas	Minimum	IBC	2000	NFPA 101	1994	1994	1996	1992
Utah	Minimum	IBC	2003	IFC	2003		1999	1998
Vermont	Mini/Max	NBC	1996	NFPA 1	1997	1997	1994	1995
Virginia	Mini/Max	IBC	2000	NFPC	1996		1996	1995
Washington	Minimum	UBC	1997	UFC	1997		1991	
West Virginia	Mini/Max	IBC	2000	NFPA 101	2000	2000	1996	1998
Wisconsin	Minimum	IBC	2000	IFC	2000		1996	1998
Wyoming	Mini/Max	IBC	2003	IFC	2003		1999	1998
Puerto Rico				NFPA 1	2003			

NJUCC

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Examples of Sprinkler Retrofit Costs	
Occupancy	Example Costs per Square Foot*
Apartment Building (Low Rise)	\$ 4.00
Office Building	\$ 4.10
School	\$ 4.50
Church	\$ 5.20
Hotel/ Motel	\$ 6.30
Apartment Building (High Rise)	\$ 6.50
Nursing Home	\$ 7.00
Restaurant	\$ 7.00
Hospital	\$ 7.30

\* COSTS ARE EXAMPLES ONLY. Actual cost will vary. Cost per Square Foot in these examples are intended to include installation of fire sprinklers and repair, patching, and painting of ceilings and walls to complete the project.

Additional factors effecting cost	
<p><u>Available Water</u></p> <p style="text-align: center;">Cost ↓ Decreases</p>	<p>Installation of a pump and tank required                      Installation of a fire pump required                      Underground fire main not present                      Underground fire main present                      Existing standpipe present and able to supply a sprinkler system                      Existing combination standpipe riser prepped for future sprinkler system</p>
<p><u>Accessibility to walls/ceilings</u></p> <p style="text-align: center;">Cost ↓ Decreases</p>	<p>Walls/ceilings closed and difficult to repair                      Walls/ceilings closed and easily repaired                      Walls/ceilings open and easily repaired</p>
<p><u>Occupant cooperation</u></p> <p style="text-align: center;">Cost ↓ Decreases</p>	<p>Work schedule accelerated (overtime pay)                      Work restricted by occupancy (building must remain in use)                      Work restricted to off hours (building occupied)                      Work unrestricted (building not occupied)</p>





## High-Rise Fire Safety The Numbers



Example building: 1,200 sq. ft. condominium unit in a high-rise building  
Masonry non-combustible construction typical in Florida

Sprinkler costs: \$2.00 - \$3.00 per square foot.  
1,200 sq. ft. = \$2,400 - \$3,600 per unit cost.

Engineered Life Safety System: \$1.75 - \$4.00 per sq. ft.  
1,200 sq. ft. = \$2,100 - \$4,800 per unit cost.

Because of the financial impact on those with fixed income, the compliance deadline of 12-years was recommended to and approved by the State Fire Marshal's Office by the Florida Fire Code Advisory Council after a series of meetings around Florida. Saving \$25.00 per month, not counting interest equals \$3,600 during this 12-year period, thus the rationale for the 12-year compliance window.

Insurance saving: Loss-Cost data; Source -- ISO

### *Residential - High-Rise per \$100 insured.*

Construction	Not Sprinklered	Sprinklered	Difference
<i>Masonry Non-Combustible</i>			
Building	\$0.46	\$0.22	\$0.24
Contents	\$0.60	\$0.31	\$0.29
<i>Fire Resistive</i>			
Building	\$0.22	\$0.06	\$0.16
Contents	\$0.38	\$0.14	\$0.24
<i>Non-Combustible</i>			
Building	\$0.12	\$0.06	\$0.06
Contents	\$0.20	\$0.14	\$0.06

ISO - 1-1-01

Prospective loss costs are that portion of a rate that does not include provisions for expenses (other than loss adjustment expenses) or profit, and are based on historical aggregate losses and loss adjustment expenses adjusted through development to their ultimate value and projected through trending to a future point in time.

If the value of this 1,200 sq.ft. masonry non-combustible condominium was \$100,000 (less than \$85.00 per sq.ft. replacement cost) and the contents were valued at \$40,000, that portion of the property insurance *lost cost* is determined at \$0.46 for the building and \$0.60 for the contents per \$100 insured. If the building is not protected throughout with the fire sprinkler system, the loss/cost for the building would be \$460.00 and for the contents \$240.00, or \$700.00 per year. This figure is the expected break-even point and the insurance provider adds overhead, administrative and profit to these numbers, typical insurance company practice is to double the loss/cost numbers. By adding the

fire sprinkler system and having this fire sprinkler system approved by local government and ISO, the insurance costs for this condominium unit will be \$220.00 for the building and \$124.00 for the contents or a total of \$344.00. The lost cost annual savings as projected by ISO would be  $\$700 - \$344 = \$356$  or figured on monthly savings as \$30.00 per month reduced insurance costs.

If the construction were fire resistive, the savings using this example would be \$256 annual savings or \$21.33 per month and if it were simple non-combustible the savings would be \$84 annual savings or \$7.00 per month.

Instead of saving the \$25.00 per month during the 12-year period and upgrade the level of fire safety in the 11<sup>th</sup> year, say I borrow money to install the system today and, for this example, let's say this money plus interest causes the condominium owner to owe \$35.00 per month. If the condominium were of masonry non-combustible construction my costs would be \$35.00 minus the insurance savings of \$30.00 or a **net cost of \$5.00 per month**. If the condominium were of fire resistive construction, the cost would be \$35.00 minus the insurance savings of \$21.33 per month or a **net cost of \$13.67 per month**. And if the condominium were of simple non-combustible construction, the costs of our example would be \$35.00 per month minus the insurance savings of \$7.00 per month or a **net cost of \$28.00 per month**.

An actual cost example is the Dolphin Cove Condominium in Clearwater, Florida, which retrofitted fire sprinklers and other safety systems after the fire death of two residents and the injury to three firefighters, one permanently disabled. The total fire safety upgrade cost \$3.44 per square foot or approximately \$3,500 per unit *and* the upgrade includes a complete fire sprinkler system, a complete fire detection and alarm system, repair of structural damage resulting from the fire and asbestos abatement. After financing each unit has been assessed \$50.00 per month. The building is constructed of masonry non-combustible materials and the typical unit size is 1,200 square feet. Thus deducting the average \$30.00 per unit insurance savings from the \$50.00 per month assessment leaves a net cost per unit for the Dolphin Cove residents at just \$20.00 per month. It is unlikely that there will be mortgage default and displacement because of an added cost of \$20.00 per month which turns into a \$30.00 income after the mortgage is paid – typically within 10 years.



## FLORIDA FIRE MARSHALS AND INSPECTORS ASSOCIATION



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### Florida High-Rise Fire Safety Codes

- Florida has adopted the current edition of the National Fire Protection Association *Life Safety Code*, which has contained special fire safety requirements for high-rise buildings for over a decade, actually since 1991. The nationally accepted *Life Safety Code* is used in all 50 states as a fire safety standard.
- Following two major high-rise fires, MGM Grand Hotel in Las Vegas (85 deaths) and the Dupont Plaza Hotel in San Juan (97 deaths), the national code development authorities focused on high-rise buildings because of the potential for major loss of life and untenable fire suppression conditions.
- The *Life Safety Code* requires all existing high-rise buildings (over 75 feet in height), regardless of its use, to apply fire safety measures. The owners of a high-rise building have been given the options of:
  - Retrofitting the existing building with an automatic fire sprinkler system: or,
  - Providing an Engineered Life Safety System whose qualified engineer may or may not require a complete or even a partial fire sprinkler system. The analyzing engineer would identify fire safety features that would render the high-rise building safe based upon fire protection engineering principles.
- There is an exemption from the special high-rise fire safety requirements for residential high-rise buildings where every dwelling unit has exterior exit access to an open-air walkway that leads to two remote stairwells.
- Extensive discussion was conducted during the Rule adoption process implementing this necessary life safety requirement. Associations and interest groups representing the stakeholders were involved and as a result of their comments, the time period for compliance was set at 12-years. The effective date of the high-rise fire safety requirement is January 1, 2002. Therefore, the final compliance date is December 31, 2014.
- While there may be non- or limited-combustible material used in the construction of a high-rise building, fires in high-rise buildings typically extend up the exterior entering the units from windows and balcony doors whose glass is weakened by heat. It is the contents in the living units that leads to fire growth and extension.



