REVIEW OF FIXED FIRE PROTECTION PRE-INCIDENT INFORMATION
AND LOCATIONS OF FIXED FIRE PROTECTION SYSTEMS
FOR THE FALMOUTH, MA FIRE RESCUE DEPARTMENT

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of other is set forth, quotation, marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed___ Glen Rogers________________________________________________________
ABSTRACT

The Falmouth MA Fire Rescue Department (FFRD) did not have adequate pre-incident information pertaining to the location, extent, use and operation of sprinkler and standpipe systems within the community. The purpose of this study was to determine which structures in the community have fixed fire protection systems in particular, sprinklers and standpipes and to determine the utility of the FFRD GIS to map these locations then to determine the utility of the GIS to provide pre-incident information and evaluate FFRD Standard Operating Guidelines for sprinkler and standpipe use and operations. Descriptive and historical research methods were used throughout the research to answer the following questions:

1. Which buildings in the community have sprinklers and standpipes?
2. What are the capabilities of the FFRD GIS to map these building locations?
3. What are the capabilities of the FFRD GIS to provide fire protection pre-incident information pertaining to these buildings?
4. What are the FFRD standard operating guidelines for fire department use and operation of fire protection systems?

This study found that there were 188 buildings with sprinkler systems and 20 with standpipe systems. Knowledge of all these system locations were unknown to line personnel. The GIS was found to be capable of mapping and recording pre-incident information pertaining to protection systems. The FFRD SOGs provided minimal direction to firefighting personnel on use and operation of fixed systems during a fire incident.

This study recommends the FFRD pursue a community risk assessment, educate personnel on fixed protection use and operation, adopt an extensive pre-incident planning program, develop SOGs pertaining to sprinkler use and operation and to engage in the accreditation process thru the Center for Public Safety Excellence.
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INTRODUCTION

The Falmouth, MA Fire Rescue Department (FFRD) did not have adequate pre-incident information pertaining to the location, extent, use and operation of sprinkler and standpipe systems within the community. This purpose of this research was to utilize descriptive and historical research to conduct a community wide survey of structures featuring sprinklers and standpipes as well as analyze standard operating procedures within the Falmouth Fire Rescue Department pertaining to fire service operations with these fixed fire protection systems in order to answer the following research questions:

1. Which buildings in the community have sprinklers and standpipes?
2. What are the capabilities of the FFRD GIS to map these building locations?
3. What are the capabilities of the FFRD GIS to provide fire protection pre-incident information pertaining to these buildings?
4. What are the FFRD standard operating guidelines for fire department use and operation of fire protection systems?

The Falmouth Fire Department was established in 1897 when town meeting funded monies to purchase a hand drawn hose wagon and form a cadre of volunteer firemen. Eventually 13 village fire stations were in service within the 44 square mile community featuring an entire fleet of hand drawn hose carts and hand drawn ladder wagons. In 1919, a young and brash newcomer to Falmouth, Ray D. Wells, became Chief of the Falmouth, MA Fire Department. Chief Wells eradicated 13 village hand drawn ‘hose wagon’ stations located across the farmlands of town and set about establishing 5 fire stations, with motorized apparatus, in strategic response areas. These Ahrens-Fox and Model T fire apparatus could respond quicker and farther than the hand drawn carts and revolutionized fire response for the citizens of Falmouth. In the mid 30’s
the first building featuring a sprinkler system was constructed in the community. Motorized fire apparatus could now be called upon to support sprinkler systems. (Todd, 1993)

The Falmouth Fire Rescue Department has been operating for over 100 years providing fire and rescue services to the community with very few incidents of fire requiring support of sprinkler systems or use of standpipe systems. However the last ten years have seen an upsurge in commercial buildings requiring sprinkler systems and standpipes as well as several residential structures with systems. Currently there are 191 structures in the community with sprinkler systems and 9 commercial structures in the plan review phase with fire protection systems. However no information has ever been gathered to actually document which structures have sprinklers or standpipes: map these building locations: provide pre-incident information. The department does not have standard operating guidelines for use and operation of these systems in times of fire.

BACKGROUND AND SIGNIFICANCE

The Falmouth Fire Rescue Department protects the citizens, visitors and structures in the Town of Falmouth. The town was incorporated in 1686 as part of the Plymouth Bay Colony formed by the Pilgrims who sailed from England. Located on the peninsula of Cape Cod off the southeastern tip of Massachusetts, the town comprises 44 square miles with a year round population of 33,451 and a summer population of 108,500. (Falmouth Chamber Commerce, 2010)
The median age of the community is 45 thereby signifying a significant retirement community. There are 20,000 housing units grouped around several unique villages which provide the large town with a small town feel. A renowned scientific presence, the Woods Hole Oceanographic Institution and Marine Biological Laboratory, is clustered in the town’s Woods Hole village. The community has many public and private schools, nursing and assisted living facilities and a 95 bed hospital.

