DETERMINING WHAT INFORMATION IS AVAILABLE IN VARIOUS CITY DEPARTMENTS THAT WOULD BE HELPFUL DURING A COMMERCIAL BUILDING FIRE

Obtaining information from different city departments to pre-plan commercial buildings

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others 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:_____

Abstract

The problem was the Martinsville Fire & EMS Department had not identified the commercial building information maintained by various city departments that may have been useful to the Fire & EMS Department during a commercial building fire. The purpose of this applied research paper was to study and identify the commercial building information available from the building/tax department that the Fire & EMS Department could use during commercial building fires

The descriptive research method was used for this applied research project. The research will be used to answer the following research questions: a) What building construction information is available? b) What Global Information System (GIS) special information is available? c) What utility information is available? d) What life hazard information is available? e) What hazardous material/process information is available?

Literature reviews along with the following procedures were conducted to gather additional information to answer the research questions. The Real Estate Assessors, Zoning, Inspections, and Engineering Departments of the City of Martinsville were visited to see what commercial building information was available to use during a fire.

This applied research project resulted in there being no real useful information available in the various departments listed above that could have been be used by the Martinsville Fire & EMS Department to pre-plan commercial buildings. It was recommended that the department should concentrate on a concerted effort between the Operations Division and Inspections & Code Enforcement of the Fire & EMS Department to develop a pre-fire plan program.

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Introduction

According to the National Institute for Occupational Safety and Health (NIOSH) the need for pre-incident building information has been frequently cited in line-of-duty death reports (Murphy, 2009). NIOSH noted that the fire departments involved were deficient in conducting a pre-incident survey prior to the fatal incidents (Murphy, 2009). Developing and improving building intelligence skills enhance firefighters' tactical capabilities of anticipating fire behavior and water supply needs, preparing for search and rescue, meeting forcible entry challenges, placing hose and ladders, performing ventilation, containing the fire, and improving firefighter safety and survival (Murphy, 2009).

The Martinsville Fire & EMS Department in the past has done pre-incident planning of commercial buildings, however, because of limited departmental resources, pre-incident planning of commercial buildings are not being conducted as they should. The problem is the Martinsville Fire & EMS Department has not identified the commercial building information maintained by various city departments that may be useful to the fire department during a commercial building fire. The purpose of this applied research paper is to identify the commercial building information available from the building/tax department that the Fire & EMS Department may use during commercial building fires. The descriptive research method will be used for this applied research project.

A qualitative research method will be used that includes meeting with departments heads, information technology specialist, and chief information officers to determine what commercial

building data is available in the various Global Positioning System (GPS), records, and other digital file systems used by the city. The information will be compared to the various National Fire Protection Association (NFPA) and National Incident Management System (NIMS) standards related to pre-planning, size-up, and situational awareness during commercial building fires.

The research will be used to answer the following research questions: a) What building construction information is available? b) What Geographical Information System (GIS) special information is available? c) What utility information is available? d) What life hazard information is available? e) What hazardous material/process information is available?

Background and Significance

The Martinsville Fire & EMS Department is a career/volunteer combination department that covers twelve square miles, serving approximately 14,500 citizens from two stations consisting of two engine companies, one ladder company, a rescue truck, and two advance life support ambulances.

The department is comprised of 29 full-time uniformed personnel, eighteen part-time uniformed personnel, three civilian personnel, and fifteen volunteers. The department is not affiliated with any union. The department is composed of four divisions; Administration, Operations, Inspections & Code Enforcement, and Emergency Management & Safety. The department has an ISO Public Protection Classification of “4”.

Fire suppression, advanced life support EMS transport, vehicle rescue, technical rescue, fire/building inspections, fire investigations, plans review, public education, emergency management, city-wide employee safety, and hazardous materials response services are

provided. In 2011 the department responded to 3,205 calls. Of those 3,205 calls, 2,829 (88%) were medical calls and 376 (12%) were fire related..

The City of Martinsville is located in Henry County, Virginia, right on the Virginia/ North Carolina border. The area hosts two Nascar Sprint Cup and Camping World Truck Series races a year. The Council/Manager form of government is used by the City of Martinsville. The city was once the nation's leading manufacturer of textiles and furniture. DuPont once had a Nylon Manufacturing plant located here and it was the area's largest employer. During the 1990's with the enactment of the North American Free Trade Act (NAFTA) these industries began to shut down and the unemployment rate began to rise. As of June 2012, Martinsville's unemployment rate is 14.4% compared to the state average of 5.5% (Virginia Employment Commission [VEC], 2011). Martinsville has had the highest unemployment rate in Virginia since May 2007.

The Department's Operating Budget for Fiscal Year 11/12 is $2,470,966; there has been no increase in the operational budget over the last three years and the 12/13 Operating Budget remains at level funding. Two personnel positions in the Martinsville Fire & EMS Department are currently unfilled and will remain unfilled until revenue sources for the city improve. Also, for fiscal year 10/11 the City of Martinsville eliminated the Public Information Officer (PIO) position due to budget constraints. Each department is now responsible for handling anything dealing with the media.

