



WPI

A History of Worcester's Deadliest Fire Incident

Responses to the Worcester Cold Storage And Warehouse Company Fire

Major Qualifying Project Report

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Submitted By:

Sarah Stuart

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Approved By:

Professor David Spanagel, Adviser

Abstract

This paper provides a historical analysis of the consequences of the Worcester Cold Storage and Warehouse Company fire. On December 3, 1999 the Worcester Fire Department responded to a five-alarm fire at the Worcester Cold Storage and Warehouse Company. Six firefighters died, making it the worst structure fire in terms of loss of life to firefighters for the City of Worcester. In response, key issues related to the fire incident were identified. This paper examines how the Worcester Fire Department and the City of Worcester changed their safety culture to reduce civilian and firefighter injuries and fatalities and how the development of fire protection engineering at Worcester Polytechnic Institute, has affected the Worcester Fire Department.

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Worcester Cold Storage and Warehouse Co. Fire

On December 3, 1999 the Worcester Fire Department responded to fire box alarm 1483 at 266 Franklin Street at 6:15PM. Engine 1 arrived on scene reporting smoke showing from the Worcester Cold Storage and Warehouse Company, a six-story warehouse constructed of eighteen-inch thick brick walls with no windows above the first floor. The fire was started accidentally by two homeless people who were squatting inside the vacant warehouse. “It was just this big warehouse building with smoke coming out of it. I’d say the beginning of the fire was textbook. They found the fire, lines were stretched out, guys on the roof were venting it. Textbook.” said Firefighter Tom Dwyer from Grove Street station.¹ Two firefighters became disoriented and lost while searching for fire extension and the two homeless victims thought to be trapped in the warehouse. Four more firefighters proceeded into the interior of the structure to conduct search-and-rescue operations for the firefighters and homeless people and became lost in the heavy smoke and fire. The Incident Commander ordered all companies to evacuate from the structure after their final radio transmission at 7:58 PM. Search and rescue operations commenced until recall of the box alarm eight days later on December 11, 1999 at 10:27 PM, when all six firefighters’ bodies had been recovered.² On December 9, 1999, a memorial service and procession attended by the President and Vice President, as well as firefighters from across North America, was held for the “Worcester Six”: Firefighter Paul Brotherton (Rescue 1), Firefighter Jeremiah Lucey (Rescue 1), Lieutenant Thomas Spencer (Ladder 2), Firefighter Timothy Jackson (Ladder 2), Firefighter Joseph McGuirk (Engine 3), and Firefighter James Lyons (Engine 3), who received a posthumous promotion to Lieutenant. The painstaking effort to

¹ Interview with Grove Street station firefighters ten years after the 1999 Cold Storage and Warehouse Company fire, in which four firefighters from the station died in the incident. Author and interviewees reveal the relationship between the firefighters of Grove Street station and the conditions that impeded a search and rescue for the missing firefighters. Initially, the firefighters agreed to not talk publicly about the events, avoiding the media, and refusing to be interviewed for *3,000 Degrees* by Sean Flynn in 2003. Jim Keogh, “The Fire that still Burns,” *Worcester Magazine* (December 2, 2009).

² For additional content related to the Worcester Cold Storage and Warehouse fire refer to the National Institute for Occupational Safety and Health and Federal Emergency Management System investigation reports. National Institute for Occupational Safety and Health, “Six Career Fire Fighters Killed in Cold-Storage and Warehouse Building Fire - Massachusetts,” *Centers for Disease Control and Prevention*, September 27, 2000; John R. Anderson, “Abandoned Cold Storage Warehouse Multi-Firefighter Fatality Fire: Worcester, Massachusetts,” *U.S. Fire Administration/Technical Report Series* USFA-TR-134/December 1999.

find the remains of the six firefighters continued as their family members and friends kept vigil and searchers worked through weariness and grief. While most of the recovery effort was performed by the Worcester Fire Department personnel, departments and firefighters from across New England came to the scene to assist or cover fire stations. Six counts of manslaughter were brought against each of the individuals and they were eventually dismissed by a Superior Court Judge who felt neither defendant exhibited “wanton and reckless behavior” and both people involved were believed to have mental deficits.³