The town government is led by a town manager overseen by a 5 member board of selectmen. The community incorporates a biannual representative town meeting to approve the town budget and vote on major matters within the town. Taxes are raised primarily via property taxes, vehicle excise taxes and other assorted fees. (Falmouth Chamber Commerce, 2010)

The Falmouth Fire Department was established as a volunteer firefighting unit in 1897 utilizing 13 far flung stations with hand drawn hose reels and ladder carriages. The volunteers could only ‘run’ a mile or so with the wagon like apparatus and the water supply was limited hence the fire and life safety protection was minimal.

In 1919, the town hired a young summer visitor from Worcester, MA, Ray D. Wells, to be the first full time Fire Chief. Over the next 10 years Chief Wells abolished the 13 hand drawn stations and established 5 stations in the significant villages of Woods Hole, Falmouth center, East Falmouth, West Falmouth and North Falmouth. All stations were within 1 mile of the shoreline of town where the majority of the population lived. Each of these stations was outfitted with motorized apparatus and with at least one 24 hour a day person as a driver. (Todd, 1993)
The Ahrens Fox and Model T apparatus significantly changed the response times and efficiency of the fire service of that era. As a matter of fact the establishment of those stations and was so revolutionary that they remain in the same exact locations 90 years later.

Much has changed in those intervening years. The town’s population has grown from 3,500 to nearly 35,000 year round. The populated areas of town are denser and the sprawl of citizens has covered the entire town. Commercially the town currently houses a significant federal scientific and oceanographic community, several major and minor shopping malls and 10 nursing and assisted living facilities.

Many of the commercial buildings installed sprinklers to satisfy insurance regulations. The scientific community installed sprinklers to protect experiments and as a federal government requirement. The nursing and assisted living facilities installed sprinklers as recommended by the NFPA life safety code for licensure by the Commonwealth of Massachusetts. In 1995, the town adopted Massachusetts General Law Ch. 148 sec. 26G requiring sprinkler installation for any building with a gross square footage of 7,500 sq. ft. or greater. MGL 148 sec. 26I was adopted as well requiring sprinklers for residential occupancy of 4 or more dwelling units within one structure. Not surprisingly the quantity of structures outfitted with sprinklers has increased dramatically the 1990s.

The Falmouth Fire Rescue Department (FFRD) of modern times is a full service emergency service providing 5 advanced life support ambulances, 5 fire engines, and 1 aerial ladder working within a $6 million municipal budget. The department also supports a 3 person fire prevention and life safety division providing fire inspection, code enforcement and fire education. Fire Suppression and Emergency Medical Services are provided by trained firefighter paramedics and emergency medical technicians. The department has 4 groups of 15
personnel (minimum of 10 personnel) from 5 stations. Each group is led by a shift Captain and Lieutenant. Command staff includes the Chief of Department, 2 Deputy Fire Chiefs, 1 Emergency Medical Supervisor, Fire Prevention Officer and 2 fire prevention inspectors. Civilian personnel include 2 mechanics, 1 fire alarm supervisor and 6 dispatchers.

The FFRD responded to 6080 combined EMS and Fire incidents in calendar year 2010. 75% of those calls were for EMS related causes with the remaining 25% being fire alarms, miscellaneous assistance, and fires (FFRD, 2010). In calendar year 1989, the department responded to 3,296 incidents (FFRD, 1989). 1969 calendar year recorded 1127 incidents to the department (FFRD, 1969). Despite the obvious increase in incidents the department still operates from the same fire station locations. One fire station is staffed by a single firefighter. The same staffing that existed 90 years ago. Another station has 1 person 50% of the time. The interior of the town has no fire rescue station. This area is portioned out to the nearest station located towards the shoreline.

The Falmouth Fire Rescue Department (FFRD) currently does not have an accurate inventory of structures outfitted with fire sprinklers and standpipes. This inventory is a keystone to comprehensive pre-incident planning, risk assessment and firefighter safety. Without an accurate picture of protected buildings there is no benchmark to assess risks, no awareness of which structures neither present greater hazards nor a basis for a ‘standard of cover’. Risk assessment is essential to overall operational deployment. There is presently no way to know if the dollars being expended are ‘hitting the mark’ when it comes to standards of saving lives and protecting property. This study will research the inventory of structures within the community for fixed fire
protection systems; evaluate the FFRD capabilities to map these structures via computerized Geographical Information Systems (GIS) and assess FFRD standard operating guidelines (SOGs) pertaining to use and support of fixed fire protection systems.