Operations Division is staffed by three rotating shifts of eight personnel; 1- Assistant Chief, 1- Captain, 1- Lieutenant, and 5- Firefighters/EMT-Intermediates or Paramedics that work a twenty-four on, forty-eight off schedule, minimum staffing is seven personnel. The main station, Company 1, has five personnel (Assistant Chief, Captain, three firefighters) that operate an engine, a ladder, and an ALS ambulance. Company 2 has three personnel

(Lieutenant and two firefighters) that operate an engine and an ALS ambulance. If both ambulances are out on medical calls there are three to four personnel left at the stations to bring equipment to structure fires and engage in extinguishing the fire. Because the department is so small, we don't have the luxury of taking personnel out of service to conduct only pre-fire planning.

The city does not have a local CBS, NBC, or ABC TV station located here. It does have a local government access channel that is provided to the city by the local cable company. This channel is received by all residents that subscribe to the local cable company's services. The channel is used to broadcast all of the City Council and School Board meetings along with a scrolling bulletin board telling about city services or activities. There is a local radio station along with a local newspaper.

The department has an automatic mutual aid agreement with surrounding volunteer fire departments in Henry County. Also, the area is served by a joint Communications Center, with Enhanced 9-1-1, and a citizen's alerting system (reverse 9-1-1) through a partnership with Twenty First Century Communications, Inc.

The Martinsville Fire & EMS Department has done pre-incident planning in the past; however, there has never been any systematic way of how the inspection was being done. On most occasions a shift would go out to a new building being under construction or renovated and do a simple walk through of that building. No contact information would be gathered or drawings made. Most of the times the shift that did the tour would not share any information they learned to the other two shifts, they assumed the other two shifts would eventually also tour the building.

There was a period of time in the early nineties before the department started running EMS calls that shifts were assigned a building to pre-fire plan. They were to go out and get specific information; owner names, emergency contact information, building square footage, etc. and also draw a floor plan. This information was then put in a book that was kept on the engines. The plans were great when they were first put on the engines, but as the department started running EMS calls and transporting patients to the hospital, the books were never updated and were eventually taken off the engines.

In 2004 the Martinsville Fire & EMS Department applied for and received a Federal Grant of $21, 273.00 from the Federal Emergency Management Agency (FEMA) for pre-incident planning. This grant money was used to pay personnel overtime for conducting pre-incident inspections. Over a seven month period, thirteen men were able to visit 569 businesses and conduct an extensive pre-incident fire plan. Again this information was compiled in books and put on the engines, but the information has never been updated and the books have again been taken off the engines. Also, at the same time the department received this grant, we started providing transport services with two ALS ambulances. So, because of the call volume we receive for EMS calls, there has been no real attempt to do any pre-incident planning or update any previous information since 2004. The Martinsville Fire & EMS Department does not carry Mobile Data Terminals (MDT).

As stated in the Executive Analysis of Fire Service Operations in Emergency Management (EAFSOEM) student manual; the primary goal of the EAFSOEM course is to prepare senior fire officers in the administrative functions necessary to manage the operational component of a fire department effectively (United States Department of Homeland Security [DHS], 2011, p SM 1-8). Furthermore, this applied research paper will assist the department in meeting the following

USFA goals; Operational Goal 1: Reduce risk at the local level through prevention and mitigation. Operational Goal 2: Improve local planning and preparedness. Operational Goal 3: Improve the fire and emergency services' capability for response to and recovery from all hazards. Operational Goal 4: Improve the fire and emergency services' professional status. Operational Goal 5: Lead the Nation's fire and emergency services by establishing and sustaining USFA as a dynamic organization (USFA, 2010). It is important for the administration of the Martinsville Fire & EMS Department to research the results of using the information gathered from other city departments to help pre-fire plan commercial buildings so as to help prevent the loss of life and injuries to firefighters and reduce the dollar loss to a commercial building.

Literature Review

According to the National Fire Protection (NFPA) 1620, *Standard for Pre-Incident Planning* a pre-incident plan is one of the most valuable tools available for aiding responding personnel in effectively controlling an emergency (NFPA, 2010). The needs and benefits of pre-incident planning should be explained in detail to all involved participants. Although there are many types of incidents that require emergency response, fires generally represent the most frequent challenge to emergency responders (NFPA, 2010).

Pre-incident planning is a total concept based upon the following items; situation awareness, management commitment, education, prevention, protection, and emergency organization. A thorough pre-incident plan involves information gathering, analysis, and dissemination, planning, reviewing, training, and evaluating (NFPA, 2010).

According to Michael Serapigla in his chapter *Pre-Incident Planning for Industrial and Municipal Emergency Response;* a pre-incident plan is one of the most valuable tools available

for aiding the fire department, in effectively controlling a fire or other emergency incident (Serapigla, 2008). Fire service personnel that plan for fire in industrial and commercial facilities increase their confidence and ability to deal with most emergency situations. More importantly, it increases the potential for saving lives and property.

Serapigla (2008), defines pre-incident planning as a written document resulting from the gathering of general and detailed information/data to be used by public emergency response agencies and private industry for determining the response to reasonably anticipated emergency incidents at a specific facility.

In simple terms, pre-incident planning is ensuring that responding emergency personnel know as much as they can about a facility's construction, occupancy, and fire protection system before an incident occurs (Serapigla, 2008). No matter what effort it takes, fire departments today literally cannot afford not to pre-incident plan. An incident commander will have a better chance of handling an incident more successfully if he has all the information available to him about the facility.

In his book, *Fire Command* Alan Brunacini (1985), states that pre-incident planning is conducted with the advantage of ideal conditions. Surveys are carried out in daylight under ideal conditions. Firefighters have time to visit, decide, contemplate, draw, and even redraw if necessary to get the plan right. Pre-fire plans are drawn under the best conditions but generally used under the worst conditions (Brunacini, 1985).