In a 2015 interview with *Firehouse Magazine*, Worcester Fire Department Chief Cio discussed his relationship with the six firefighters: “In the fire service we have guys that give one-hundred percent all the time and this was the type of fire were the guys that gave one-hundred percent died. It wasn’t a fluke collapse or anything. They were in there working the job they always did. Nick[el]-and-dime fire or a million dollar fire, they’re in getting dirty and loving it...And those were the type of characters, the nature of them, they were firefighters. They were Jakes...They were one-hundred percent all the time.”⁴ Twelve guys came from the Grove Street Station and only eight returned. “You come back to the station and you see two sets of shoes next to Engine 3, two sets of shoes next to Ladder 2. Four lockers, wide open, with pictures of their families,” said Worcester Fire Department Firefighter Jim Glasberg. “This was about six guys who were our friends, who had families, and they died. It wasn’t about what we did or didn’t do that night. It was a shit fire, and we lost,” said Firefighter Doug Courville.⁵

³ Tom Levesque, then 37, and his companion Julie Ann Barnes-King, who was 19 and three months pregnant. The fire started during an altercation between the two inside the Worcester Cold Storage and Warehouse Company building, in which Barnes knocked over a lighted candle that ignited papers and clothing. The two did not extinguish the fire and left the building without reporting it to authorities. Former Police Chief Edward Gardella stated, “Certainly we believe that they should have been aware enough to notify somebody that there was a fire there.” Levesque was described by acquaintances as a “little slow,” but caring and a decent person. Court documents portrayed him as a man who abandoned his children, terrorized the mother of his twins, and beat a pregnant former girlfriend. King has since moved to Maine and married, renamed St. Pierre. St. Pierre is classified by psychologists as having mental limitations because of past abuse. Chris Echegaray, “Accused fire suspects led dysfunctional lives,” *Telegram & Gazette*, December 9, 1999; “Trial After Fire? A Homeless Couple Had Lived In Abandoned Warehouse,” *CBS News: Forty Eight Hours*, November 1, 2000; Gary V. Murray, “Charges dismissed in tragic blaze,” *Telegram & Gazette*, September 21, 2000; Danielle M. Horn, “Ex-homeless woman marries, begins a new life in Maine,” *Telegram & Gazette* (December 2, 2009).

⁴ “Interview Chief Cio Worcester Fire Dept,” *Firehouse* (May 21, 2015).

⁵ Keogh.

In addition to the National Institute for Occupational Safety and Health (NIOSH) report, the U.S. Fire Administration Federal Emergency Management Agency (FEMA) investigated and published a report titled “Abandoned Cold Storage Warehouse Multi-Firefighter Fatality Fire Worcester, Massachusetts.”⁶ The investigation included a detailed report of the fire incident, identification of key issues related to the fire incident, and lessons learned from the identification of the key issues. Based on the lessons learned, Federal Emergency Management Agency argued that the potential for a similar fire incident involves these four considerations. First, the fire service should initiate life safety activities early on at a fire scene. Second, abandoned buildings remain a serious threat to the fire service and a danger to the communities in which they stand. Third, homeless people and drug addicts have been known to inhabit such buildings out of necessity. Fourth, techniques must be improved to better track the movements of firefighters within a structure.

In conducting a historical analysis of an event that had social, political, and economic implications for the City of Worcester, this paper begins by critically examining the concept of “culture” before applying the concept to better understand the culture that existed in the Worcester Fire Department—the safety culture that developed shortly after the fire incident—and the proximity of an institution—Worcester Polytechnic Institute—that researched and developed technology specifically for the fire service. The sources cited throughout this paper discuss these key issues in regard to the Worcester Fire Department or the City of Worcester or Worcester Polytechnic Institute, but it is necessary to understand their relationship—how their cultural characteristics affect how they interact and communicate with each other—to evaluate whether lessons were learned from the Worcester Cold Storage and Warehouse Company fire.

⁶ In 1971, the U.S. lost more than 12,000 residents and 250 firefighters to fire. Congress passed the Federal Fire Prevention and Control Act in 1974, which created the U.S. Fire Administration and the National Fire Academy. The U.S. Fire Administration, as an entity of the Department of Homeland Security, was established to reduce life and economic losses due to fire and related emergencies, through leadership, advocacy, coordination, and support.