- The City of Louisville, Kentucky was one of the first cities in the nation to pass a high-rise fire safety ordinance after an independent study found that the fire department could not respond fast enough to prevent flashover on upper floors of a twenty-story building.
- Fire suppression force capabilities are no different in Kentucky than in Florida when it is faced with combating a high-rise fire. The fire suppression forces typically climb stairways with heavy loads of fire fighting equipment. The ability of the firefighter to promptly exit causes great concern for the firefighter when the fire becomes untenable.
- *A recent Pinellas County high-rise condominium fire resulted in the death to two occupants and injury to numerous firefighters.* There have been fires and fire deaths in high-rise buildings throughout Florida in the past.
- While firefighters understand that facing risk is part of their job, the unreasonable level of risk faced in combating high-rise fires is unacceptable. Governmental costs, particularly workers' compensation, increase when fires occur in unprotected high-rise buildings.
- Liability avoidance or the minimization of liability risk from fire incidents occurs when high-rise buildings are protected with automatic fire sprinkler systems. National model fire safety codes have required fire sprinkler protection in high-rise buildings since 1991 and the owners of said buildings know or should know the life safety benefits of proper fire sprinkler protected high-rise buildings.
- While many business and property owners are now facing significant increases in liability insurance, it must be anticipated that significant high-rise property and liability insurance rate increases will occur, as has been the experience with other businesses and property owners in recent months. A high-rise protected with a fire sprinkler system, coupled with the existing insurance rate reduction provisions of s. 627.0654, F.S., will go far in minimizing insurance rate increases.
- The economic impact of a tragic fire in high-rise residential structures can be documented by looking at tourist declines after the MGM Grand Hotel fire in Las Vegas. The airlines reported over 200,000 less travelers from previous months and years immediately following the tragic fire, an economic fallout situation that lasted for over 10 months. Florida's tourist industry would be negatively impacted if a multiple fire death fire should occur in one of our many tourist destinations.





## Retrofit Laws

### **Alabama**

All nursing homes are required to have sprinkler systems installed. Phase 1 will require sprinkler systems to be installed by January 1, 2006; Phase 2 requires systems to be installed by September 1, 2006, and Phase 3 by February 1, 2007. (Source: Alabama Department of Public Health (334) 206-5300)

### **Alaska**

*Fairbanks* - Retrofit required for all residential. (Source: AHMA 1992 article)

*Juneau* - Retrofit required for high-rise 75 ft or more in height. (Source: AHMA 1992 article)

### **Arizona**

*Phoenix* - In 1976, the City of Phoenix began requiring all assembly areas within high-rise buildings to be sprinklered if the building did not already have a complete fire sprinkler system. Source: Phoenix Fire Department (602) 262-6849). In 1991, new ordinance required retrofit of all high-rise. (Same Source - Joe Radocovich)

*Scottsdale* - All high-rise required to be retrofit. (Source: AHMA 1992 article)

*Tucson* - The City of Tucson successfully passed the ordinance requiring retrofit of all high-rise buildings greater than 50 ft. in height. Individuals were given a 3 year time frame to comply. Source: Northwest Fire District, Tucson, AZ (520) 742-4749.

### **California**

Adult Residential Facilities and Residential Care Facilities for the Elderly that house or care for no more than 6 patients, must have an approved, operable automatic fire sprinkler system if they are licensed before December 31, 2005. The bill would require every facility for which a license is newly issued on or after January 1, 2006, to have an approved, operable automatic fire sprinkler system on and after the date of issuance.

*Chino Hills* - When additions to existing buildings are 50% or greater of the original building square footage, the existing building shall be retrofitted throughout. Both the new construction and existing building shall be equipped with an automatic fire sprinkler system as set forth in NFPA 13D

*Felton* - The Felton Fire Protection District modified it's fire code to include a fire sprinkler ordinance for all new structures. Remodels that modify more than 75% of the structure are considered new construction and require retrofit fire sprinklers.

*Fremont-Corridors* serving more than ten occupants in existing buildings two stories or more in heights which contain Group R Division occupancies (hotels and apartments) must be protected with automatic sprinkler systems, with a sprinkler adjacent to each door opening within each guest room or dwelling unit. Permits are to be obtained within one year after notification, with work completed within three years. (Source: Ordinance No. 2270 adopted December 9, 1997)

*Fresno* - In 1961, Fresno began encouraging sprinkler retrofit as a part of a downtown urban renewal program. This was changed to a requirement in 1974 when all buildings over 3,000 sq ft in the central business district were required to comply. In 1979, the sprinkler requirement was extended to include all buildings in the city exceeding 5,000 sq ft in area. By 1983, 90 percent of the 5.2 million sq ft within two major areas of the city (one commercial and one industrial) were sprinklered. Total fire losses for these areas between 1970 and 1983 were \$72,335 with more than one-third of the loss accounted for by two fires in unsprinklered buildings. (Source: Fresno Fire Marshal's Office (209) 488-1023)

*Los Angeles* - In July of 1988, the Los Angeles City Council enacted a law to require sprinklers in all buildings 75 or more ft in height, except apartments and condominiums. This ordinance affected approximately 300 buildings. Since this law was passed, about 50% of the complexes have been sprinklered. The remaining retrofit market was estimated to be about \$50 million. (A 1974 ordinance required sprinklers in all new construction exceeding 75 ft. Retrofit of pre-1974 residential high-rise was considered by the City Council in late 1991). (Source(s): September 30, 1991 Engineering News-Record. BFGoodrich Report. Sales personnel at Fire Protection Group, Los Angeles. )

*Petaluma* – As of July 1, 2000, all new construction in Petaluma, both residential and commercial, has required installation of an approved fire sprinkler system. The current policy calls for building owners in the heart of downtown to install sprinklers in their basements by 2011 and above ground by 2017. The city is offering to pay 10 percent of the cost, up to \$10,000.

*Ventura* - All new and existing buildings over 5,000 sq ft have been required to be fully sprinklered since 19\_\_\_\_. (Source: Ventura Fire Marshal's Office (805) 654-7760)

*San Diego* - All non-residential high-rise buildings 75 ft or more in height and hotels/motels over 75 ft to be sprinklered. Estimated market is \$10-15 million. (Source(s): AHMA 1992 article. BFGoodrich Report. Western Fire Protection, Inc.)

*San Francisco* - All hotels. Retrofit ordinance was passed in 1989 that required all nonresidential high-rise buildings (75 ft or more) to be sprinklered. Almost 100% complete. All commercial buildings 75 ft and higher are required to be sprinklers by an ordinance passed 11/15/93, excluding apartment and condominium buildings. (Source(s): AHMA 1992 article. BFGoodrich Report.)

*San Jose* - All business and residential high-rise ordinance was passed in January 1990. Owners are given one year for plans, another year to get water supply in place and a third year to finish the system. (Source: AHMA 1992 article)

## **Colorado**

*Boulder* - In 1988, the city of Boulder passed an ordinance which requires fire sprinklers throughout existing buildings of the following types: residential occupancies more than 55 ft in height, health care occupancies, dormitories, hotels above two stories in height except 3-story hotels with exterior exit balconies for all guest rooms, windowless structures except small well-divided warehouses with individual access and aircraft hangers, and basements greater than 2,500 sq ft which are below places of assembly. All work must be completed by May of 1993, with installation contracts by May of 1992.

*Denver* - Certain business, hotel and mercantile occupancies. (Source: AHMA 1992 article)

**Connecticut** - In June of 1988, the State of Connecticut passed a law to require sprinklers in all hotels, motels and housing for the elderly which are more than 4 stories in height. Hotels and motels must be sprinklered by October of 1992, while homes for the elderly must comply by October of 1993. In a law that took effect April 15, 1987, the State of Connecticut began to require sprinkler systems in all assembly occupancies for 300 or more people, on the story of the assembly and any story below the assembly occupancy. Exceptions are provided for places of worship, multi-purpose rooms of less than 12,000 sq ft not used for exhibition, and gymnasiums, skating rinks, and swimming pools with audience seating for

less than 300 people. (Source: Bureau of State Fire Marshal (203) 238-6624) By July 1, 2005 each chronic or convalescent nursing home or rest home with nursing supervision is required to have an automatic sprinkler system on each floor.

**Florida** - In 1983, the State of Florida enacted legislation to require fire sprinkler systems throughout all public lodging establishments three stories or more in height including time share units. Sprinklers can be omitted from closets not over 24 sq ft and bathrooms not over 55 sq ft located in guest rooms of time share units. Buildings with construction contracts let prior to October 1, 1983 may install a sprinkler system only in corridors and public areas if the building is non-combustible with 1-hour separations between guest rooms and along corridors. All buildings were required to comply by 1990. This is nearly 100% completed with about a \$50 million market remaining. Florida is also requiring any assisted living facility (ALF) to be retrofitted with sprinklers. 30% of the 1800 assisted living facilities in the state of Florida remain to be sprinklered, a \$60 million dollar market. Finally, all prisons must be sprinklered, a value estimated at \$100 million. (Source(s): Division of State Fire Marshal (904) 488-8268. See ordinance #509.215 per AHMA 1992 article. BFGoodrich Report. Consultant Benlolo for BFG Blazemaster.)

*Miami Beach* - Requiring all existing condos to be retrofitted with sprinklers by 1999. Approximately 70 remain, a \$5 million dollar market. (Source: BFGoodrich Report)

*Dade County*- schools are required to be retrofitted with sprinklers. (Source: BFGoodrich Report)

*Boca Raton*- Ordinance passed approximately 10 years ago which required all nursing homes and health care occupancies to be sprinklered. (Source(s): BFGoodrich Report. Boca Raton Fire Prevention Bureau.)

## **Georgia**

*Atlanta* - The City of Atlanta passed legislation in December of 1989 to require sprinkler protection of buildings more than 6 stories or 75 ft in height of the following types: all business, mercantile, institutional, and residential, including hotels. Sprinklers were also required throughout assembly occupancies with exhibition or display areas exceeding 15,000 sq ft.