The FFRD has been mandating sprinkler systems for certain structures for 30 years. State fire laws, building codes as well as national life safety codes formed the basis for these mandates. The systems are thoroughly engineered, placement of fire department connections are analyzed for premier locations and laws and codes are adhered to the letter. However a “silo” mentality exists that prevents this information from filtering down to the operational firefighter. The “boots on the ground” are not provided with this information in a pre-incident format nor during incidents. Additionally the department does not map out hazards or categorize hazard levels as needed to form a standard of cover. Building protected by fire sprinklers and standpipe hose connections present a far lower level of risk than structures not protected by these systems. These structures are also safer for firefighters to operate within. These systems do need to be supported during a fire event requiring clear standard operating guidelines for best performance.

National fire prevention recommendations were researched to form a baseline of the importance of sprinkler and standpipe protection in certain structures. The importance of risk assessment was researched utilizing professional journals and management texts. Risk assessment as an integral part of Standard of Cover was researched to form a baseline for performance standards. Research findings will used as a tool to develop a ‘standard of cover’ according to the Center for Public Safety Excellence’s Commission on Fire Accreditation International.
Massachusetts General Laws as pertaining to fire sprinklers were researched to determine the type of structures requiring fixed protection. FFRD standard operating guidelines were researched to gauge the operational readiness of the department to operate in a sprinkler and standpipe equipped structure safely and efficiently during a fire.

With this data as a baseline, the department can build upon, track and map protected structures and then focus attention on unprotected structures and the hazards that they present. This information will allow the FFRD to stay at the forefront of the goals and objectives of the United States Fire Administration particularly those listed in Goal #2 “Increase fire service personnel participation in local planning and preparedness processes. Expand the use of modern data and information analysis in planning and preparedness. Enhance the fire and emergency services’ performance in response to all hazards.” (USFA, 2009).

Great significance has to be placed on firefighter safety. The 16 Firefighter Life Safety Initiatives will also be researched to garner how important risk management is to bring firefighters home after each call. Properly operating sprinkler protected occupancies present a significant safety factor to firefighters and the general public. Reducing risk to the community a key component of fire protection.

LITERATURE REVIEW

This research project began on returning to the Falmouth Fire Rescue Department from Executive Analysis of Community Risk Reduction course at the National Fire Academy with one simple question about risk assessment. That question was simply “Does the FFRD have a list of buildings in Falmouth that are protected by sprinklers?” Prior to asking the question to the department personnel this researcher had to investigate why risk assessment was important.
The NFPA has vigorously researched and documented research on fire dynamics as they relate to fire propagation and time sequencing. Additional NFPA research has developed standards relating to fire response chronology. This agencies’ standards are not ‘law’ however due to their high level of research and peer review the NFPA represents the “gold” standard and are referred to extensively in both civil and criminal law.

The International City Managers Association, in their text Managing Fire Services as edited by Fire Chief Dennis Compton and consultant John Granito, address all aspects of the large and small fire services from budgeting to communications centers. In Chapter 2, the text delves into evaluating and planning for risks. Several risks are discussed such as fire, natural disasters, and hazardous materials. “Because none of the risks can be entirely prevented from materializing, communities must use effective evaluation and planning to minimize loss of life and property. Control measures may include building, fire, and life safety codes; pre-incident planning; adequate fire department deployment and staffing; and effective management techniques.” (Managing Fire Services, P.40)

Communities must investigate their own fire risk analysis and classify properties according to their risk providing an easily recognized grading or score. One clear component of risk analysis is risk identification. Within risk identification, a community must do an “analysis of selected fire protection methods” such as sprinklers and standpipes. (MFS, 2002)

NFPA 1710 Standard for the Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments (NFPA, 2001, revised 2009) is focused on emergency service delivery by career fire departments thereby applying to the Falmouth Fire Rescue Department. Another NFPA standard, 1720, is focused on Volunteer Fire Departments. NFPA 1710 sets
the bar for the minimum requirements of career departments in delivering fire, ems and special operations. A 32 member committee, chaired by Chief Alan Brunacini of the Phoenix Arizona Fire Department extensively studied and researched the definitions, organization, services provided and systems used by full time fire and rescue services before establishing a codified standard.

The fire suppression objectives are established around a 2,000 sq. ft., 2 story, and single family home with no cellar or basement and not factoring in any exposure issues. This scenario represents a low hazard occupancy thereby generating a fairly standardized emergency response (NFPA 1710, 2009). Research for this level of response was based on numerous experiments on flashover of fire, fire propagation, civilian deaths, and dollar losses. The level of dollar loss and loss of life clearly rises after the fire stage defined as ‘flashover’. Flashover simply means the total envelopment of the room, area or building in fire. Survival of humans in these conditions is nil (Managing Fire Services, 2002). Fire propagation experiments have shown consistently that flashover occurs generally within 10 minutes after the initiation of the fire. Response of first arriving units within 10 minutes of the start of a fire places resources where needed to save life and property from flashover.