Ongoing training activities should include the use and revision of these preplans. This will help increase the familiarity with specific occupancies and up-to-date plans. If a pre-incident plan is written only to be buried in a binder, it will not be effective when needed (Brunacini, 1985).

Prior to implementing a pre-incident planning program, fire department leadership must establish the priorities that it wants to cover in the program. John Norman states in his chapter *Pre-Incident Planning for Emergency Response;* in an ideal world, every structure and site in a department's area of responsibility would be subject to pre-incident planning (Norman, 2008). This is a very attainable goal in some organizations, such as suburban towns consisting primarily of large segments of nearly identical tract housing, whereas it may be totally unrealistic in other areas that consist of great numbers of large complex and different buildings (Norman, 2008). Departments that fall under the above situation have a tendency to preplan only "targeted hazards" and let SOP's or SOGs take care of the remaining structures. Norman states "that is fine as long as the fire understands that and remains cooperative, fitting into the framework of "standard" incidents (Norman, 2008). Too often though, nonstandard situations develop, and that is where pre-incident planning pays dividends. For this reason Norman states that pre-plans should be developed for all locations in your response area (Norman, 2008).

A starting point for pre-planning is an evaluation of the fire problems associated with the building in terms of size, hazard, and built in protection (Brunacini, 1985). The size of the building and the potential size of the fire provide a description of the scale of possible operations. The analysis of hazards should include the number, location, condition, and activity of occupants; the amount, nature, location, and arrangement of fire load; assess characteristics that could obstruct normal operations; present or potential water problems; possible delayed or inadequate response; and any special hazards associated with the structure or the area. The benefits provided by automatic extinguishment systems, early warning devices, adequate separation, fire-resistive construction, and firefighting support equipment must also be considered.

To be effective, the plan should address the information that fire-fighting personnel, particularly the incident commander, will need in order to develop a strategy to handle the incident. Most pre-incident planning focuses on aspects of the size-up that can be known beforehand and that are likely to remain static until an event occurs, such as building construction or occupancy loads (Norman, 2008). Pre-incident planning should be flexible enough to take into consideration temporary situations that pose unusual risks or hazards, such as disruption to the fire protection water system.

Larger departments have greater resources than smaller departments, but every department has constraints on the amount of resources and personnel that can be devoted to pre-incident planning. This is the reason why some departments concentrate their pre-planning on their target hazards. The collection of data on buildings takes time and a lot of buildings in communities have been standing over 50 or 100 years, just waiting to be pre-planned (Norman, 2008). Not all fire fighters remember everything they saw in a building a year or two or five years prior. That is the point of documenting conditions and preparing a written plan or training program that can be reviewed periodically to refresh the memories of fire personnel and can also be used at the time of an actual incident to augment the incident commander's size-up as he develops his strategy and implements tactics (Norman, 2008).

Frank Brannigan (1987) in his book *Building Construction for the Fire Service* states the most important reason for knowing building terms is safety. There are too many instances of fatalities which have occurred because fire officers had not been trained to recognize construction elements and the conditions under which they are likely to fail (Brannigan, 1987). Most fires are fought in buildings, and the study of fire tactics should properly start with the study of buildings.

Brannigan goes on to say that any officer pre-planning fire ground tactics, at buildings of ordinary construction, should consider the following factors; the probability of exterior collapse, the potential for interior collapse, the existence of void spaces in buildings and their possible interconnection, and the potential for extension to or from adjacent buildings (Brannigan, 1987).

Fire officers and fire fighters should have knowledge of the principles of construction and the proper terms for various building elements (Corbett, 2008). Some of the more important principles of construction include the following:

- Construction is primarily designed to resist the force of gravity and other stresses such as wind and snow loads under normal conditions.
- The supporting system of a building is composed of many elements designed to transfer the building load to the ground.
- Exposure to fire is not a normal condition and design provisions are made in some types of construction to protect the gravity-resisting (structural) elements from failing when exposed to fire. Unprotected structural elements can result in early and unexpected failure leading to partial or full collapse.
- Contents, not construction elements, typically drive the growth, intensity, and spread of fire; however, combustible construction elements can both contribute to the fire and lead to collapse (p. 12-128).

Also, included in any plan, should be one of the five basic types of building construction: fire-resistive, non-combustible, ordinary, heavy timber and wood frame should be identified. Note any pre-engineering construction methods. Indicate any alterations and renovations that may have affected construction, the means of egress, and fire protection systems (Murphy, 2009).

According to Wikipedia (2012), geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. In the simplest terms, GIS is the merging of cartography, statistical analysis, and database technology (Wikipedia, 2012). This address- based information system serves as a valuable tool to many municipal agencies and can provide a central information link between departments if GIS has been developed, integrated, and networked properly (Duggan, 2008).

GIS can also be used to support fire service planning needs, ranging from response time evaluation to station location analysis. Operationally, GIS can be used to support fire service at a variety of emergency situations, including hazardous materials situations, wildfires, and weather –related events (Duggan, 2008).

The ability to provide critical information to responding units can be accomplished through the use of wireless computer technology. Through mobile data systems, responding units can obtain situation updates, directions, pre-fire plans, digital imaging, structure information, hazard information, water-supply configurations, and hydrant locations.