All systems must be installed by the end of 1995, although buildings exceeding one million sq ft are permitted an extension until the end of 1999. (Source: City of Atlanta Bureau of Buildings (404) 330-6152)

*DeKalb County* - All 5 high-rise buildings constructed prior to the adoption of fire sprinkler laws must be retrofitted within 4 years (by July 1994). This includes three residential and two hotel buildings. High-rise buildings inside DeKalb's cities are not covered. (Source: DeKalb News/Era July 12, 1990)

## **Hawaii**

*Honolulu* - The City and County of Honolulu enacted legislation to require that all hotels 75 ft and higher, with more than 50 percent of the building used as hotel rooms, be equipped with complete smoke detection and fire sprinkler systems. The law affected 82 existing buildings within the city and county. (Source: Honolulu Fire Chief's Office (808) 943-3301)

*Maui* - All high-rise buildings. (Source: AHMA 1992 article)

**Illinois** - State-wide retrofit ordinance passed in 1976 requiring nursing homes to be sprinklered. (enforces 1985 NFPA 101 provisions - AHMA 1992 article). (Source: BFGoodrich Report). In 2004 legislation was passed requiring dormitories at all public and private colleges and universities to have fire sprinkler systems installed by 2013. The statute also provides for low interest loans to finance the installation (Source: NIFSAB Advisory Report).

*Champaign* – Effective November 16, 2004, the Municipal Code was amended to require sprinklers in dormitories, nursing homes and high-rise buildings within a five-year timeframe.

*Chicago* - In 1935, the City of Chicago required all men's dormitories to be equipped with automatic sprinkler systems. In 1963, all schools and similar institutional occupancies were required to be sprinklered. By 1970, all exhibition areas in the city were required to be sprinklered. Following two severe nursing home fires in the mid-1970's, the City passed legislation requiring all nursing homes to be sprinklered by 1977. The law was challenged in the courts, and a Circuit Court Judge ruled it unconstitutional, but the law was ultimately upheld by the Illinois Supreme Court. (Source: Chicago Fire Prevention Engineer's Office (312) 744-1876) On December 15, 2004 Chicago City Council voted to enact an ordinance requiring all high-rise commercial buildings constructed before 1975 to be completely protected by automatic fire sprinklers by 2017. The ordinance also requires that high-rise residential and landmark buildings be subjected to a code equivalency analysis to ensure that some minimum level of fire safety is achieved. (Source: NFPA Journal, March/April 2005)

*Evanston* – Fire Prevention Regulations were adopted in November 2005 to require automatic fire sprinklers in existing dormitories, hospitals, non-owner occupied rooming/lodging houses and nursing homes in accordance with the 2003 IBC. All retrofits must be completed by December 31, 2008. (Source: City of Evanston Fire & Life Safety Services)

*Oak Brook* - In 1979, Oak Brook enacted an ordinance requiring that all buildings without approved fire alarm systems as of that date be equipped with automatic sprinkler systems. In a 1981 survey, only 6.3 percent of the 12.9 million sq ft of building area was not protected with sprinklers. By the time of a 1984 estimate, the unsprinklered percentage had been reduced to 1 percent. (Source: Oak Brook Director of Fire Prevention (312) 990-3000)

In 2004, legislation passed requiring dormitories at all public and private colleges and universities in Illinois to have fire sprinkler systems installed by 2013. The newly enacted statute also provides for low interest loans to finance the installation of dormitory sprinkler systems.

*Wheeling* - Fire sprinkler systems are required in all new construction regardless of its square footage. Existing commercial, industrial, and multi-family occupancies are required to be retrofitted with fire sprinkler systems if, the structure is increased in square footage and/or the degree of fire hazard is increased as defined by the Village of Wheeling Building Code. (Source: Village of Wheeling, IL)

*Hodgkins* - The new automatic fire sprinkler ordinance requires an automatic fire sprinkler system to be installed in all existing multifamily residential buildings containing more than four units. It also requires fire sprinklers in all new construction multi-family buildings with more than four units. The ordinance was passed November 8, 2004. Working plans for retrofitting the buildings are due March 31, 2005. Installation must be completed by November 30, 2005.

## **Iowa**

*Ames* – Ames City Council passed a retrofit sprinkler ordinance on May 9, 2006 regarding Greek Housing. The ordinance allows 10 years to complete the retrofitting.

## **Kansas**

*Lawrence* – In 1993 a retrofit ordinance passed requiring all of then 39 fraternities and sororities in Lawrence to retrofit their buildings with sprinkler systems.

## **Kentucky**

*Louisville*- passed ordinance in 1993 that stated all high-rise buildings (75ft or more) must be sprinklered except for airport control towers, open parking garages, outdoor assemblies, low hazard use, telephone



equipment rooms, and owner occupied residential co-ops. All compliance must be completed by 2005. (Source: AHMA 1992 Article)

**Louisiana** - All existing high-rise (over 75 ft) must be fully protected with sprinklers by the end of 1999. Plans must be submitted by the end of 1991. (Source: June/July 1990 Fire News)

**Maryland**- Does not have a state wide retrofit ordinance. However, a resolution passed that requires government employees to stay at sprinklered hotels/motels has led many existing hotels/motels to be sprinklered. (Source: BFGoodrich Report)

*Ocean City* - In 1981, Ocean City required sprinklers to be installed in public areas of all high-rise occupancies. (Source: Ocean City Fire Marshal's Office (301) 289-8221)

*Baltimore County* - Adopted the Life Safety Code in the mid 1980's, which required any new high rise over 75 ft. to be sprinklered. According to the Baltimore County Fire Marshall, 99% now conform. (Source: BFGoodrich Report)

Prince George's County - The city recently required off-campus dorm-style housing — mostly university-owned fraternity and sorority houses — to install fire sprinkler systems, and a task force is studying the feasibility of retrofitting high-rises with sprinklers.

**Massachusetts** - In 1986, the Commonwealth of Massachusetts required that sprinkler systems be installed in all buildings over 70 ft in height and built prior to 1975 (the date from which all new high-rise buildings were required to be fully sprinklered).

The state also established a local option to permit municipalities to require that sprinklers be provided in all boarding homes with more than five residents. The local option was first exercised by the cities of Beverly and Salem. (Source: State Fire Marshal's Office (617) 566-4500)

*Worcester* - Requires retrofit of lodging and rooming houses. (Source: AHMA 1992 article)

In 2004, legislation passed requiring the installation of automatic fire sprinklers within three years in places of assembly with occupancy of 100 people or more.

## **Michigan**

## **Minnesota**

*St. Paul* - requires retrofit per Appendix 1A of Uniform Building Code. (Source: AHMA 1992 article)

## **Missouri**

*St. Louis* - Requires retrofit of buildings over 12 stories at time of ownership change. (Source: AHMA 1992 article)

## **Montana**

*Billings* - Retrofit of all high-rise buildings required. (Source: AHMA 1992 article)

**Nebraska** - Uses 1994 Life Safety Code, including existing buildings chapters. (Source: State Fire Marshalls Office (402-471-2027))

**Nevada** - In 1982, the State of Nevada required that sprinklers be provided in corridors, and in each room above any door opening onto the corridor, in all existing hotels, offices, apartment and condominium buildings with floors for human occupancy more than 55 ft above the ground. Also, any building of at least 12,000 sq ft with 5,000 sq ft used for public assembly was required to be protected with a sprinkler system. Any building used for public assembly with an occupant load greater than 300 is also required to be sprinklered unless interior finish is controlled. (Source: Nevada State Fire Marshal's Office (702) 687-4290).

## **New Hampshire**

*Nashua* - Requires retrofit of 12-unit, 3-story or more? (Source: AHMA 1992 article)

**New Jersey** - The State of New Jersey in 1986 required retrofit of all hospitals, hotels/motels, non-residential high rises, rooming and boarding homes and all residential health care facilities. Some assembly occupancies have also been required to be retrofitted on a case-by-case basis under Phase 1 of Subchapter 4 of the Fire Safety Code, primarily night clubs, dance halls, and discotheques. (Source: Office of the State Fire Marshal (609) 633-6130)

## **New York**

*Greenburgh* - In 1982, the town of Greenburgh passed an ordinance requiring existing hotels, motels, child and day care centers, hospitals, infirmaries, sanitariums, nursing homes, nightclubs, restaurants, group homes, and halfway houses to be sprinklered within 5 years, with valid installation contracts to be signed within 3 years. (Source: Greenburgh Bureau of Fire Prevention (914) 682-5223)

*New York City* - Local Law 5, originally enacted in 1973 and finally upheld by the courts in 19\_\_\_\_, mandated retrofit of either a complete sprinkler system or a package of compartmentation, stair pressurization, and detection for office buildings exceeding 75 ft in height, although an equivalency system later provided for exemptions of some buildings. Local Law 41, enacted in 19\_\_ required sprinklers in nightclubs, discotheques, and social clubs. Local Law 16, enacted in 19\_\_\_\_, required sprinklers in storage areas, laundry rooms, and rubbish areas, not protected with smoke detectors, of high-rise and low-rise hotels. Also, buildings leased to the Federal Government must be sprinklered. (Source(s): Office of Fire Prevention (718) 403-1367. BFGoodrich Report. Fire Marshals Office.)

*Poughkeepsie*- The Town of Poughkeepsie passed an ordinance in July of 1987 to require sprinkler systems in all hotels, motels, child-care institutions, hospitals, infirmaries, sanitariums, nursing homes, nightclubs, public restaurants, day-care centers, group homes and halfway houses. Systems must be installed by June of 1993, with an installation contract required by June of 1991. (Source: Poughkeepsie Fire Inspector's Office (914) 485-3600). NOTE: Retrofit ordinance rescinded in January of 1992.