This standard mandates that fire departments develop pre-incident plan with specific attention to target hazards. The level of risk assigned to each hazard is “The cumulative effects of prevention efforts, risk reduction and control, and fire suppression capabilities…” (NFPA 1710-12)

The National Fire Protection Association also delves deeply into the multi layered world of fire protection as referenced in the two volumes of the 2008 Fire Protection Handbook. Community risk assessment is a basic step toward master planning
and operational planning. (12-44-45) Risk assessment is also seen as an essential component of a Standard of Response Cover (SORC) to rate fire flow demands, fire probability, economic losses but more importantly impact on life safety. (12-47) The handbook also refers to pre-incident planning as the next operational step from risk assessment whereby the information gathered is disseminated to the “field” troops to ensure their safety. (12-57) Pre-incident information, such as sprinkler equipped buildings, can also be fed into a Geographical Information System (GIS) for quick access to field firefighters. “GIS provides a previously unknown ability to consolidate information by address. Specific to the fire service, information pertaining to hazards, permits, structure history, water supply, navigation, and topographical land features are routinely utilized.” (P. 12-86)

The “Center for Public Safety Excellence” (CPSI) is a non-profit agency that promotes excellence in public safety through a partnership with prestigious professional fire service associations such as the International City Managers Association, Insurance Service Office, International Association of Fire Chiefs, International Association of Firefighters and the United States Fire Administration. CPSI promotes fire service excellence thru performance standards in its’ Commission on Fire Accreditation International (CFAI) and Commission on Professional Credentialing (CPC).

The CFAI presents a process for professional accreditation that begins with a self assessment of the fire department using a team approach working on measurable goals and objectives of how the department is currently performing. The next step in the process is to develop a ‘standard of cover’ incorporating existing deployment, identifying risk, service level objectives and performance for the individual community. Most
importantly the performance objectives are drawn up by the community team reflecting the national standards. The final process is to obtain a ‘peer assessment’ from a team of fire service professionals whom assess the performance of the department on an in-depth level based on these performance measures (CFAI Self Assessment manual, 2006).

The ‘standard of cover’ brings together the standards of the NFPA 1221, 1710 and 1720 recognizing the science behind the justification of fire propagation and emergency medical survival. CFAI also sees different levels of service based upon the density of the community metropolitan, urban, suburban, rural and wilderness. The communities can also fractal the priority of the calls thereby focusing on ‘real’ emergency standards.

Falmouth has not yet developed a ‘standard of cover’ or begun a self assessment. The author has attended the CFAI 3 day workshop covering the self-assessment, standard of cover and peer assessor series in 2008. However, in a review of the 2006 edition of the Self Assessment Manual communities that are interested in accreditation should, as part of their SORC, conduct a thorough occupancy risk assessment which involves evaluating occupancies by such factors as built-in fire protection and fire flow. Fixed fire protection devices significantly lower the occupancy risk, require less firefighters to battle a blaze, require less fire flow, and require a lower number of fire vehicles.

In a 2006 document, GIS Technology and Applications for the Fire Service, a geographical information system company named ESRI wrote extensively on fire department needs that can be successfully mapped and computer modeled with GIS. Data such as preplans, built-in fire protection, locations of sprinklered buildings and
occupancy risk can be effectively ‘layered’ into a mapping system to enhance fire service operational efficiency.

Massachusetts General Laws Chapter 148 contains several fire laws relating to required sprinkler installation. Section 26G mandates sprinklers in buildings of 7,500 square feet of gross floor area or additions of the same size. Nightclubs with a capacity of 100 or more patron must have fire sprinklers and alarm system under Section 26G1/2. Lodging and boarding houses of 6 or more unrelated persons are covered under Section 26H. Residential buildings of 4 or more separate dwellings are required under Section 26I to be outfitted with fire sprinklers. The community of Falmouth adopted 26G, 26H and 26I in 1990 while 26G ½ was adopted after the 2004 Station Night Club incident.

The International Fire Service Training Association (IFSTA) is a respected fire service training association affiliated with the Oklahoma State University. IFSTA has been presenting texts and teaching materials to the fire service since 1934. The 2005 3rd edition of Fire Detection and Suppression Systems (FDSS) manual covers all aspects of detection and suppression systems from the fire fighters perspective. The FDSS covers residential sprinkler system operation as developed by NFPA in standard 13R and 13D. 13R is the sprinkler standard for residential occupancies 4 stories or less in height. 13D is for one and two family residential occupancies. The standards are based on life safety for occupants as opposed to standard commercial sprinkler systems which were developed primarily as a property protection device.