Images

In the days, weeks, and months following the Worcester Cold Storage and Warehouse Company fire, many local residents who witnessed the flames or smoke over the building visited the smoldering rubble in person. Others watched reporters on the television or read articles featured in their newspaper. Newspaper headlines in the local *Telegram & Gazette* read “Painful search ends,” “Fallen heroes,” “Lost but not forgotten,” “A city mourns,” and “Healing begins.” The *Worcester Magazine* printed “City of Tears.” Inside the issue, people read articles on aspects of the immediate reactions to the tragedy, such as “Too close for comfort” and “An ideal brotherhood.” Throughout the country newsstands and front porches publicized the events: ““Your tragedy is ours”” as the “Global brotherhood summons its strength” in *The Boston Globe* and *The New York Times* featured pictures of the memorial service and procession on its front page. Today, the headlines laid side-by-side provide context to understanding the cause and effect of the fire incident on the City of Worcester: “No one saw the horror that awaited,” “Homeless pair charged in firefighters’ deaths,” “Homeless gather to share in grief,” “Possible firetraps secured,” “Cruel lesson renewing safety aims,” and “Families showered with help.”⁷ The images comprise a visual account that parallels and illustrates in an evocative manner these headlines.



Image 1. Front page headlines and pictures printed after the fire incident on December 3, 1999.⁸

⁷ For additional images visit <https://sites.google.com/view/wpi-mqp-sarahstuart/>.

⁸ Thank you to Ann T. Lisi, President and CEO of the Greater Worcester Community Foundation, for displaying the newspapers featured.



Image 2. Worcester Cold Storage and Warehouse fireground scene shortly after the first alarm at 6:25 PM (Photo by Roger B. Conant, *National Institute For Occupational Safety and Health*, December 3, 1999)



Image 3. Worcester Cold Storage and Warehouse Company structure with fire venting. Aerial scopes positioned on Franklin and Arctic street pour steady streams into windows and on the rooftop of the building. The shape of a firefighter, concealed in fire, can be seen standing over the building. (Photo by Roger B. Conant, *Telegram & Gazette*, December 3, 1999)



Image 4. Worcester Cold Storage and Warehouse Co. structure where firefighters continue to pour water on the lingering fire. (Photo by *Associated Press*, December 4, 1999)



Image 5. Worcester Cold Storage and Warehouse Co. structure. (Photo by *Associated Press*, December 4, 1999)



Image 6. Massachusetts State Fire Marshal Stephen D. Coan (left) and Worcester Fire Chief Dennis Budd (right) meet with reporters. (Photo by *Associated Press*, December 4, 1999)



Image 7. Demolition of the warehouse continued during the search for the bodies of the missing firefighters. (Photo by Paul Kapteyn, *Telegram & Gazette*, December 5, 1999)



Image 8. Former Worcester Cold Storage and Warehouse Co. structure. (Photo by *The Boston Herald*, December 5, 1999)



Image 9. Firefighters search through the rubble of the Worcester Cold Storage and Warehouse Co. structure. Teams of firefighters with specially trained dogs sifted through the charred wreckage and smoke drifted above the remaining three walls. (Photo by Paul Ferazzi, *Telegram & Gazette*, December 6, 1999)



Image 10. District Fire Chief Michael O. McNamee and the former warehouse, which he described as “the building from hell.” McNamee was the Incident Commander as said as the conditions deteriorated the smoke and intense heat forced him to order the evacuation of the abandoned building. (Photo by Paul Ferazzi, *Telegram & Gazette*, December 6, 1999)



Image 11. Fire trucks from Westwood, Walpole, and Canton fill the Central fire station. Crews from out of town arrived to help in whatever ways they could, from working at fires to cleaning apparatus. (Photo by Chris Christo, *Telegram & Gazette*, December 6, 1999)



Image 12. A fire truck, Number 7, parked under I-290 overpass, covered slower bouquets, balloons, and wreaths on the hood. Mother and son stand in front of fire truck covered with flowers. (Photo by *Associated Press*, December 6, 1999)