According to NFPA 1620 every pre-incident plan should have the utilities recorded in it (NFPA, 2010). The type of fuel, storage location, and quantities should be noted, along with the locations of the emergency shutoffs (Serapiglia, 2008).

The location of the entrance for electric power should be noted. Also, the nearest disconnecting means within the facility as well as the nearest one outside the facility should be determined. Also, the location of emergency generators should be noted, as well as what equipment is powered when normal power is lost (Serapiglia, 2008).

Heating, ventilation, and air conditioning (HVAC) systems can help the spread of smoke throughout a facility. Information should be included in the plan on how to disengage these

systems if needed, and the location of automatic and manual controls for this equipment should also be included. The facilities services, such as domestic water, compressed air, and steam, should also be reviewed (Serapiglia, 2008).

The NFPA 1620 *Standard for Pre-Incident Planning* states that life safety considerations shall be addressed to allow emergency responders to assist in the evacuation of a facility or to support defend-in-place/remain-in-place strategies. The following information shall be noted in the pre-incident plan: hours of operations, occupant load, occupant accountability, assistance for people with disabilities, and strategies for protecting facility occupants, other than evacuation (NFPA, 2010).

Commercial buildings that are partially occupied with residential areas are prime locations for pre-planning, since responding fire units would normally not conduct an aggressive search for life at a late-night fire in what is perceived to be a commercial building (Norman, 2008). Many older cities have seen a significant change in some of their older commercial neighborhoods as residential occupants moved into vacant manufacturing spaces in loft-type buildings.

The occupancy of a structure has many impacts on the fire officers' strategy. Occupant load can vary with the time of day. Schools for instance have a life hazard that varies greatly with the time of day. Hospitals and apartment houses on the other hand, have a high life hazard around the clock, whereas storage warehouses and similar occupancies have a uniformly low life hazard regardless of the time of day (Norman, 2008).

In his article titled *Are You Pre-planning Your Buildings?*, Jack Murphy (2008), also states that pre-plans should have the occupant load for day-time (normal business hours), night,

and weekend hours. Plans should note whether the building staircases are open or enclosed and which stairway leads to the roof and basement (Murphy, 2009).

The presence of hazardous materials is one of the most important factors to determine in any pre-incident plan. Hazardous materials pose problems for fire fighters, ranging from health hazards to accelerated fire extension. The presence of poisons or explosives could prompt the fire department to take a strictly defensive posture and not conduct any fire-fighting operations (Norman, 2008). Information about specific hazards should be researched with an emphasis on actions to be taken in the event that fire or other conditions threaten the material. Details of the name(s) and properties of the materials, quantities, and locations of the hazardous materials, quantities and locations of the hazardous materials, as well as recommended procedures for dealing with emergencies should be entered prominently into the pre-incident plan (Norman, 2008).

In summary, the objective of the literature review process was to collect and evaluate available literature on why identifying pertinent information, especially for commercial buildings, is important for pre-incident planning. According to the National Fire Protection (NFPA) 1620, *Standard for Pre-Incident Planning* a pre-incident plan is one of the most valuable tools available for aiding responding personnel in effectively controlling an emergency (NFPA, 2010). The author also learned through this research, that the pre-incident planning process requires a team effort in collecting information, developing the plan, and implementing the plan. In simple terms, pre-incident planning is ensuring that responding emergency personnel know as much as they can about a facility's construction, occupancy, and fire protection system before an incident occurs.

Procedures

This applied research paper used the descriptive research method to identify the commercial building information available from the Building, Real Estate Assessors, Zoning, and Engineering Departments of the City of Martinsville. The purpose for this research was to see if there was any information the Martinsville Fire & EMS Department could use during commercial building fires. The procedures used to gather the above information was to do a qualitative research with employees of the above mentioned departments to see what commercial building data was available through records, GIS, and any other digital files used by the city. The information gathered from these procedures would then be used to form recommendations on whether using information from other departments in the city could be helpful during pre-planning of commercial buildings.

Research literature was also gathered for this project and it came from government documents, trade journals, fire service magazines, and internet database and sites. Research was conducted at the The Learning Resource Center located at the National Fire Academy in Emmitsburg, Maryland; also the publications store located at the National Fire Academy was utilized to obtain journals. The collection of fire trade magazines located in the training library of the Martinsville Fire & EMS Department was also utilized. Research was collected to obtain information related to the research topic and research questions.

In addition to research literature and meetings with personnel from other departments within the City of Martinsville, meetings were also held with personnel and administration from the Martinsville Fire & EMS Department to get their opinions on how to better pre-plan commercial buildings.

Three commercial buildings were chosen for this research project; (1) The Virginia Museum of Natural History, a brand new facility that was opened in March of 2007. This building has not been pre-planned, but several walk through's were conducted by all three shifts during its construction. (2) The Commonwealth Centre, a former knitting mill that has been converted into an office space that houses several business's on various floors. This building was pre-planned when it was a knitting mill, but no pre-fire planning has been done on this building since it was converted to offices. (3) The Liberty Fair Mall is 434,417 square feet of fully enclosed retail shopping and dining. It is anchored by Belk, Sears, J.C. Penney Outlet, Kroger and Office Max. It also houses several national tenants in addition to local stores and services. This building was pre-planned in 2004, but nothing has been done since that time and several stores have closed or new tenants come in. There is no particular reason why the author of this paper chose these three commercial buildings for this research paper.