Fire service use and operation of commercial automatic sprinkler systems is discussed in Chapter 6 of FDSS according to NFPA standard 13. Sprinklers are installed and designed to save lives and property. Most structures involve a multi-million dollar capital investment hence the critical importance of fixed fire protection. Sprinkler
systems have a high degree of reliability when operating and operated effectively. The
text states “In view of the prominent role sprinkler systems play in fire protection, an
understanding of these systems and their components is essential to fire department
personnel. It is especially important to understand sprinkler system operation so the fire
firefighting operational procedures can be carried out more efficiently in building
protected with sprinklers.” (FDSS P. 166)

Standpipe hose systems are covered in depth in the same text. These systems
allow firefighters to place attack hose streams onto the fire within tall or sprawling
complexes. Efficient and effective support of these fire standpipes is critical to providing
proper volume and pressure to subdue a fire. System problems have caused several fire
service deaths most notably 445 Biltmore Ave. building in Asheville, NC, Deutsche bank
in New York City and the Meridian Plaza fire in Philadelphia, PA.

The National Fire Protection Association based in Quincy, MA. has published a
standard 13E Fire Department Operations in Properties Protected by Sprinkler and
Standpipe Systems. This 2009 consensus based standard was developed to guide the fire
service in proper operational methods to support and utilized fixed fire protection
systems. Knowledge of the different systems encountered such as a wet and dry
systems are important to the responding firefighter. NFPA 13E outlines situations wherein
the system may be non-functioning and how the fire department can either render the
system functional or work around the problem. Recognizing the situation must be part of
an inspection program however if encountered during a fire situation the problem needs
to be recognized early. The standard points out that the local fire department should know
which building are outfitted with fixed fire protection devices and where the fire
department connections (FDC) are located around the building. These systems should be supported early in the fire operation with a separate water supply than the fire attack.

An NFPA technical committee comprised of fire service, insurance service and planning experts devised NFPA 1620 Pre-Incident Planning. This document lays out the recommended information necessary for a comprehensive pre-incident plan and the importance, based on case histories of large and small loss fires. The standard recommends a locally adopted process of information gathering, distribution and training. The standard specifically references firefighter knowledge of a buildings sprinkler and standpipe capabilities. 7.3.1 Sprinkler and Water Spray “All water based systems, including type of systems, location and identification of main riser valves, extent of coverage, and means of manual activation, shall be recorded in the pre-incident plan”.

7.3.2 Standpipe Systems “All standpipe systems, including type of system, location and identification of control valves, location of hose valves, and the presence of pressure reducing devices (PRV), shall be recorded in the pre-incident plan.” (NFPA 1620 P.9)

This in-depth reading of research, national standards, state laws and available technology provided this researcher with a broad perspective on the importance of breaching the “silo” mentality to insure firefighters, civilians and property are protected by fire sprinklers. The literature spanned the precise technical design of sprinkler systems and standpipes thru hands-on firefighter operation of the systems. More importantly the readings brought forth how technology can be utilized to place information pertaining to hazard analysis in the ears of firefighters.
The process started by asking one simple question, Does the Falmouth Fire Rescue Department have a listing of all buildings in the Town of Falmouth that have sprinklers and or standpipes? This question was asked as part of a discussion within the department concerning hazard analysis, and pre-incident planning. Many hours of consultation and cooperation ensued between this researcher, Fire Prevention Officer Mel Trott, Fire Inspectors Boyd DeMello and Mike Metell and Fire Alarm Supervisor Gerry Martin gleaned multiple resources for an anecdotal knowledge of sprinkler locations. 191 buildings were listed initially. Very few fire department connection (FDC) locations could be recalled with only a few standpipe equipped buildings being recalled.

The next level of research involved a field survey of all 191 buildings. This researcher concluded site visits to all locations verifying 188 buildings with sprinkler systems, 19 with standpipes and sprinklers and 1 occupancy with just a standpipe. Fire Department Connections (FDC) were located and noted as to ALPHA location. This information was collated into a street listing along with occupancy name and other information as may be useful to responders.

This researcher also attended the Center for Public Safety Excellence’s Commission on Fire Accreditation International’s Self Assessment Workshop, Standards of Cover-Basic Workshop and Peer Assessor Workshop in September of 2007. This workshop was held on West Barnstable, Massachusetts comprising 24 hours of instruction on the standards and processes involved in obtaining professional accreditation from CPSE.
This researcher also observed and interviewed 3 full time and 3 part-time dispatchers in the Falmouth Fire Rescue Department to ascertain the GIS capabilities within dispatch as well as the process involved in entering data. Discussions were also conducted with fire officers as well as dispatchers pertaining to how this information could be used at the time of incident dispatch.

The procedures for this research also included reading and taking notes from professional journals, texts, and consultant’s studies all relating to the existing national and regional standards pertaining to sprinkler systems, standpipe systems, pre-incident planning and GIS capabilities. These national standards where then compared to the performance of the FFRD.

Falmouth Fire Rescue Department Standard Operating Guidelines were also researched for documents pertaining to use and operation of sprinklers and standpipes during fires.

RESULTS

RESEARCH QUESTION #1 Which buildings in the community have sprinklers and standpipes?