New York City – Local Law 126-A was signed into law on June 25, 2004. It requires all office buildings of 100 feet in height or more to be retrofitted with sprinklers no later than July 1, 2019. A one-year report is due July 1, 2005. Subsequent reports of plans and progress are due July 1, 2011 and July 1, 2018 with the final report and project completion by July 1, 2019. (Source: NYC Department of Buildings (212) 566-5000)

## **North Carolina**

*Chapel Hill*- Ordinance in effect which requires all dormitories, fraternities and sorority houses to be sprinklered by 2001. An estimated \$1-2 million dollar market exists. (Source(s): BFGoodrich Report. Bolton Corporation in Raleigh, NC.)

## Ohio

**COLUMBUS** – If high-rise buildings have adequate egress, they have to retrofit with sprinklers on a floor-by-floor basis as they get new tenants.

## Pennsylvania

*Harrisburg* - In December of 1987, the Harrisburg City Council passed a law to require sprinkler systems in all business and apartment buildings over 75 ft in height, and in all hotels and motels. Owners must comply by the end of 1992. All occupancies except one- and two-family dwellings when renovating 50 percent or more (Source: AHMA 1992 article)

*Philadelphia* - An ordinance was enacted in December of 1991 which requires sprinkler systems retroactively in all high-rise buildings exceeding 75 ft in height except Group R-2 residential occupancies. Group R-2 includes multiple - family dwellings, boarding houses and similar buildings with sleeping accommodations in which the occupants are not transient in nature. All retrofit work must be completed within eight years, i.e. by the year 2000. An earlier ordinance enacted in the 1980s had required all basements with rooms in excess of 2500 sq ft, or in excess of 120 sq ft used for storage of combustibles, all assembly and mercantile occupancies in high rises, commercial kitchens, trash and rubbish chutes and rooms, and any occupancy below a residential occupancy to be equipped with fire sprinklers.

Another ordinance passed in December 1991 requires all existing high-rise (more than 75 ft from highest floor to lowest level of fire department vehicle access) buildings to be sprinklered except apartment buildings with wet standpipes which also meet other requirements. The ordinance gives building owners a schedule of compliance dates. Within 18 months (July 1993) water supplies must be available to all floors.

Within 30 months (July 1994) 20 percent of the floors in the building must be fully sprinklered. Within 39 months (April 1995) 40 percent of the floors must be fully sprinklered. Within 48 months (January 1996) 60 percent of the floors must be fully sprinklered. Within 57 months (October 1996) 80 percent of the floors must be fully sprinklered. And within 66 months (July 1997) 100 percent of the building must be fully sprinklered. (Source: Department of Licenses and Inspections (215) 686-2471)

*Pittsburgh*- Requires all business high rise office buildings to be retrofitted with sprinklers, but only when tenants change. (Source: BFGoodrich Report)

**Rhode Island** – All new and existing places of assembly with a maximum occupancy of 300 must be fully sprinklered in accordance with NFPA 13(2002) by July 1, 2005, places of assembly with a maximum occupancy of 150 – 299 must be fully sprinklered in accordance with NFPA 13(2002) by July 1, 2006.

**South Dakota** - A number of schools have been required to retroactively install sprinklers in accordance with the provisions for existing educational occupancies of the NFPA Life Safety Code, such as windowless classrooms and classrooms below grade. (Source: Office of the State Fire Marshal 605-773-3562)

**Tennessee** - All nursing homes are required to have sprinkler systems installed. Phase 1 will require sprinkler systems to be installed by January 1, 2006; Phase 2 requires systems to be installed by September 1, 2006, and Phase 3 by February 1, 2007.

**Texas – All High-rise dormitories are now retrofitted.**

## Vermont

**Virginia** - Virginia has a state wide ordinance that requires all hotels/motels four stories or greater to be sprinklered by March of 1997. Strongly enforced in the Virginia Beach and northern Virginia areas. Also, a

limited retrofit ordinance is in effect requiring the patient areas and adjacent halls in hospitals to be sprinklered by January 1998, an estimated market of \$10 million. All nursing homes and nursing facilities to be sprinklered by January 1, 1993. General Assembly to receive report on further retrofit from Board of Housing Community Development in November 1990. (Source: June/July 1990 Fire News) Nursing homes and hotels by 1997 (Source(s): AHMA 1992 article. BFGoodrich Report. Worshem Sprinkler Co.).

*Virginia Beach* - Strictly enforcing the state retrofit ordinance for hotels/motels. An estimated 25 hotels/motels, still need sprinklering, a market of 7-8 million. (Source(s): BFGoodrich Report. Worshem Sprinkler Co.).

## **Washington**

*Mercer Island* – As of **July 1, 2004** automatic fire-sprinkler is required during additions and substantial alterations costing 50 percent or more of the current assessed value to existing buildings regardless of use when floor area equals 5,000 or greater square feet.

*Seattle* - In May, 2005, the Washington State Legislature approved a law which requires fire sprinklers to be installed in existing nightclubs by December 1, 2007.

## **Wisconsin**

On December 21, 2005 Wisconsin Governor Jim Doyle signed into law a landmark bill that requires automatic fire sprinkler systems installed in all new construction residence facilities on private campuses, all residence halls greater than 60 feet in height, all Greek housing in private and public colleges and privately owned high-rise buildings that have a student population of 50 percent or more. Five years ago, a bill was passed requiring fire sprinkler systems installed in all high-rise residence halls located on public campuses. Colleges have eight years to comply.

## **Wyoming**

*Casper* - Retrofit all high-rise. (Source: AHMA 1992 article)

## Microbiological Control in Buildings After Flooding or Water Damage

Floods, leaks from plumbing or sprinkler systems, or condensation can cause unintentional wetting of office and residential surfaces. Microbial growth will begin on these surfaces very quickly, usually in less than 24 hours. With a few notable exceptions, most molds and fungi are harmless. However, individuals' allergic susceptibility can be significant, and odors from molds and fungi can be offensive. After water damage, take *immediate* action to minimize the growth of molds and fungi. After controlling the water source, follow these guidelines\* to resolve this problem quickly and cost-effectively:

### Decontamination Procedure

1. **Inventory all flooded areas** so that every water-damaged area is identified, treated and cleaned.
2. Remove and dispose of all wet **ceiling tiles and drywall** within 24 hours of water contact.
3. Remove and replace all **drywall and insulation** up to 12 inches above the water line.
4. Dry all wet **light fixtures**.
5. Water damaged **furniture, including wood**, should be replaced or cleaned with a 10% bleach solution. *Note: be sure to verify that bleach will not discolor or damage surfaces before application. When in doubt, test in a small hidden area before general application.* Furniture made of or with **particle or pressed board** should be discarded. Treat fabrics as you would carpeting (see below).
6. Leave all **cabinets and drawers** open to facilitate air flow for drying. Treat surfaces of cabinets and drawers with the dilute bleach solution.
7. Remove and discard all non-essential **wet files and paper**. Remove essential paper to a location where it can be dried, photocopied, and discarded.
8. If a large amount of **paper** cannot be dried within 24 hours, **essential files** can be rinsed with clean water and temporarily frozen until proper drying can take place.
9. Immediately remove as much water as possible from **wet carpeting** using water vacuums.
10. After wet vacuuming, **shampoo the carpet** with a 10% bleach solution twice within a thirty minute period. Begin shampooing *immediately* after wet vacuuming. *Spot test an inconspicuous area first.*
11. **If the carpet fades** with the bleach solution, then the area must be immediately dried and treated with an alternate biocide. *Consult a public health official, a microbiologist, or an industrial hygienist to determine the appropriate biocide.*
12. **Rinse the carpet** with clear water to remove the bleach, and assure that the carpet is totally dry within 12-24 hours of treatment.
13. When using any form of biocide, including bleach, **increase air circulation and ventilation**
14. Use **dehumidifiers and air conditioning** to speed the drying process.
15. Verify that the source of **contamination has been controlled** to prevent future occurrences.
16. **If odors or complaints of health effects** exist after the clean up, consult an industrial hygienist or environmental microbiologist to determine the need for bioaerosol testing.

\*Source in part: Protocol for Microbiological Control in Buildings After Water Intrusion, ENVIRON, August 1993, vol 3, no. 8.