At monthly administrative staff meetings that were held in April, May, and June, the lack of pre-fire planning that was being done by the Martinsville Fire & EMS Department was discussed at length. Personnel at these meetings discussed possible solutions to this problem along with me informing them of my intentions to research information that could be obtained from the various city departments that could help us make this process a little easier by being able to get some information such as building construction, utility information, life hazard etc. in house without trying to conduct pre-fire planning and run emergency calls at the same time.

One day was spent visiting with Jody Duncan in the Real Estate Assessor's office, Tammy Davis in the Inspections office, Tonya Rumley in the Zoning office, and Weldon Reynolds in the Engineering office. I met with each one for approximately an hour and a half, except for Ms. Rumley in the zoning office; we met for approximately two and a half hours. In the zoning

office I was introduced to Mr. Joshua Pope who was hired by the city of Martinsville to install a new program the city had purchased called *Pictometry*.

All the above departments utilize the same program, *Assess IT,* to enter and store information concerning properties in the City of Martinsville. As this research paper was being prepared the zoning department was also adding a new program called *Pictometry*.

The limitations to these procedures were that I chose only to seek information from various department employees located in the City of Martinsville. I did not survey any other fire departments or groups.

Results

This applied research project utilized the descriptive method to answer five research questions that applied to the problem statement and purpose for this paper. Applicable literature was collected; and met with various city departments to find out what information may be useful to the fire department during a commercial building fire.

Research question #1: What building construction information is available?

Literature review revealed that there are too many instances of fatalities which have occurred because fire officers had not been trained to recognize construction elements and the conditions under which they are likely to fail (Brannigan, 1987). Any officer pre-planning ordinary construction, should consider the probability of exterior collapse, the potential for interior collapse, the existence of void spaces in buildings and their possible interconnection, and the potential for extension to or from adjacent buildings.

When meeting with the various city departments such as zoning, inspections, real estate assessor, etc. the program, *Assess IT,* is used by all too record vital information about buildings in the City of Martinsville. Every building that is recorded in this program has the same basic

information listed; building name and owner, building characteristics, property factors, building and land valuation. Also, there is a picture of that particular building taken at ground level and an overhead view of the building as it looks on the tax map.

When looking at the print out for The Virginia Museum of Natural History (Appendix A), under the section titled *Building Characteristics,* there is limited information on building construction such as the exterior of the building is brick, the roof is built up, and that the interior is dry wall. The Commonwealth Centre (Appendix, B) however, had nothing listed in its building characteristics section. The Liberty Fair Mall (Appendix, C) had the same information listed in its building characteristics section as the museum did.

Research question #2: What Geographic Information System (GIS) special information is available?

Research revealed that geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data (Wikipedia, 2012). This address based system also serves as a valuable tool to many municipal agencies and can provide a central information link between departments if GIS has been developed, integrated, and networked properly (Duggan, 2008). Also, GIS can be used to support fire service planning needs, ranging from response time evaluation to station location analysis.

None of the three sample commercial buildings (Appendices A, B, and C) chosen for this research paper by the author of this paper had any GIS information listed on them.

Research question #3: What utility information is available?

Literature review revealed that according to NFPA 1620 every pre-incident plan should have the utility information recorded in it (NFPA, 2010). Things such as the location of the

entrance for electric power and the nearest disconnecting means, water shutoff, compressed air, and steam services should be reviewed. Also, heating, ventilation, and air conditioning (HVAC) help to spread smoke throughout a facility, so information on how to disengage these systems if needed should be included in the plan.

All three commercial buildings chosen for this research project (Appendices A, B, and C) by the author of this paper, had some limited utility information listed for them. The forms listed whether they had central air and heat, public water, and underground utilities, but there was nothing listed about where these utilities were located.

Research question #4: What life hazard information is available?

Research revealed that according to NFPA 1620 *Standard for Pre-Incident Planning* life safety considerations shall be addressed to allow emergency responders to assist in the evacuation of a facility or to support defend-in-place/remain-in-place strategies. The following information shall be noted in the pre-incident plan: hours of operations, occupant load, occupant accountability, assistance for people with disabilities, and strategies for protecting the facility occupants, other than evacuation (NFPA, 2010).

The information listed for the three commercial buildings (Appendices A, B, and C) chosen by the author of this research paper had nothing listed on them about life hazards, other than the author of this paper knowing what the specific use group was for each building.

Research question #5: What hazardous material/process information is available?

According to research that was done for this paper knowing the presence of hazardous materials is one of the most important factors to determine in any pre-incident plan. Hazardous materials pose problems for fire fighter, ranging from health hazards to accelerated fire extension. Information about specific hazards should be researched with an emphasis on actions

to be taken in the event that fire or other conditions threaten the material. Details of the name(s) and properties of the materials, quantities, and locations of the hazardous materials should be entered prominently into the pre-incident plan (Norman, 2008).

Again, the sample commercial buildings (Appendices A, B, and C) that were chosen for this research paper by this author had no hazardous material information listed anywhere on the paperwork that was retrieved from the various city departments.

When visiting the zoning department to do research for this paper, I met Mr. Joshua Pope, who was in the initial stages of installing a new program the City of Martinsville had purchased and is going to be used by the zoning department along with its current program, *Assess IT*. This new program is called *Pictometry*, according to Wikipedia; *Pictometry* is the name of a patented aerial image capture process that produces imagery showing the fronts and side of buildings and locations on the ground. Images are captured by low-flying airplanes, depicting up to 12 oblique perspectives (shot from a 40 degree angle) as well as an orthogonal (overhead) view of every location flown (Wikipedia, 2012).