Early in the process the researcher realized that individual assessments of each residential and commercial occupancy within the community of Falmouth, MA would have required an enormous quantity of resources. A method has to be followed that insured comprehensive initial results that could be verified with a field survey. The method utilized the combined knowledge of FFRD fire prevention and fire alarm personnel. Fire Prevention Officer Mel Trott, Fire Inspectors Boyd DeMello, Mike Metell and Fire Alarm Superintendent Gerry Martin have a combined 30 years of fire inspection
knowledge. These fire service professionals have inspected, at one point or another, most of the commercial occupancies in the community as well as the multi unit apartment-condo buildings, group homes and resorts. They also have intimate working of Massachusetts fire laws and codes as they pertain to sprinkler and standpipe systems.

Efforts of the team initially focused on a printed numerical listing of coded fire alarm boxes indexed to commercial buildings. 433 commercial buildings throughout the community have fire alarm boxes. The FFRD utilizes King Fisher radio alarm as well as 100 milliamp hard wire alarm boxes. 318 buildings are on the 100 milliamps hardwire system and 115 utilized radio transmitted alarms. 170 of these buildings were highlighted as having known sprinkler systems.

The next level of research involved anecdotal knowledge of the staff pertaining to buildings that were not connected to the FFRD fire alarm system that have sprinkler systems. A listing of 10 commercial and 7 residential occupancies were added to the list.

A field survey of each occupancy listed was initiated by the researcher to determine actual sprinkler installation as well as the location of the FDC in terms of ALPHA location. The field survey found 3 occupancies that were listed did not have sprinkler systems however 3 additional occupancies were found that had sprinklers that were unknown to the team before this field survey. 2 restaurant occupancies had sprinklers without FDC. 1 occupancy has a standpipe only. 20 occupancies have standpipes as well as sprinklers. The 7 residential occupancies with sprinkler systems have 1 ½ inch national standard thread hose connections. The other commercial occupancies have an equal mix of double 2 ½ inch national standard thread or 4 inch stortz connections for fire department pumper pressure augmentation.
RESEARCH QUESTION #2 What are the capabilities of the FFRD GIS to map these building locations?

The Town of Falmouth uses a geographical information system product developed by ESRI named ARCGIS for Servers. This mapping system employs layers of information that are integrated with a base map of an area. The different layers can be added or subtracted easily by the user as they are needed. This allows one map to be used for different specific purposes at different times.

The ARC GIS software can easily add a layer of information utilizing computer software. The software used most often in the FFRD is Microsoft Excel. ESRI ARCGIS recognizes the excel fields as directed by the user. The FFRD produced a listing of structures protected by sprinklers using MS Excel spreadsheet. Falmouth GIS expert Bob Shea uploaded the spreadsheet into the ARC GIS program to produce a geographical map of locations with sprinklers.

The map layer can be turn on or off as needed by dispatch personnel. Additionally a map can be printed as a learning tool for firefighters. This tool can add another dimension to absorb a building location. The map can also be printed or transmitted via Smartphone technology to incident commanders in the field. This ability would be particularly important during a multiple building fire to plan where the fire could be halted using sprinkler protected buildings.

RESEARCH QUESTION #3 What are the capabilities of the FFRD GIS to provide fixed fire protection pre-incident information pertaining to these buildings?
The ARC GIS system is the key component in the FFRD’s computer aided dispatch produced by Applied Geographics Incorporated. The dispatch software does allow information to be entered easily as it pertains to an individual residence or structure. When a dispatcher enters a building address to locate an incident location the file for that address appears.

Dispatcher Chris Lemay entered the FFRD sprinkler building information. The dispatch program offers a ‘pre-plan’ information area with each entered address. One issue that Mr. Lemay encountered was the fact that one building may contain several businesses with individual addresses. Each address within the building required a separate entry. The FFRD list contained 188 structures with addresses however the actual address input required an additional 30 entries.

The preplan field also allowed the FDC location to be added as a notation for an ALPHA side of the building. This will allow dispatch to communicate the presence of sprinklers and direct firefighters to the correct side of the structure to connect supply hoses.

RESEARCH QUESTION #4 What are the FFRD standard operating guidelines for fire department use and operation of fixed fire protection systems?

This researcher conducted a search of FFRD SOG’s as they pertain to sprinkler and standpipe systems. Thirty one SOG’s were found and two pertained to sprinkler and standpipe operation. FFRD SOG #8-99 “Health Care Occupancy Fire Attack Plan” was initiated in November 1999. This guideline states that all health care occupancies in the community have sprinkler systems and all but two have standpipes. The guideline
further directs that the first fire engine on scene is placed at the FDC and hydrant. Upon confirmation of a fire “1st engine connects to and pumps the fire department connection (FDC) and secures a supply line. Interior crews bring standpipe line and tools.” (FFRD SOG #8-99)

FFRD SOG #1-2011 “Standpipe Pack” was implanted in June 2001. This SOG describes the contents and equipment in the FFRD standpipe pack. Each pack contains 150’ of 1 ¾” hose with automatic nozzle with various gates and appliances. This pack is to be brought into any multi story building with or without a standpipe system. In the event of a fire in a standpipe equipped building the hose line will be attached and a fire attack initiated. In the event of a fire in a non standpipe equipped structure the hose line would be connected to a hose brought to the fire floor.