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CFLC 10 Microbiological Control in Buildings After Water Damage

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*For more information, contact your local Hartford agent or your Hartford Loss Control Consultant.*

*Visit The Hartford's Loss Control web site at <http://www.thehartford.com/corporate/losscontrol>*

## *Asbestos and Sprinkler Installation*

*With sprinkler retrofit activities becoming active, the issue of asbestos abatement has been raised. Asbestos was a primary type of fireproofing material used to protect structural steel during the 1960's and early 70's. It is no longer used due to the discovery that the fibers, when brought into the lungs, cause lung cancer.*

*Building owners with asbestos in their buildings are given two options by the federal government when asbestos is discovered to be a problem:*

- 1) Properly remove and dispose of the asbestos*
- 2) Seal up the areas where asbestos is present so nobody breathes the air from these spaces and to keep people from coming into contact with it.*

*Most building owners chose to seal up the areas containing asbestos. While this is a decent short term solution, it really is not a good long term solution. Sooner or later, somebody is going to need to get into the space where the asbestos exists. It might be a sprinkler contractor needing to hang pipe, it might be an HVAC contractor needing to run new ducts. It might be the cable TV company or the computer network providers, but the point is that sooner or later somebody has to get up there. Building owners need to deal with the problem, not keep ignoring it.*

*At a minimum, building owners with asbestos in their buildings have three choices when installing sprinkler systems. In order (least expensive to most expensive) they are:*

- 1) Use sidewall sprinklers, soffits and wall cavities where there is no asbestos, to install the sprinkler system. This just puts off the asbestos problem until another time, but at least the sprinkler system gets installed.*
- 2) Use the procedure developed by the GSA to only remove the small piece of asbestos where the hanger for the sprinkler system needs to go. This avoids having to get rid of all of the asbestos and can be done pretty inexpensively. The size of the asbestos that needs to be removed is about the size of a half-dollar.*
- 3) Remove all of the asbestos.*

**Notes from GSA Video**  
**“A Method for Installing Sprinklers**  
**in Buildings Containing Asbestos Fireproofing”**

Prior to the start of sprinkler installation work, the fire sprinkler contractor needs to have:

- 1) A plan for localized control of the asbestos fibers; and
- 2) An air monitoring and testing plan to ensure safe reoccupancy.

Before beginning work, the entire space needs to be vacuumed with a HEPA Vacuum.

The workspace must be sealed off from the rest of the building using an enclosure. There are three choices for an enclosure:

- 1) A commercially available mini enclosure which must be adjustable vertically to the ceiling and must create a tight seal with the ceiling.
- 2) A contractor designed mini enclosure which must conform to EPA guidelines, must be adjustable vertically to the ceiling and must create a tight seal with the ceiling.
- 3) Total room enclosure with polyurethane sheeting and all joints and seams taped.

Protective clothing and respirators must be worn by all personnel in the enclosure. The enclosure must cover all of the area beneath where tiles are removed. The respirator must have a half-face mask and a HEPA filter cartridge approved for asbestos use.

Warning signs must be prominently displayed to warn of the asbestos hazard.

HVAC and Elevators serving the effected areas must be shut down.

Baseline air readings of fiber levels inside and outside the work areas must be taken before work begins.

Airborne levels of fibers must be monitored at all times outside the enclosure. If levels exceed 0.01 fibers per cubic cm, all work must stop.

An exhaust system must be set up to put the area in the enclosure in a negative pressure. The exhaust system must be independent of the building's HVAC system and must provide an airflow of at least 4 air changes per hour.

Ceiling tiles that are removed must be wet-wiped or vacuumed and then stored where they will not be damaged.

The tops of the tiles adjacent to those removed must be vacuumed (with the HEPA Vacuum) as well as any wires, pipe or ducts in the vicinity. This process must be repeated each time additional tiles are removed.

All vacuumed material is to be placed in doubled asbestos material disposal bags and placed in sealed containers for proper disposal.

Hanger locations are then marked by the sprinkler fitter with spray paint.

Using an airless spray gun, a penetrating encapsulating substance is sprayed in a 12 inch diameter circle around where the hanger is to be located. Spaying must continue until the liquid begins to drip from the asbestos.

Hypodermic needles are used to inject more of the penetrating encapsulating fluid directly into the asbestos. The needle must be inserted all the way to the metal deck for the injections. Evenly space the injections 8 times around the hanger location.

Using a coring tool, push through the asbestos to the metal deck and gently remove the fireproofing. Additional scraping might be necessary to fully expose the metal.

Properly dispose of the asbestos material removed.

Encapsulating fluid must be sprayed on the exposed outer edges of the asbestos fireproofing.

Shoot the pin into the steel deck using a powder-driven tool (such as Hilti). Screw a threaded union onto the anchor pin. Screw a properly sized rod into the union. Attach the saddle to the rod.

Beam clamps can be installed in much the same fashion.

Install all hangers and pipe above the drop ceiling.

After all work is done above the ceiling, vacuum again.

Spray everything above ceiling with a lock down mist spray.

Cut hole in ceiling tile. Install sprinkler.

Wet down work area with encapsulating substance.

Carefully take down enclosure and dispose of it properly.

Vacuum area with HEPA Vacuum one more time.



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# **Fire Sprinkler Retrofit Guide**

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Understanding Fire Sprinkler  
Installation Criteria in the  
Retrofitting of Fraternity and Sorority Houses

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## Fire Sprinkler Retrofit Guide

### Understand The Importance of Fire Sprinklers

#### Fire Sprinklers Save Lives And Money

Our nation's Fire Chiefs have long recognized the significant importance of automatic fire sprinklers. For decades, automatic fire sprinklers have maintained an impressive 97+% effectiveness in controlling fires in large manufacturing plants, hospitals, and storage facilities. However, each year 80% of our nation's fire deaths occur in residential settings. During the past 15 years and at the insistence of our nation's fire service community, fire sprinkler technology has developed an affordable residential fire sprinkler system. While practically any change brings out many "naysayers," many fire sprinkler system myths assumed by the public have created a barrier of misunderstanding. For example, movies and television typically and erroneously show fire sprinkler systems completely flooding the interior of buildings. The truth is that each fire sprinkler operates independently from others when heat, in a residential setting, reaches 155°F - 165°F. The truth is that two or less fire sprinklers control over 90% of fires in sprinklered residential buildings. The following points are presented to improve one's understanding of fire sprinkler systems and to counter the many myths that cloud a true understanding of fire sprinkler systems:

- Each sprinkler operates individually from other sprinklers.
- Loss records of Factory Mutual Research indicate that the probability of a sprinkler discharging accidentally due to a manufacturing defect is only 1 in 16,000,000. A person has a better chance of winning the lottery than a sprinkler does of accidentally discharging.
- A National Institute for Science and Technology study reports that there will be a 82% reduction in fire deaths if fire sprinklers are included with smoke detectors in residential occupancies.
- Key contributing factors in fire deaths are: Building Materials Used in Construction, Alcohol, Smoking, Interior Finish, and Physical Impairment.
- Aside from fire fighter and explosion fatalities, there has never been a multiple loss of life (3 or more people) in a fully sprinklered building due to fire or smoke.
- Smoke detectors do not control fires; fire sprinklers control fires and slow or stop the production of lethal smoke and toxic fire gases.
- Sprinklers are affordable.

## Picking The Least Cost Fire Sprinkler Design Standard

There are three fire sprinkler design standards that may be applied during fire sprinkler retrofit or installing a new fire sprinkler system in a fraternity/sorority house. The National Fire Protection Association (NFPA) pamphlet 13 is the fire sprinkler design standard used for fire sprinkler installations in most commercial buildings. This standard may also be used for fire sprinkler design criteria when the installation is in a fraternity/sorority house. The standard requires water flow of not less than four fire sprinklers and may impose additional water flow if large places of assembly exist within the property. The NFPA 13 fire sprinkler design standard requires the installation of fire sprinklers in attics and other unoccupied spaces where fires rarely originate. Compliance with the NFPA 13 standard is the most costly of the three fire sprinkler design standards.

A fire sprinkler design standard has been developed specifically for residential occupancies that are four and less stories in height. The NFPA 13R fire sprinkler design standard does not require fire sprinklers in unoccupied spaces and allows design criteria up to four fire sprinklers. If the largest room can be protected with less than four fire sprinklers (400 sq. ft. each maximum coverage), then the water supply needed can be reduced to the lesser requirement which means smaller pipe and lower costs. NFPA 13R fire sprinkler design standards is the document that should be used for the vast majority of fire sprinkler retrofit in fraternity/sorority houses. Application of NFPA 13R is less costly than the NFPA 13 design standard.

There also exists an NFPA 13D fire sprinkler design standard, the least costly of all, which is designed for one- and two-family dwellings. While some fraternity/sorority houses may have been originally classified as a single-family home, fire codes are applied based upon how a building is being used, not how it was originally constructed. Most fire officials will classify a fraternity/sorority house as a rooming and lodging facility and may be reluctant to allow the use of a fire sprinkler design standard developed for single-family properties. The NFPA 13D design calls for water supply to feed up to two fire sprinklers, a criterion that should not be applied in the typical fraternity/sorority house.

You need to specify that your fire sprinkler system be designed using the least cost fire sprinkler design standard which typically will be the criteria found in NFPA 13R. If NFPA 13R cannot be used, investigate why not. Ask for an outline of fire sprinkler costs to include impact fees, connection fees, plans review fees, and any other fee that may be increasing the cost of the system. Feel free to ask the local government for a waiver of impact and other fees that may be increasing the cost of the system. And, ask the contractor to include inspecting, testing, and maintenance for at least two years as part of the bid package.

## Fire Sprinkler Retrofit Guide

### Identify Reputable Fire Sprinkler Contractors

#### The National Fire Sprinkler Association Membership

Members of the National Fire Sprinkler Association were so distressed by the needless loss of life in a fraternity house fire at Chapel Hill, North Carolina that it established a Retrofit Task Force with the mission of providing technical resources to facilitate fraternity/sorority house fire sprinkler retrofit. Many contractors within our nation's fire sprinkler industry have donated much time and effort to aid fraternity/sorority leadership in determining fire sprinkler installation criteria. The Task Force polled the membership of the National Fire Sprinkler Association (NFSA) and determined that many members have historic ties to fraternities and sororities. The members of NFSA are available to help and assist fraternity/sorority leadership by providing free cost estimates.