Image 13. Mother and daughter read sympathy notes outside the Central Fire Station. (Photo by Paul Kapteyn, *Telegram & Gazette*, December 8, 1999)



Image 14. Firefighters march in a line of thousands under a U.S. flag outside the Worcester Centrum.
(Photo by *Telegram & Gazette*, December 9, 1999)

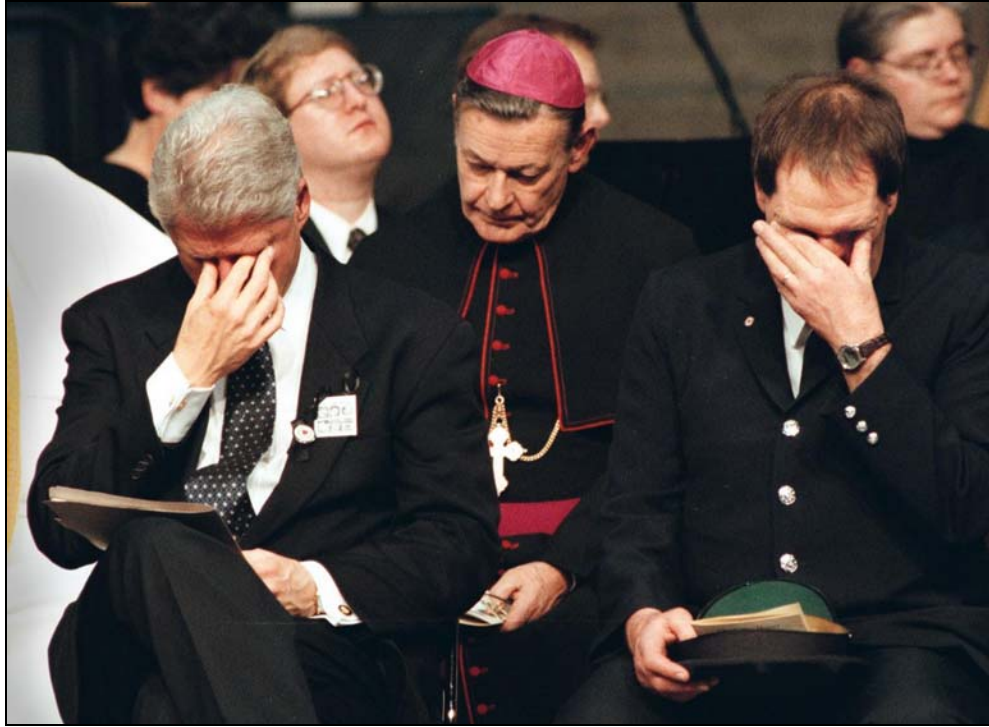


Image 15. President Bill Clinton (left) and President of Local 1009 of the International Association of Fire Fighters Frank P. Raffa (right) at the ceremony. (Photo by *Telegram & Gazette*, December 9, 1999)



Image 16. A firefighter wipes tears from his eye toward the end of the procession. (Photo by Paul Kapteyn, *Telegram & Gazette*, December 9, 1999)



Image 17. Visiting firefighters stand outside the former Worcester Cold Storage and Warehouse Company building after the procession. (Photo by Paul Kapteyn, *Telegram & Gazette*, December 9, 1999)



Image 18. Firefighters search with their hands for the remains of the firefighters. Firefighters sift through charred wood and broken pipe with axes, hooks and shovels, looking for anything that might lead to the location of a body. (Photo by Rick Cinclair, *Telegram & Gazette*, December 10, 1999)



Image 19 and 20. At 6:13 PM, December 10, 1999, one week to the minute that the firebox alarm was struck, firefighters at the Grove Street Fire Station join hands in prayer and firefighters at the scene stand for a moment of silence. (Photos by Tom Rettig and Paul Kapteyn, *Telegram & Gazette*, December 11, 1999)



Image 21. Worcester City Manager Thomas Hoover (center right) joins a line of Worcester firefighters as they stand at the edge of the fire-gutted Worcester Cold Storage and Warehouse building and salute all the out-of-town firefighter gathered at the fire site Saturday evening on December 11, 1999, shortly after the remains of the sixth firefighter were removed. (Photo by Paul Kapteyn, *Telegram & Gazette*, December 11, 1999)