No mention is made in either SOG as to fire department operations of sprinkler systems. No mention is made in either SOG pertaining to pump pressures of standpipe systems or sprinkler systems. No mention is made pertaining to supplying water neither to working sprinkler systems nor in combination with attack hose line supply needs.

DISCUSSION

The first automatic sprinkler was developed in 1874. The Falmouth Fire Rescue Department has been in existence since 1897. The first building outfitted with fire sprinklers is unknown however several buildings with sprinklers date back to the 1930’s. The Falmouth Fire Department transitioned into motorized pumping apparatus in the 1930’s hence their ability to support sprinkler systems emerged.
Since that time Massachusetts General Laws (MGL) have required certain occupancies to be outfitted with automatic sprinkler systems. Building height, square footage, number of dwelling units, and number of patrons are all criteria set by MGL for required protection.

The National Fire Protection Association has been recommending fire sprinkler installation as well. These consensus standards are followed by the building architects and engineers in the design phase of a structure. These standards are based on the fact that sprinklers work! They work early, residential systems earlier than commercial systems, and they work reliably to save property and lives. Those lives are not only the residents or civilians but firefighters that are called to battle the blaze.

The FFRD fire prevention division has been enforcing the MGL’s and NFPA standards for over fifty years. These many decades have evolved 191 occupancies to be outfitted with life and property saving sprinkler systems. 20 Occupancies have been outfitted with standpipe systems to assist firefighters combat fires in large structures. 7 non commercial dwelling structures are outfitted with residential sprinkler systems specifically designed to saves lives.

Despite over 100 years of providing firefighting service to the community, despite the required installations and despite the FFRD fire prevention division inspecting buildings and approving plans, no information pertaining to fixed fire protection ever broke through the silo mentality to inform the line firefighters and line supervisors which buildings they were safer in during a fire, which buildings they would need to supplement the sprinkler system, or which buildings were outfitted with standpipe systems to facilitate their fire attack. The FFRD culture has historically been
to require owners to install sprinklers however the firefighting force would find out by chance which buildings have these systems. This reactive culture needs to be converted to a pro-active culture.

The FFRD is outfitted with adequate standpipe packs. The FFRD SOG’s require their personnel to use standpipes for fire attack. However there has been no guidance on which buildings these are nor any guidance on the proper use of these fixed fire protection systems. The FFRD apparently wants their fire fighting personnel find these systems by chance during a real fire emergency.

A pro-active and pre-incident information culture does not exist in the FFRD. This organizational change must occur in order to allow the FFRD to operate more effectively and efficiently according to it’s mission statement. This change must also occur to protect property. This change must evolve in order to save civilian lives as well as firefighter’s lives.

Risk Assessment is an accepted practice for professional fire services. This practice is recommended by the NFPA, ICMA and CPSE. Identifying occupancies protected by automatic sprinkler systems and standpipes provides a first step in the process. These buildings are forever classified as “life savers”. All other structures now need to be classified according to their building construction type and as “non sprinkler protected”.
RECOMMENDATIONS

1. The FFRD conduct a community wide risk assessment according to CPSE standards.

2. The FFRD should educate personnel at all levels in the importance of pre-incident information and fixed fire protection.

3. The FFRD should adopt a pre-incident planning standard at all levels.

4. The FFRD should increase firefighter training efforts on pre-incident information.

5. The FFRD should provide an information cycle from fire prevention bureau to line firefighters.

6. The FFRD should adopt standard operating guidelines for fire operations of sprinkler systems and standpipe systems.

7. The FFRD pursue accreditation thru the Center for Public Safety Excellence.
REFERENCES


http://www.nfpa.org/assets/files//PDF/Research/Group_1_Large-Scale_Fire_Tests_ESFR_Sprinkler.pdf


Washington, DC: Author


Incident at 118, 100 TER HEUN DR

Thursday, September 8, 2011 at 3:59 PM

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**Contacts:**
- **Facility Name:** FALMOUTH HOSPITAL
- **Business Number:** 508-549-5300
- **First Contact Name:** Maintenance
- **First Contact Phone Number:** 508-457-3676
- **First Contact Cell Number:**
- **First Contact Page Number:**
- **Second Contact Name:**
- **Second Contact Phone Number:**
- **Second Contact Cell Number:**
- **Second Contact Page Number:**
- **Third Contact Name:**
- **Third Contact Phone Number:**
- **Third Contact Cell Number:**
- **Third Contact Page Number:**
- **Parcel Owner:** FALMOUTH HOSPITAL ASSOC INC
- **Notes:** Knox Box SPRINKLERED BUILDING
Incident at 116, 100 TER HEUN DR
Thursday, September 8, 2011 at 3:59 PM