Pictometry imagery can be overlaid with various shapefiles and GIS information because every pixel is georeferenced to its exact location on the earth. Measurements that can be made directly on pictometry imagery include area, distance, height, elevation, pitch, and bearing, among others (Wikipedia, 2012).

Mr. Pope explained to the author of this paper how Pictometry could be useful to the Martinsville Fire &EMS Department for pre-fire planning. With practice and continued use, a person could figure the square footage of a building, roughly how much hose would need to be laid to the closest fire hydrant, zoom into the building to see where utilities maybe located, etc. Mr. Pope then showed me how detailed the pictures would be of the three commercial building

chosen for this research paper; The Virginia Museum of Natural History (Appendix D), The Commonwealth Centre (Appendix E), and The Liberty Fair Mall (Appendix F).

Discussion

Literature revealed that the National Institute for Occupational Safety and Health (NIOSH) has listed the lack of pre-incident building information as being frequently cited in line-of-duty death reports (Murphy, 2009). NIOSH noted that the fire departments involved in those lines-of-duty deaths were deficient in conducting a pre-incident survey prior to those fatal incidents.

According to the National Fire Protection (NFPA) 1620, *Standard for Pre-Incident Planning* a pre-incident plan is one of the most valuable tools for aiding responding personnel in effectively controlling an emergency (NFPA, 2010).

In discussions held between the author of this paper and the administration of the Martinsville Fire & EMS Department, we realize that the department's efforts in conducting pre-fire planning have been virtually nonexistent for several years. This is due to several factors: limited manpower, increased call volume, etc. We also feel that if we do not find a solution to this problem, we are setting the department up for failure. We are putting firefighters and the citizens of Martinsville in grave danger.

NFPA 1620 states that pre-incident planning is a total concept based upon the following items; situation awareness, management commitment, education, prevention, protection, and emergency organization. A thorough pre-incident plan involves information gathering analysis, and dissemination, planning, reviewing, training, and evaluation (NFPA, 2010).

Alan Brunacini states in his book, *Fire Command* that pre-incident planning is conducted with the advantage of ideal conditions. Surveys are carried out in daylight under ideal conditions

and that firefighters have the time to visit, decide, contemplate, draw, and even redraw if necessary to get the plan right (Brunacini, 1985).

As the author of this research paper, my idea of seeing what the various city departments had on file to help with pre-planning of commercial buildings was to see if we could possibly do some pre-planning right here in the station using information that was already on hand. But, as Brunacini clearly states above, pre-planning should be done on site in ideal conditions.

As research literature revealed, building construction information, Global Information System (GIS) information, utility information, life hazard information, and hazardous materials/process information are all important information to have in pre-fire plans and were used as research questions for this paper. There were three commercial buildings chosen for this research paper and they were all chosen at random; The Virginia Museum of Natural History (Appendix A), The Commonwealth Centre (Appendix B), and The Liberty Fair Mall (Appendix C).

Visiting the Real Estate Assessor's office along with the Zoning, Inspections, and Engineering Office's and obtaining any information they had on the three commercial buildings listed above revealed no real helpful information for pre-fire planning a fire at those particular buildings. There was limited information on the building's construction such as what the exterior of the building was made of, if the roof was built up, and what the interior walls were made of.

There was a picture of the building and an overhead view of how the building looked on the tax map. There was no life hazard, hazardous material/process, utility, or GIS information listed on the forms. Again, basically no help to the department for pre-fire planning.

While visiting the zoning department I was introduced to Mr. Joshua Pope who was installing a program called *Pictometry* that the zoning department had just purchased. Mr. Pope explained to me how useful *Pictometry* may be to the department. According to Wikipedia, *Pictometry* is the name of a patented aerial image process that produces imagery showing the fronts and sides of building and locations on the ground (Wikipedia, 2012).

He stated that by using this new program the fire department could get the square footage of a building, how far the nearest hydrant is, and the pictures of buildings were so clear that we could get some information such as utility locations, HVAC locations, etc. just by zooming in on the building. All this could be done at the station before going on location to get more detailed information. Mr. Pope also downloaded pictures of the three buildings (Appendices D, E, and F) that were used for this research paper to show how clear and detailed the pictures are.

John Norman states in his chapter *Pre-Incident Planning for Emergency Response;* that larger departments have greater resources than smaller departments, but every department has constraints on the amount of resources and personnel that can be devoted to pre-incident planning. This is the reason why some departments concentrate their pre-planning on their target hazards and let their SOP's or SAGs take care of the remaining structures (Norman, 2008).

Recommendations

The efforts of the Martinsville Fire & EMS Department to conduct pre-fire planning have been virtually nonexistent for several years. This is due to several factors: Limited manpower, increased call volume, etc. The purpose of this research paper was to see if there is any information maintained by various city departments that may be useful to pre-plan commercial buildings in the City of Martinsville.

Research of the various departments revealed no information that would be helpful for this type of planning. The zoning department was installing a program called *Pictometry* that may be of use to the department after some future training on this new program.

Since the information other departments in the city is of no real value to us for pre-fire planning purposes, it is time for the Martinsville Fire & EMS Department to get back to the basics of pre-fire planning. To address these concerns and after meeting with the Administrative staff of the department I have come to the conclusion that there needs to be a more concerted effort between the Operations Division and Inspections & Code Enforcement Division to develop a pre-fire plan program.