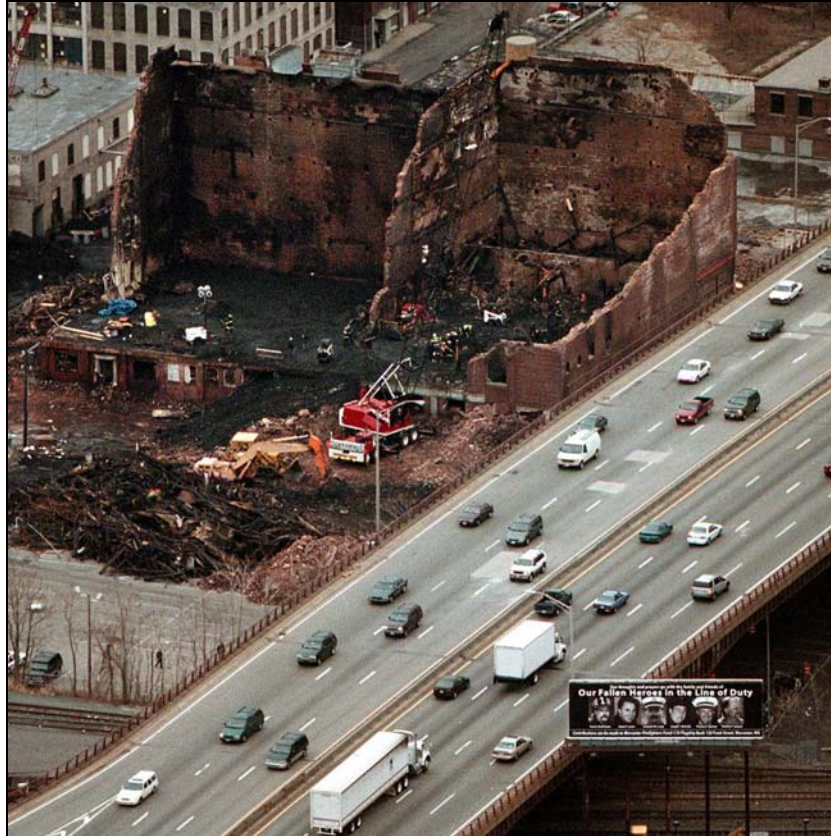


Image 22. Former Worcester Cold Storage and Warehouse Company. (Photo by Paul Kapteyn, *Telegram & Gazette*, December 13, 1999)



Image 24. "Worcester Six," Firefighter Joseph McGuirk, Firefighter Timothy Jackson, Firefighter James Lyons who was posthumously promoted to Lieutenant, Lieutenant Thomas Spencer, Firefighter Jeremiah Lucey, and Firefighter Paul Brotherton. (Photo by *Telegram & Gazette*)



Image 23. District Fire Chief and Incident Commander on the night of the fire, Michael O. McNamee walks on the site. (Photo by Betty Jenewin, *Telegram & Gazette*, December 3, 2004)



Image 25. Worcester Cold Storage and Warehouse Company fire memorial located at Franklin Street Station at 266 Franklin Street in the former location of the structure. Vacant commercial buildings located behind the fire department are indicated with a red 'X' placard. (Photo by Dan Gould, *Telegram & Gazette*, November 30, 2009)

Defining Culture

What do people mean when they use the term “culture?” Cultural anthropology is the academic discipline which studies how cultures can be defined, how they develop, how they change, and what differentiates one from another.⁹ Culture is a component within management and organizational studies,¹⁰ but what is the definition of an “organizational culture”? Social psychologist Edgar H. Schein defines organizational culture as a pattern of shared basic assumptions that the group has learned as it solves its problems of external adaptation and internal integration which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to behave in relation to those problems. Schein also defines “artifacts” as the visible elements in a culture by which they can be recognized by people not part of the culture, the espoused values, and the shared basic assumptions.¹¹ How does an organizational culture change? In the *International Journal of Emergency Services*, researchers William Pressemier and Robert England provide a comprehensive model of safety culture for the fire service. Pressemier and England discuss the process of organizational change, organizational effectiveness, successful performance improvement implementation, and organizational performance. Organizational change will occur when three conditions are met: first, a problem is identified and the need to resolve the problem is accepted; second, people have an awareness and basic understanding of the nature of the problem; and third, information is available that allows people to define the problem and make appropriate choices between alternative courses of action.