By contacting the NFSA at 1-800-683-NFSA, one can obtain a list of members that regularly do business in your area of the country. We recommend that three separate companies be afforded the opportunity to bid your retrofit project. Also, on our website, [www.NFSA.org](http://www.NFSA.org), you may search for contractors by selecting Members, then Contractors, then select your state to identify fire sprinkler contractors. The fire sprinkler industry, when compared to other construction trades such as plumbing and electrical, is very small. Accordingly, it is common for contractors to bid work outside their city of residence.

The NFSA has Regional Managers covering the entire nation. These Regional Managers have the expertise and experience in dealing with governmental officials on fire sprinkler related issues, as all have extensive fire service experience. The NFSA staff should prove to be a valuable resource in addressing excessive impact fees and the many externalities that increase the cost of fire sprinklers. The contact for identifying the appropriate regional manager is:

Buddy Dewar, Director of Regional Operations  
National Fire Sprinkler Association  
200 West College Avenue  
Tallahassee, FL 32301  
(850) 222-2070 Fax (850) 222-1752 [Dewar@NFSA.org](mailto:Dewar@NFSA.org)

Buddy is the former Director of Florida's State Fire Marshal's Office and is nationally recognized as a fire safety expert. Through the NFSA Regional Manager network, the Greek Housing Advisor can obtain valuable guidance and assistance in dealing with complex fire safety issues that are typical with older housing. The Regional Manager network has acted as a "second opinion" on fire safety issues impacting Greek Housing, which has resulted in significant cost savings.

## Fire Sprinkler Retrofit Guide

### Reviewing and Accepting Bids

#### Understanding Bid Differences

There are a number of different ways to install a fire sprinkler system. The NFPA fire sprinkler design standards require a specific gallon per minute flow of water over a specific area for residential occupancies. Fire sprinkler contractors must design and install fire sprinkler systems based upon the national standards. Accordingly, the end result of fire control and suppression will occur regardless of the fire sprinkler layout design.

An example to help you understand this dilemma, one fire sprinkler contractor may bid a project that will result in exposed pipes in rooms and corridors while another contractor may bid an installation that has piping concealed in the ceilings and walls. Obviously the exposed pipe installation will be lower cost. If you intend to conceal the piping, the cost of drywall, dropped ceilings, or other concealing methods added to the fire sprinkler installation costs may exceed the cost of installing the system with concealed pipes. Another low cost option would be the use of prefabricated Soffi-Steel™ pipe concealing systems. Take time to understand what the differences are between bids.

As mentioned earlier, many costs external to the fire sprinkler installation costs may make differences in bid packages. One contractor may include the cost of installing a device intended to protect a municipal water supply known as a backflow preventor. Some jurisdictions will require a backflow preventor while others do not. A jurisdiction may require a backflow preventor and the contractor may have left the requirement out of the bid package. You may wish to determine if backflow preventors are required by your local jurisdiction. If the fire sprinkler system uses plastic pipe and is maintained on a regular basis, the backflow preventor will be of little to no value. In another example, a contractor's bid may include the cost of tapping an additional line to the city water main while a competing bid may indicate tapping on the domestic side of the water meter. The cost of the additional tap often doubles the cost of the NFPA 13R designed fire sprinkler system. If the fire sprinkler system can be hydraulically calculated to perform by using existing water supplies and water main taps, by all means take advantage of this cost savings. Local fire code enforcement officials are responsible to review the hydraulic calculations to verify that the existing water supply is appropriate to meet the fire sprinkler system needs.

Some political jurisdictions may impose an impact fee. There is no impact or additional costs imposed on local government as a result of the installation of a fire sprinkler system. New construction may add to government's infrastructure costs but the impact of an existing building has already occurred. Fire sprinklers reduce government's fire suppression expenditures. If you should be faced with what appears to be excessive barriers and costs to installing fire sprinklers in existing fraternity/sorority houses, please contact Buddy Dewar, whose address and telephone number is listed herein. After review, select the best bid and go forward with the retrofit installation.

## **Sprinkler Retrofit Guide**

### **Obtaining Insurance Credit For Fire Sprinkler Protection**

#### **Insurance Savings Can Pay For Fire Sprinkler Installation**

There could be a substantial insurance savings achieved by adding a fire sprinkler system to an existing Greek house. One fraternity located at the University of California at Berkeley recently analyzed insurance savings. The cost per \$100.00 insured property went from \$0.694 to \$0.450 after the fire sprinkler system was installed, or an annual savings of \$3,654.00 in insurance payments. Insurance savings in typical fraternity house is usually twice that expected in the typical sorority house because of differing risk factors.

Insurance savings are not automatically applied to fire sprinklered property. One typically requests an insurance reduction once the property is equipped with a fire sprinkler system. Insurance companies typically ask for a copy of the design plans and specifications and the hydraulic calculations for its review before credit is applied. Some insurance companies allow less credit for NFPA 13R installations than they would allow for a NFPA 13 installation. Some insurance companies give no allowances for NFPA 13R designed fire sprinkler systems. Some states like Florida require by law that insurance companies apply credits for NFPA 13R systems. There are a number of insurance companies that allow substantial credit for NFPA 13R designed systems so shop around. Because of uncertainty, it may be advisable to identify insurance savings prior to making a determination on which fire sprinkler design is most cost effective for your property.

Insurance companies typically require a maintenance contract with a fire sprinkler company to ensure that the system for which you are receiving credit is operational. There exists one nationally recognized maintenance standard for fire sprinkler systems, NFPA 25. Maintenance contracts should be prepared such that the provisions of NFPA 25 are met. Maintenance contracts for the typical fraternity/sorority house will cost a few hundred dollars each year. To make maintenance of the fire sprinkler system even more affordable, existing fraternity/sorority house staff can perform some of the recurring inspections and tests thereby reducing the frequency of fire sprinkler contractor visits.

Also investigate income tax savings by taking advantage of depreciation allowances for the value of the system, which typically is 27.5 years for residential type occupancies. Also the interest on a loan used to retrofit the fire sprinkler system may be tax deductible. And, perhaps the greatest economic benefit of installing fire sprinkler systems is liability avoidance.

Please feel free to contact the National Fire Sprinkler Association with any questions you may have regarding the retrofit of fire sprinkler systems.

**Model Ordinance Language**

**Introduction:**

When considering the adoption of an ordinance (mandate) for the purpose of requiring automatic fire sprinklers to be installed in buildings (occupancies) beyond those outlined and required by the model code(s) your jurisdiction has adopted, it is vitally important to understand what the format is for such an ordinance, as well as what the mandate(s) will be requiring. Said differently, the typical fire sprinkler ordinance will establish when fire sprinklers will be required in certain buildings/occupancies above what is currently required in the Building and/or Fire Code.

It is essential that in the drafting of the fire sprinkler ordinance, that the jurisdiction does not create a conflict with existing adopted Building and/or Fire Codes and that they be correlated to insure that they are both saying the same thing. In other words, if the Fire Agency adopts a fire sprinkler ordinance requiring fire sprinklers to be installed in a specific buildings/occupancies when these buildings/occupancies are larger than (say 5,000 square feet in aggregate area). If the Building Code, adopted by that same Fire Agencies jurisdictional boundaries had not made that amendment by the Building Department (or referenced the Fire Agencies Amendments in some manner), then the fire sprinkler requirements would be in conflict.

**Model Code Adoptions:**

The “*model codes*” International Building Code (ICC-IBC), Building Construction and Safety Code (NFPA-5000), International Fire Code (ICC-IFC), and Uniform Fire Code (NFPA-1) are typically adopted by the Authority Having Jurisdiction (AHJ’s); be that a State Agency, County Agency, City/Township Agency, or Special District, and the authority to enforce the Building Code is normally vested with the Building Department/Building Official and for the Fire Code normally vested with the Fire Department/Fire Chief or Fire Marshal.

The following is the format typically used when adopting/amending the model Building/Fire Code:

**Header:**

**AN ORDINANCE AMENDING THE  
[jurisdiction] (Building Code or Fire Code)  
TO INCORPORATE SPECIFIC REQUIREMENTS  
FOR THE INSTALLATION OF  
AUTOMATIC FIRE SPRINKLER SYSTEMS.**

**ORDINANCE No \_\_\_\_\_**

*(**Note:** Most AHJ's will be using the format approved and used by their respective agency; however, it is important to clearly define what this ordinance will cover – Installation of Automatic Fire Sprinkler System.)*

**Body of the Ordinance:**

*(**Note:** The Body of the Ordinance is where you define in very specific referenced chapters and code section numbers, clear code language, and whether the provisions are being added, deleted, or amended. This is where you must clearly define if these provisions will be associated with new construction, existing construction, remodel or repair of existing construction and whether it impacts specific occupancies, heights of buildings, areas within the jurisdictional boundaries, response time, water supply, etc. and each such criteria must be clearly defined.)*

***(Examples):***

***New Construction:***

“[F] 903.2 Where Required. Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in this section.”

(amendment):

“[F] 903.2 Where Required. Approved automatic sprinkler systems in new buildings and structures shall be provided in every building or structure having an aggregate floor area of more than 5,000 square feet irrespective of occupancy classification.”