Pre-Fire Plan:
F D Connection: LOADING DOCK AND OTHER SIDES OF THE BLDG.
Alarm Box: RADIO BOX
Alarm Panel: FAXON BASEMENT, 2nd right corridor
Sprinkler Room: LOADING DOCK-SHED
Utility Room: BASEMENT-OLD BLDG.
Outside Gas Shut Off: SIDE C BY MRI TRAILER
Special Hazards: MULTIPLE HAZARDS W/TYING OF FACILITY

Zones:
40 MASTER BOX
   00
   03
   04
   05
   06
   07
   08
MEDICAL
OLD BUILDING
BASEMENT ADDITION
ADDITION
FIRST FLOOR ADDITION
WATER FLOW
TAMPERS
This guideline provides a method for firefighting strategy and tactics concerning Health Care Occupancies (HCOs). The major fire problem presented in HCOs is life safety. All residents have some level of physical or mental impairment which compromises their ability to escape during a fire. All HCOs have a municipal alarm system which responds 3 engines and 1 ladder. All staff are trained in proper fire evacuation procedures as part of their certification with the Commonwealth of Massachusetts. All general and intensive care HCOs have extensive fire and smoke resistant doors and corridors. All, except the Woodbriar/Atria, have sprinklers and or standpipes. All guidelines are structured to account for minimum initial manpower with increased duties for increasing manpower.

INITIAL RESPONSE:

3 Engines, 1 Ladder and Command vehicles

APPARATUS PLACEMENT: 1st Engine to FDC and hydrant connection
Other apparatus as directed by I.C.

GUIDELINES: Upon confirmation of a fire of any magnitude:

1) 1st Engine connects to and pumps into the Fire Department Connection (FDC) and secures a supply line. Interior crews bring standpipe line and tools.

2) Interior crews instruct staff to evacuate patients as needed.
   Horizontal Evacuation for Nursing Homes and Hospital
   Total Evacuation for Rest/Retirement Homes

3) Interior crew ensures containment of fire to room of origin by closing fire room door
and attempt removal of any patients/victims from fire room. Fire Containment should be accomplished by closing the door to the fire room. **No fire attack should be begin until patients are evacuated from fire area,** unless the fire has already breached the fire room then the line should be placed in service immediately between the fire, occupants and their escape route.

4) Fire Attack should be initiated only upon assembling a minimum 3 person crew at the fire room.

5) Handlines should be stretched from standpipes. If standpipes are not available then a ‘water thief’ type line should be initiated with handlines.

6) Patient counts should be obtained from staff members and any patient unaccounted for should be the subject of search and rescue operations.

7) Aerial and ground ladders are usually ineffective for rescue operations in General and Intensive Care facilities. The primary use of ladders would be for ventilation purposes.

8) Multiple Alarms should be activated for fires that are not immediately extinguished or create an untenable smoke condition for patients.

**SPECIAL CONSIDERATIONS:**

1. Be mindful of the resources needed for total evacuation.
2. Radioactive Materials and Hazardous Materials may be involved or about to be involved.
3. Oxygen and other medical gases can be involved in the fire thereby increasing the intensity. It may be necessary to isolate the source, while still maintaining a supply to other parts of the structure.

10/11/99
DEFINITION: Standpipe Packs are carried on all FFRD Engines. These packs contain 150' of lightweight 1 3/4" hoseline, automatic nozzle, 2 ½" gated wye, 2 spanner wrenches and pack holder. The Standpipe Pack is a lightweight, quick attack line for the protection of the initial crew, protection of the occupants and initial fire containment.

A “crew” consists of 2 or more line fire personnel. A “crew” should enter a building or area together and be prepared for action. A pump or ladder operator remaining at the piece is not considered a member of an “interior” crew in this SOG, unless ordered otherwise.

INITIAL RESPONSE: N/A

APPARATUS PLACEMENT: N/A

GUIDELINES: The first arriving crew entering a standpipe equipped, or non-standpipe equipped, multi-story high occupancy, building for a fire, fire alarm or other hazardous condition, shall enter with the standpipe pack and bring such pack to the floor or area of their investigation.

Upon identification of a fire, or other hazardous condition requiring hoseline protection, the standpipe line will be deployed utilizing the nearest standpipe. In a non-standpipe equipped building, the line will be deployed to a convenient location and tied into the “water thief” line from an engine.

SPECIAL CONSIDERATIONS: Depending on fire conditions reported from the initial crew, the Incident Commander and Fire Officers should anticipate the need for additional hoselines. Most likely, a 2 ½ “ line would need to be deployed to back up the standpipe pack in the event of heavier fire.

This additional line should be deployed at least one floor below the fire floor.