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⁹ Ronald J. Siarnicki is a retired chief of Prince George’s County (Maryland) Fire/EMS department, where he served for 24 years in operations. Siarnicki serves as the executive director of the National Fallen Firefighter Foundation. Richard Gist is principal assist to the director of the Kansas City (Missouri) Fire Department. Gist’s research is concerned with the emergency response and the psychoanalysis impacts of disaster and community response to catastrophe. Ronald J. Siarnicki and Richard Gist, “Changing the Culture of Safety in the Fire Service,” *Fire Engineering* (2014).

¹⁰ Mats Alvesson, *Understanding Organizational Culture* (January 2, 2002).

¹¹ Edgar H. Schein’s model of organizational culture identifies the three levels of organizational cultures: artifacts and behaviors, espoused values, and assumptions. Steven M. De Lisi, “Organizational Culture in the Fire Service,” *Fire Engineering* Vol. 158 Issue 8 (August 2015): 119.

¹² The authors define organizational culture as “a combination of the practices, values, beliefs, and underlying assumptions that members within a group share about appropriate behavior.” They provide a comprehensive model of safety culture for the U.S. fire service. Based on a modified version of M.D. Cooper’s Reciprocal Determinism Model, the research uses two sets of independent variables, labeled Safety Management System and Safety Related Behaviors, to explain a dependent variable called

How are new members integrated into the organizational culture? Organizational assimilation refers to the process of newcomers fitting into and becoming members of organizations. Researcher Karen Myers defines organizational assimilation as a process of mutual acceptance: a new member accepting the organization and his or her role in it and the organization accepting the new member.¹³ Most high-reliability organizations cause new members to quickly adopt the shared basic assumptions of an organization and assimilate into their new environment. The organization's efforts to train and orient the recruit, or organizational socialization efforts, are influenced by dangerous work environments. Organizational socialization efforts, and not maximum productivity and efficiency, are the primary focus of high-reliability organizations because it develops reliability among coworkers in high-risk occupations.¹⁴ A fire department is an example of a high-reliability organization, "If there's ever been an organization that transmits knowledge to succeeding generations, the fire service is it," said Firefighter Steven De Lisi, "We just need to make sure the right message gets transmitted."¹⁵

Organizational Safety Climate. The model has been used successfully to improve safety performance in other high risk, high performance organizations. Using survey data collected from over one-thousand firefighters in three medium-sized U.S. municipalities, the theoretical model is tested. Results from multiple regression analyses provide strong support for the hypothesis that individual perceptions of safety management and safety behavior predict individual perceptions of safety climate, both at the "fire service" organization level and at the individual department level. The model holds the promise of reducing firefighter injuries and deaths by identifying managerial and behavioral safety improvement areas within U.S. fire departments. William Pressemier and Robert England, "Safety culture in the US fire service: an empirical definition," *International Journal of Emergency Services* Vol. 1 No.1 (2012): 10-28.

¹³ This study utilized Myers and Oetzel's six-dimensional model of organizational assimilation as a framework to explore members' assimilation into a high-reliability organization - stations of a fire department in a major U.S. city. Qualitative data were gathered from semistructured interviews and participant observation. Karen Myers, "A Burning Desire: Assimilation into a Fire Department," *Management Communication Quarterly* Vol. 18 No. 2 (February 2005).