***(Examples):***

***Existing Construction:***

“[F] 903.2 Where Required. Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in this section.”

(amendment):

“[F] 903.2 Where Required. Approved automatic sprinkler systems in existing structures as follows:

- (a) When there is a change in character of the occupancy or use of any building, which in the opinion of the fire chief increases or may cause to increase the hazard of fire or threat to life or safety.
  
- (b) When additions are made so as to increase the total floor area of the structure by (10%, 20%, 25%, 33%, 50%, 75%) or more in (Group A,



Group B, Group E, Group F, Group H, Group I, Group M, Group R, Group S, Group U occupancies, as defined in the Building Code.

Exception:

- (1) Group U-1 Occupancies not more than 1,000 square feet.
- (2) Group B and Group M occupancies not more than 500 square feet.
- (3) In R-3 Single-Family Dwellings and Multiple Residential Occupancies containing less than four (4) units where additions do not create additional living units or increase the total existing square footage by more than 50%, the installation of fire sprinklers shall not be required.

- (c) In Group A, Group B, Group E, Group F, Group H, Group I, Group M, Group R, Group S, and Group U Occupancies, as defined in the Building Code, where alterations or repairs to any building or portion thereof exceeds (25%, 33%, 50%, etc.) of the current building valuation.

Exception:

- (1) In R-3 Single-Family Dwellings and Multiple Residential Occupancies containing less than four (4) units where alterations or repairs exceed (25%, 50%, 75%, etc.) of the current building valuation.

Note: It is the intent of this exception to require the installation of automatic fire sprinklers where a complete rehabilitation of a structure occurs, including but not necessarily limited to the removal of wall and ceiling surfaces, repair of structural defined deficiencies, replacement of electrical wiring, replacement of plumbing, replacement of mechanical systems, and roofings.

- (d) When additions are made so as to increase the total floor area in Group A, Group B, Group E, Group F, Group H, Group I, Group M, Group R, Group S, and Group U Occupancies, as defined in the Building Code, which are already (5,000-, 6,000-, 8,000-square feet, etc.) or greater in total floor area.

- (e) Exception: Attached garage converted to accessory dwelling units.

Notwithstanding subsections (a) through (d), when there is a change in use of an R-3 occupancy, from single-family dwelling with an attached garage to a single-family dwelling with the attached garage converted to an accessory dwelling unit, only the new Attached Dwelling Unit (ADU) portion of the structure shall be required to have an approved fire sprinkler system, provided: a one-hour rated fire resistant wall (conforming with applicable Building Code requirements) exists between the single-family dwelling and the ADU. Under these circumstances, it shall be permissible to supply the required fire sprinkler system with the water from the

existing domestic service, provided the volume and pressure is adequate to support the required fire sprinkler water flow calculations.

Decisions of the Fire Chief under this section may be appealed to the to the Building Board of Appeals, in accordance with the provisions of (Chapter \_\_\_\_, Section \_\_\_\_).

***(Examples):***

***Additional Amendments:***

***(Note:*** *It should be pointed out that for each occupancy group or sub-group that is being amended must flow with regard to the Building Code/Fire Code Sections; such as Building Code Section [F] 903.2.9.1 Commercial parking garages, if these structures are going to be required to have sprinklers in such structures of less than 5,000 square feet. Your ordinance must be clear to noted that the provisions of Sections [F] 903.1 through 903.2.12.1 may be amended, deleted, and/or remain as written in the current Code.)*

“[F] 903.2.10.3 Buildings 55 feet or more in height. An automatic sprinkler system shall be installed throughout buildings with a floor level having an occupant load of 30 or more that is located 55 feet or more above the lowest level of fire department vehicle access.”

(amendment):

“[F] 903.2.10.3 Buildings (30-, 40-, etc.) feet or (3-, 4-, etc.) stories or more in height. An automatic sprinkler system shall be installed throughout buildings with a floor level having an occupant load of 30 or more that is located 55 feet or more above the lowest level of fire department vehicle access.”

***(Examples):***

***Residential Amendments:***

“[F] 903.2.7 Group R. An automatic sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area.”

(amendment):

“[F] 903.2.7 Group R. An automatic sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area.

In Group R occupancies, which incur damage to the structure by fire or other natural or manmade causes, which result in damage to the structure in excess of (25%, 33%, 50%, 75%) of the assessed valuation, shall cause

the building or structure to have automatic sprinkler systems installed in accordance with Section 903.3.”

***(Examples):***

***Area Separation Amendments:***

(amendment):

“Area separation walls shall not be considered to create a separate occupancy for the purpose of automatic fire sprinkler systems required under the provisions of this ordinance. The floor area shall be the total floor area of the building respective of area separation walls as herein set forth.”

***(Examples):***

***Zero-Based Amendments:***

(amendment):

“An automatic fire-extinguishing system shall be installed in all new occupancies as defined in Table 503 (ICC-IBC) regardless of type of construction or floor area. Any remodel or addition to, in excess of (25%, 33%, 50%, 75%, etc) of the square footage of a structure shall have an automatic fire-extinguishing system installed in the new construction and retrofitted to the entire pre-existing structure, without regard to occupancy classification or floor area. Any occupancy usage not mentioned specifically shall be included in the occupancy group that it most nearly resembles, based upon the existing and proposed life and fire hazard. For purposes of this section only, the term “remodel” shall not include interior or exterior painting, roof replacement or repair, landscaping improvements, minor repairs or upgrades to existing mechanical, electrical, or plumbing improvements, or similar types of projects.

Exceptions:

- (1) Garages, carports and sheds not more than 1,000 gross square feet shall not require fire sprinklers where they are detached and separated from other structures and provided with exterior wall and opening protection as per the Building Code as adopted and amended, Table 503 (ICC-IBC) for Group M occupancies, shall not require automatic fire sprinklers.
- (2) Agricultural Buildings as defined in Appendix C of the Building Code (ICC-IBC) and not exceeding 2,500 gross square feet, having a clear and unobstructed side yard exceeding 60-feet in all directions and not exceeding 25-feet in the clear ceiling height, and not used for the storage, use or manufacturing of hazardous materials or hazardous waste, shall not require automatic fire sprinklers.
- (3) Greenhouses or non-combustible construction shall not require automatic fire sprinklers.

(4) Qualified Historical Buildings or Properties, as defined in on a Federal, State, or Local Registry, and where the construction or remodeling work is performed in compliance with a Historical Building Code.”

***(Examples):***

***Zero-Based Amendments:***

(amendments):

“An automatic fire-extinguishing system or other approved fire suppression system(s) shall be installed in “ALL” occupancies and locations.

Exceptions: Group U, Division 1 Occupancies that serve as residential garden sheds and do not exceed 144 square feet. Group U, Division 2 Occupancies.”

***(Examples):***

***Geographic Area Amendments:***

(amendments):

“Installation of Automatic Fire Sprinklers in Pre-existing Buildings – Historic Downtown Business District.

(A) Geographic Boundary – Historic Downtown Business District:

For the purpose of this section, the Historic Downtown Business District shall include all buildings located inside the geographic area generally formed by Kentucky Street to the west, Washington Street to the north, the Petaluma River to the east, and B Street to the south. Also included in this ordinance is 201 Washington Street (\*\*\*\*\* Theater) and 132 Keller Street (formerly \*\*\*\* Drug), as more particularly described in Figure 1003.2.12.

(B) Installation Requirements:

An automatic sprinkler system conforming to the Standard for the Installation of Sprinkler Systems (NFPA-13) shall be installed in all existing buildings in the Historic Downtown Business District in accordance with the following criteria:

(1) Kentucky Street and Western Avenue:

(a) In any building wherein a change of use as defined by the Fire Code occurs.

- (b) In any building or occupancy where the square footage of the building or occupancy is increased in area by greater than or equal to 25% of the building's or occupancy's existing square footage.
- (c) All buildings with basement or space below street grade used for storage, business, or public use shall have automatic fire sprinklers installed within the basements or the below street grade area no later than December 31, 2010.
- (d) All buildings not meeting the criteria of "a", or "b" above, shall have automatic fire sprinklers installed throughout the structure, including all public, private, storage and/or concealed spaces, as defined by the Standard for the Installation of Sprinkler Systems (NFPA-13) by no later than December 31, 2016.

(2) Petaluma Boulevard North:

Automatic fire sprinkler requirements shall not become effective until the City of Petaluma installs an appropriate sized water main and laterals to the curb lines similar to the main installed. Upon notice by the City of such installation, an automatic sprinkler system conforming to the Standard for the Installation of Sprinkler Systems (NFPA-13) shall be installed according to the following criteria:

- (a) In any building wherein a change of use as defined by the Building Code occurs.
- (b) In any building or occupancy where the square footage of the building or occupancy is increased in area by greater than or equal to 25% of the building's or occupancy's existing square footage.
- (c) All buildings with basement or space below street grade used for storage, business, or public use shall have automatic fire sprinklers installed within the basements or the below street grade area no later than December 31, twelve (12) years from the date of the water main installation.
- (d) All buildings not meeting the criteria of "a", or "b" above, shall have automatic fire sprinklers installed throughout the structure, including all public, private, storage and/or concealed spaces, as defined by the Standard for the Installation of Sprinkler Systems (NFPA-13) by no later than December 31, twelve (12) years from the date of the water main installation.