The goals of this program are to develop a formalized pre-fire planning process. The department needs to develop a standardized form and establish the minimum data that will be collected at each occupancy that is pre-planned. The department should also determine how and where these completed records will be kept along with developing a logical, systematic approach for reviewing and sharing of information between divisions.

The department should also establish a means of prioritizing high-hazard occupancies. A realistic quota for the number of pre-fire plans to be completed each month needs to be developed. We also need to develop a process of quality management to assure that accurate data is being recorded. Finally, SAG's needs to be developed to cover how pre-fire planning will be handled by this department.

Once the above goals are met and the program has been developed, the finished product would work something like this; a) Each Operations Division Shift would be required to complete two pre-fire plans, for a total of six per month. b) Each shift would be required to review the plans completed by their counterparts. Basically, each shift completes two plans, and

then reviews four others each month. c) The completed paperwork, along with any photos or attachments, would be given to the Deputy Fire Marshal. d) The Deputy Fire Marshal will then enter that information, with attachments, into our Fire Inspection software. e) At this point, each computer that has either the Fire Inspection software or internet access to our Rescue Bridge site would have access to the pre-fire plan. I envision having this program up and running within six months.

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Appendix A

The Virginia Museum of Natural History

Property Sheet:

MAP# 34 (06)00 /06 06A ACCT# 050006890 ADDRESS 21 STARLING AVE

LEGAL DESCRIPTION VIRGINIA MUSEUM OF NATURAL HISTORY

CODES	Classification	Zoning	District	Property Use	Assessor	Mort Cd
	22	P-1	3X29	04	JCD	

OWNER	Name	Address	Date	Deed Book	Consid.
Current	COMMONWEALTH OF VIRGINIA	MUSEUM OF NAT HIST 21 STARLING AVE	5/28/2004	LR04/01024	
Prev 1	MARTINSVILLE CITY OF	55 W CHURCH ST MARTINSVILLE,VA 24112	3/21/1997	247-583	176511
Prev 2	SOUTHEASTERN HEALTH CARE INC	8108 PICARDY DRIVE BATON ROUGE, LA 70809-3514		140-558	

ACTIVITY	Vst Date	Time	H	S/D Date	PlatRef
	?/28/2008				

REMARK

BOE
Date
Land
Impv

PROPERTY DESCRIPTION

Res'l Y C'cial MUSEUM Model: M/H?

Building Characteristics

Split Level?	Split Foyer?	Central Heat? Y	Cental Air? Y		
Stories 3.00	Rooms	Bedr.	Baths	Fire Pl.	Chim.
Roofing BUILT UP	Exterior BRICK		Cond. GOOD		
Foundation C/B	Basement PARTIAL				
Flooring CAR/VIN	Interior DRY WALL		Fuel GAS		

Property Factors

☒ Pub Watr	☐ WatrFrn	☐ No Road	☒ Paved	Topo: LEVEL	
☒ Pub Sewr	☐ Septic	☒ Crb/Gutr	☐ Gravel	Soil: CLAY	
☐ Well	☐ UG Utl	☒ Sidewlk	☐ Dirt	Loca: GOOD	

Grade C Yr Assessed 2009 Yr Built 2007 Yr Remod

BUILDING VALUATION

Item Description	Size	Rate	$ Value
MUSEUM			
ABOVE GRADE SF	66787		
BSMT FIN	22340		

Total Grade Replacement

SUMMARY OF IMPROVEMENTS

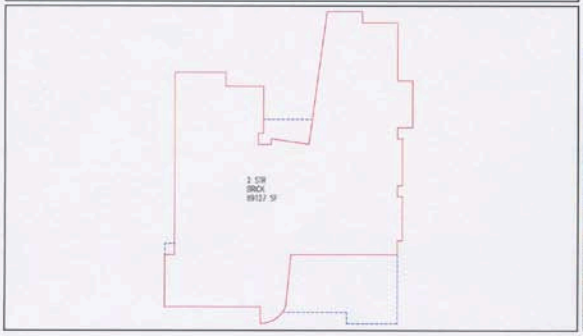
Description	Size	Rate	Grad	Dep	Func	Econ	$ Value

I:	2009	10492800	-0.05%	1.00
L:		401800	-0.##%	1.00
MKT:		10894600	-0.07%	

LAND VALUATION

Description	Size	Rate	Adj	$ Value
	160703.000			
3.689 AC 160703 SF PER MAP MB 15-100				
Land 1:	×			
Land 2:	×			

Total Size: #####.### Value: 401800



Appendix B

The Commonwealth Centre

Property Sheet:

MAP# 23 (05)00 /01RS ACCT# 000678200 ADDRESS 101 E COMMONWEALTH BLVD

LEGAL DESCRIPTION TRACT 1RS, 22.967 AC & LOT 20A, .129 AC

CODES | Classification 15 | Zoning M-2 | District 4I26 | Property Use MT15 | Assessor JCD | Mort Cd

OWNER	Name	Address	Date	Deed Book	Consid.
Current	COMMONWEALTH BLVD ASSOCIATES	P O BOX 4991 MARTINSVILLE, VA 24115-4991	12/06/2007	LR07/01957	
Prev 1	COMMONWEALTH BLVD ASSOCIATES	P O BOX 4991 MARTINSVILLE, VA 24115-4991	12/05/2007	GM07/00025	
Prev 2	COMMONWEALTH BLVD ASSOCIATES	P O BOX 4991 MARTINSVILLE, VA 24115-4991	1/03/2001	LR01/00007	750000

ACTIVITY	Vst Date	Time	H	S/D Date	PlatRef
	'/30/2008			?/05/2007	07/0025

BOE
Date
Land
Impv

REMARK

PROPERTY DESCRIPTION

Res'l C'cial Y | COMMONWEALTH CENTRE | Model: | M/H?