¹⁴ Consistent with the Myers and Oetzel framework, new firefighters did develop a familiarity with others, acculturate, become involved, feel recognized, and develop job skills. The firefighters did not role negotiate, but they put considerable effort into establishing trustworthiness. Trust was built by demonstrating humility and a good work ethic. Furthermore, unlike newcomers to most non-high reliability organizations, newcomers were required to socialize themselves prior to entry. The study also reveals how a strong culture and environment affect informal socialization and offers additional evidence of the reciprocal nature of organizational assimilation: "The atmosphere in the station did feel very family-like...the rules of conduct are strict, but the members appeared to respect and admire one another...the presence of the socially constructed family allowed participants to feel close to the other members of the organizational family." Participants reported "learning organizational practices and norms and about their expected roles helped them to feel more relaxed in their work environments...Prior to entry, recruits know about the norms and hierarchical nature of the organization and are willing to accept it." Myers, 370.

¹⁵ A twenty-five year veteran of the fire service, Deputy Chief of the Virginia Air National Guard Fire and Rescue in Henrico County and has served as a company officer for the Newport News (VA) Fire

The fire service is characterized by a high probability of injury and death.¹⁶ Although firefighting is inherently a high-risk occupation, the safety performance of other industrialized nations demonstrates that it is possible for the United States fire service to reduce firefighter injury and fatality rates without necessarily lowering performance in the field. Despite a decline in reported fires, fire department responses have tripled since 1985. On average, fire departments in the United States respond to a fire every twenty-four seconds.¹⁷ In 2016 there were sixty-nine fatal firefighter injuries and 62,085 non-fatal firefighter injuries.¹⁸ The number of structure fires annually has decreased by almost two-thirds. These trends are attributed to improvements in protective clothing and equipment, fireground procedures, and training.¹⁹ While improvements in fire safety, technology, training and equipment have been credited for these reductions, fire departments as a whole still suffer from a serious lack of funding, equipment, manpower and training across the United States. The number of structure fires and civil deaths annually at structure fires has been steadily declining since 1977, but the total number of firefighter fatalities is not decreasing at the same rate. Why has the problem of high rate of firefighter injuries and fatalities in the United States been so persistent? Founder of *Firehouse Magazine* and eighteen-year veteran of the New York City Fire Department, Dennis Smith said, “After all the editorials and homilies praising our firefighters, after the coffins are saluted and buried, even after the flood of tears, the firefighters are left in the companies and departments that are largely inadequately protected.”²⁰ Despite improvements in fire safety efforts, hostile fire events still occur and are often catastrophic in nature, resulting in injuries, deaths and disruption of business operations. Some career fire departments are inadequately staffed because firefighter salaries are costs that not every town wants to pay, and the answer is to limit the number of full-time firefighters on duty. While these fire departments might be able to contain a one-room house fire,

Department and as a regional training manager for the Virginia Department of Fire Programs. De Lisi, 119.

¹⁶ In 2016, more than 1,342,000 fires were reported in the United States, causing 3,390 civilian deaths, 14,650 civilian injuries, and \$10.6 billion in property damage. National Fire Protection Association.

¹⁷ Statistics About the Fire Service, National Fire Protection Association, accessed April 2018, <https://www.nfpa.org/News-and-Research/Fire-statistics-and-reports/Fire-statistics/The-fire-service>.

¹⁸ National Fire Protection Association.

¹⁹ Rita F. Fahy, “U.S. Fire Service Fatalities In Structure Fires, 1977-2009,” *National Fire Protection Association Fire Analysis and Research Division* (June 2010).

²⁰ Dennis Smith, “A Reflection: Worcester Firefighters - All Firefighters,” *Firehouse Magazine* (February 29, 2000).

they are quickly overwhelmed by anything more.²¹ Manpower shortage is magnified in many smaller cities and towns, which also need critical equipment, fire prevention programs and training. When fire departments do not accurately assess their own capability to provide various services to the community and then effectively share the results of that assessment with the public, they run the risk of engaging in operations for which they are neither equipped nor trained. Understanding the resources that might be available, their limitations as well as some of the basic strategies and tactics employed by fire departments may help a company in its pre-fire emergency planning process. Fire departments need to analyze the tasks their organization expects to perform, identify the hazards associated with those tasks, and articulate these risks to the responders expected to perform the tasks, in addition to establishing systems that will prepare and equip personnel to safely work in those environments.