(C) Property Owner's Responsibility for System Installation:

- (1) The Property Owner shall be responsible for installation of the lateral service from the curb line into the building. This also includes isolation, check or other valves or devices, as applicable.
- (2) The Property Owner shall be responsible for the installation of the automatic fire sprinkler system according to the Standard for the Installation of Sprinkler Systems (NFPA-13).

(D) Plans and Specifications:

Plans and Calculations (NFPA-13, Chapter 8) for the service lateral and fire sprinkler system shall be submitted to and approved by the Fire Prevention Bureau (FPB) prior to installation of equipment and materials.

- (1) For the Kentucky Street installations that are required on or before December 31, 2010 or December 31, 2016, All plans and Calculations for service lateral and sprinkler systems shall be submitted no later than June 30, 2010 or June 30, 2016 respectively, with installation and approval of work to occur prior to December 31, 2010 or December 31, 2016 respectively.
- (2) For Petaluma Boulevard North installations that occur in the last year of the six (6) or twelve (12) year deadline (when established) after the installation of the water main by the City of Petaluma, Plans and Calculations shall be submitted in the last year, no later than June 30, with installation and approval of work to occur prior to December 31 of that last year."

***(Examples):***

***Response Time Amendments:***

(amendments)

"An automatic fire extinguishing system or other approved fire suppression system(s) shall be installed as follows:

- (A) All buildings residential or commercial over five (5) minute response time, as determined by the Fire Chief, from a City fire station."

***(Examples):***

***High Fire Hazard Area Amendments:***

(amendments)

"An automatic fire extinguishing system or other approved fire suppression system(s) shall be installed as follows:

(A) Any structure in any area or location determined by the Fire Chief to be a high fire hazard. High Fire Hazard Area shall be defined as those areas beyond five minute driving time for fire apparatus from the fire station serving those particular districts; or areas determined by the Fire Chief to be either high hazard areas or extremely high hazard areas based on steepness of slope and/or fuel loadings from combustible plant materials as set forth in the Safety Element of the General Plan.”

***(Examples):***

***Rubbish Area Amendments:***

(amendments)

“An automatic fire extinguishing system or other approved fire suppression system(s) shall be installed as follows:

(A) At the top of rubbish and linen chutes and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Sprinklers shall be accessible for service.”

**Effective Date:**

**(Note:** Typically, the ordinance will take effect 30-days after the Final Adoption. Prior to the Final Adoption there is the Introduction/First Reading, followed in 2-weeks (or next regularly scheduled meeting) by the Second Reading and then the 30-day count is started. It is important to recognize that under certain retrofit criteria, there may be a timeline which extends out for several years, giving the building owners time to prepare, obtain the funding, obtain bids from several contractors, and notification to tenants, before installation of automatic fire sprinkler systems is expected to commence. The word “**REASONABLE**” must be considered in this area.)

# # # #

# LOUISVILLE, KENTUCKY SPRINKLER ORDINANCE

## FIRE SPRINKLER SYSTEMS

### § 94.15 SPRINKLER SYSTEMS REQUIRED.

(A) *Requirement.* An automatic fire sprinkler system shall be installed throughout all existing high-rise buildings having floors used for human occupancy located more than 75 feet above the lowest level of Fire Department vehicle access. Such automatic fire sprinkler systems and related installations shall be installed in accordance with appropriate National Fire Protection Association (NFPA) standards as approved by the Department of Inspections, Permits and Licenses ("IPL").

(B) Exceptions to the requirements above shall include:

- (1) Airport control towers;
- (2) Open parking structures;
- (3) Buildings and structures used for outdoor assembly, and defined as use group A-5 by the provisions of the Kentucky Building Code;
- (4) Buildings and structures designed for low-hazard special industrial uses, and defined in the Kentucky Building Code;
- (5) Within telephone central office equipment buildings, the automatic fire-suppression system is not required in the following rooms or areas when such rooms or areas are protected with an approved automatic fire alarm system:
  - (a) Generator and transformer rooms;
  - (b) Communication equipment areas when such areas are separated with fire assemblies consisting of one-hour fire-resistance rated walls and two-hour fire-resistance rated floor/ceiling assemblies, and are used exclusively for such equipment;
- (6) Individual living units in high-rise residential condominiums, classified as such as of January 1, 1993.

(1994 Jeff. Code, § 94.15) (Jeff. Ord. 32-1993, adopted and effective 10-13-1993; Lou. Metro Am. Ord. No. 75-2005, approved 6-1-2005)

### § 94.16 RESERVED.



## **§ 94.17 VARIATIONS OF PRESCRIBED STANDARDS.**

The provisions of this subchapter are not intended to prevent variations of the prescribed NFPA standards. An alternative method shall be approved when the Department of Inspections, Permits and Licenses ("IPL"), in cooperation with the Chief of the Fire Department or suburban Fire District of the jurisdiction in which the building is located, finds that the proposed design is satisfactory and complies with the intent of the provisions of this subchapter and provided that the work offered is, for the purpose intended, at least the equivalent of that prescribed in this subchapter, in quality and effectiveness, durability and safety as related to the building occupants. An alternative method will only be approved by the Department of IPL when it is a part of an approved automatic fire sprinkler system.

(1994 Jeff. Code, § 94.17) (Jeff. Ord. 32-1993, adopted and effective 10-13-1993; Lou. Metro Am. Ord. No. 75-2005, approved 6-1-2005)

## **§ 94.18 PLANS REQUIRED; TIME LIMITS.**

(A) The owner of every affected existing high-rise building which is not equipped throughout with an automatic fire sprinkler system shall submit for approval to the Department of IPL, in cooperation with the Chief of the Fire Department or suburban Fire District with jurisdiction which is the primary protector of the fire protection district in which the building is located, a detailed written plan describing the time schedule and method to be used for compliance with this subchapter.

(B) Time limits for the installation of automatic fire sprinkler systems shall be as follows:

(1) All high-rise buildings, with the exception of high-rise residential condominiums classified as such as January 1, 1993:

(a) By July 1, 1997, approved water supply shall be installed to all floors of the building. Also all lobby floors and below grade levels shall have installed and operational full automatic sprinkler system protection.

(b) By July 1, 1999, a minimum of 25% of the remaining unsprinkled square footage of the building shall have installed and operational full automatic sprinkler system protection.

(c) By July 1, 2001, a minimum of 50% of the remaining unsprinkled square footage of the building shall have installed and operational full automatic sprinkler system protection.

(d) By July 1, 2003, a minimum of 75% of the remaining unsprinkled square footage of the building shall have installed and operational full automatic sprinkler system protection.

(e) By July 1, 2005, total square footage of the building shall have completed, approved, operational automatic sprinkler system protection.

(2) High-rise residential condominiums:

(a) By July 1, 1997, approved water supply shall be installed to all floors of the building. Also all lobby floors and below grade levels shall have installed and operational full automatic sprinkler system protection.

(b) By July 1, 1999, with the exception of individual units, a minimum of 25% of the remaining unsprinkled square footage of all hallways, stairways and other common areas shall have installed and operational full automatic fire sprinkler protection.

(c) By July 1, 2001, with the exception of individual units, a minimum of 50% of the remaining unsprinkled square footage of all hallways, stairways and other common areas shall have installed and operational full automatic fire sprinkler protection.

(d) By July 1, 2003, with the exception of individual units, a minimum of 75% of the remaining unsprinkled square footage of all hallways, stairways and other common areas shall have installed and operational full automatic fire sprinkler protection.

(e) By July 1, 2005, with the exception of individual units, the total remaining unsprinkled square footage of the building shall have complete, approved, operational automatic fire sprinkler protection.

(C) All building owners that have in their possession at the time of passing of this section, a letter from the Fire Chief or Fire Marshal of the jurisdiction, shall continue to be excused from requirements under this section. If, in the future, the Kentucky State Fire Marshal requires installation of sprinkler systems in specific occupancies, building owners would be required to comply.

(1994 Jeff. Code, § 94.18) (Jeff. Ord. 32-1993, adopted and effective 10-13-1993; Lou. Metro Am. Ord. No. 75-2005, approved 6-1-2005)

## **§ 94.19 MODIFICATIONS TO TIME LIMITS.**

When there are practical difficulties involved in complying with the time frames of this subchapter, the Chief of the Fire Department or suburban Fire District with jurisdiction is permitted to vary or modify such time frames upon application by the owner or the owner's representative, provided that the spirit and intent of the law is observed and public welfare and safety are assured.

(1994 Jeff. Code, § 94.19) (Jeff. Ord. 32-1993, adopted and effective 10-13-1993; Lou. Metro Am. Ord. No. 75-2005, approved 6-1-2005)

## **§ 94.20 APPEAL OF DECISIONS.**

Any party aggrieved by any decision, order or ruling ("order") relating to local enforcement of the Kentucky Building Code may set forth an appeal in writing to the local Building Code Appeals Board ("Board") within 30 days of official notification from Metro Government. A hearing shall be convened within 60 days of receipt of the appeal letter. All parties shall be notified of the time and place of the hearing by certified mail, sent no later than ten days prior to the hearing. The Board shall render a decision within 30 days after the date of the hearing. Pending the Board's decision, enforcement of the order shall be stayed.

(Lou. Metro Ord. No. 75-2005, approved 6-1-2005)