Building Characteristics

Split Level?	Split Foyer?	Central Heat?	Cental Air?
Stories	Rooms	Bedr.	Baths	Fire Pl.	Chim.
Roofing	Exterior	Cond.
Foundation	Basement	
Flooring	Interior	Fuel

Property Factors

☒ Pub Watr	☐ WatrFrn	☐ No Road	☒ Paved	Topo: LEVEL
☒ Pub Sewr	☐ Septic	☒ Crb/Gutr	☐ Gravel	Soil: CLAY
☐ Well	☐ UG Utl	☒ Sidewlk	☐ Dirt	Loca: GOOD

Grade C | Yr Assessed 2009 | Yr Built 0000 | Yr Remod 2008

BUILDING VALUATION

Item Description	Size	Rate	$ Value
COMMONWEALTH CE			
Total	Grade	Replacement	

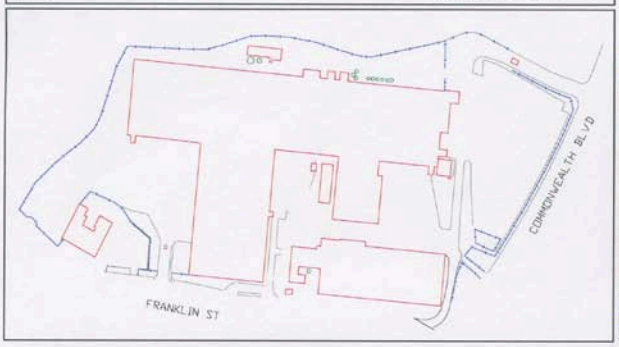
SUMMARY OF IMPROVEMENTS

Description	Size	Rate	Grad	Dep	Func	Econ	$ Value

I:	2009	5920000	-0.15%	1.00
L:		358700	-0.03%	1.00
MKT:		6278700	-0.15%	

LAND VALUATION

Description	Size	Rate	Adj	$ Value
LOT 1RS = ACRES	17.596			
22.967	4.500			
LOT 20A =				
.129				
23.096				
TOTAL				
1 AC BY	1.000			
SCC				
GM 0700025				
Land 1:	×			
Land 2:	×			
Total Size: 23.096		Value: 358700		



Appendix C

The Liberty Fair Mall

Property Sheet:

MAP# 22 (01)00 /01R ACCT# 000990225 ADDRESS 240 W COMMONWEALTH BLVD

LEGAL DESCRIPTION 39.598 AC LIBERTY FAIR MALL

CODES | Classification 04 | Zoning C-3 | District 1C54 | Property Use MT04 | Assessor JCD | Mort Cd

OWNER	Name	Address	Date	Deed Book	Consid.
Current	LIBERTY FAIR VA LP C/O	3300 ENTERPRISE PKWY BEACHWOOD, OH 44122	12/01/1999	LR99/02300	31900000
Prev 1	DEVELOPERS DIVERSIFIED & THE	P O BOX 4991 MARTINSVILLE, VA 24115	11/30/1999	LR99/O2299	31900000
Prev 2	LESTER LUMBER CO INC	MARTINSVILLE VA			

ACTIVITY	Vst Date	Time	H	S/D Date	PlatRef
	1/20/2008				

REMARK

BOE
Date
Land
Impv

PROPERTY DESCRIPTION

Res'l C'cial Y | 1STR CONC BLOCK | Model: | M/H?

Building Characteristics

Split Level?	Split Foyer?	Central Heat? Y	Cental Air? Y		
Stories 1.00	Rooms	Bedr.	Baths	Fire Pl.	Chim.
Roofing BUILT UP	Exterior CINDER BLOCK	Cond. GOOD			
Foundation CONC	Basement NONE				
Flooring ?	Interior DRY WALL	Fuel GAS			

Property Factors

☒ Pub Watr	☐ WatrFrn	☐ No Road	☒ Paved	Topo: LEVEL
☒ Pub Sewr	☐ Septic	☒ Crb/Gutr	☐ Gravel	Soil: CLAY
☐ Well	☒ UG Utl	☒ Sidewlk	☐ Dirt	Loca: GOOD

Grade C | Yr Assessed 2009 | Yr Built 1989 | Yr Remod

BUILDING VALUATION

Item Description	Size	Rate	$ Value
1STR CONC BLOCK			
Total	Grade	Replacement	

SUMMARY OF IMPROVEMENTS

Description	Size	Rate	Grad	Dep	Func	Econ	$ Value

I:	2009	13601700	-0.08%	1.00
L:		12073900	-0.17%	1.00
MKT:		25675600	-0.02%	

LAND VALUATION

Description	Size	Rate	Adj	$ Value
39.597 ACRES	1724845.000			
1724845 SF				

Land 1: ×

Land 2: ×

Total Size: ######.### Value: 12073900

Appendix D

Pictometry view of The Virginia Museum of Natural History

Appendix E

Pictometry view of Commonwealth Centre

Appendix F

Pictometry view of The Liberty Fair Mall