How does a high-risk occupation, such as the fire service, define culture? What purpose does the fire service culture serve in a fire department? In the fire service, “even neighboring departments boast or bemoan significant cultural differences, and in larger departments different cultures are said to reside at different stations or across different shifts.”²² While the organizational culture of a fire department differs from town-to-town, the fire service shares the same cultural artifacts. Ronald J. Siarnicki and Richard Gist say “We believe in honor, in courage, in valor, and in self-sacrifice. We believe in brotherhood and fraternity. But we also know to take risks that may not need to be taken that produce consequences too dire to be left unquestioned, and we are known, even among ourselves, to often resist change and intervention.”²³ Retired Fire Marshal and Deputy Chief Jim Crawford discusses how the fire service can change values and attitudes to evolve with the times: “Those shared values and behaviors are the glue that binds members of an organization together, and they’re more powerful than any standard operating procedure or general order...The fire service is evolving, and the tools and equipment used to provide public safety are evolving with it. Changing

²¹ George Browne, “How Good is Your Local Fire Department?” *Professional Safety* Vol. 35 No. 3 (March 1990): 26.

²² Siarnicki and Gist, 2.

²³ Siarnicki and Gist, 3.

attitudes about diversity and an increase in the types of emergencies to which we respond have forced us to expand our arsenal for dealing with those emergencies.”²⁴

How do high-risk behaviors emerge, how are they transmitted from one generation to the next, and how can an organization change the aspects that contribute to the high-risk behavior? In an organizational culture such as the fire service, leaders concentrate on how they communicate to members and how a safety culture is perceived by the organization. How is safety defined in the context of an organizational culture? Siarnicki and Gist consider safety culture to include the shared perceptions of individuals regarding critical behaviors, including values and beliefs, and management control systems associated with safety.²⁵ The progression to safe behaviors includes an identification and understanding of risks involved, safety systems adequate and appropriate to address identified risks, safety climate and culture, and consistently safe behaviors. The quality of an organizational safety culture directly affects how well it carries out its mission and delivers its services. An organization’s safety culture will reflect whether a leader rewards high-risk or low-risk behaviors: “The very essence of fire fighting pits personal safety against perceived need. Every tribute to firefighters begins with willingness to risk one’s life to protect another. We laud those who have made the ultimate sacrifice and reserve our most solemn rituals—the ones that most define for us who we are as a culture—to recognize their passing. For generations, senior firefighters have regaled the new kids with tales of close calls and risks survived.”²⁶

Professors of Organizational Management and Communication Richard L. Daft and Robert H. Lengel use the phrase “dropping your tools” to describe unlearning, detaching from, and leaving behind the old way when responding to crisis: “The old way is a bag of heavy tools that, if held onto, threatens the life of an organization.”²⁷ Mike Alder and Mat Fratus served together as Battalion chief and Deputy Chief in San Bernardino, California during the first

²⁴ Jim Crawford is currently a project manager for Vision 20/20 and retired fire marshal and deputy chief of the Vancouver, Washington Fire Department. Crawford is the author of *Fire Prevention Organization and Management* and serves as an editorial board member of *FireRescue*. Jim Crawford, “Evolving Culture in the Fire Service,” *NFPA Update* No. 822 (December 1997/January 1998): 2.

²⁵ Previous studies have identified three dimensions underlying organizational safety culture: values, practices, and organizational systems. Pressemier and England, 14.

²⁶ Siarnicki and Gist, 3.

²⁷ De Lisi, 120.

decade of the twenty-first century. They have argued that to achieve reliably safe behaviors in a fire service organization, certain foundational elements must be first in place. Alder and Fratus's pyramid demonstrates the concept that elements at the bottom of the pyramid must be functionally in place before higher levels can be logically or functionally reached. The "Pyramid of safe behaviors" emphasizes that strong leadership must be the linch-pin for establishing a safe culture. Accordingly, the fire department must develop fire service leaders whose leadership abilities on the fireground will dominate over a culture that says, "Let's go get it."²⁸ Although some degree of leadership is necessary at all levels of an organization, leadership is critical in establishing a culture of safety. De Lisi argues "one of the biggest mistakes leaders can make is ignoring the realities of team group rules and the collective emotions in the group and assuming that the force of their leadership alone is enough to drive people's behavior."²⁹

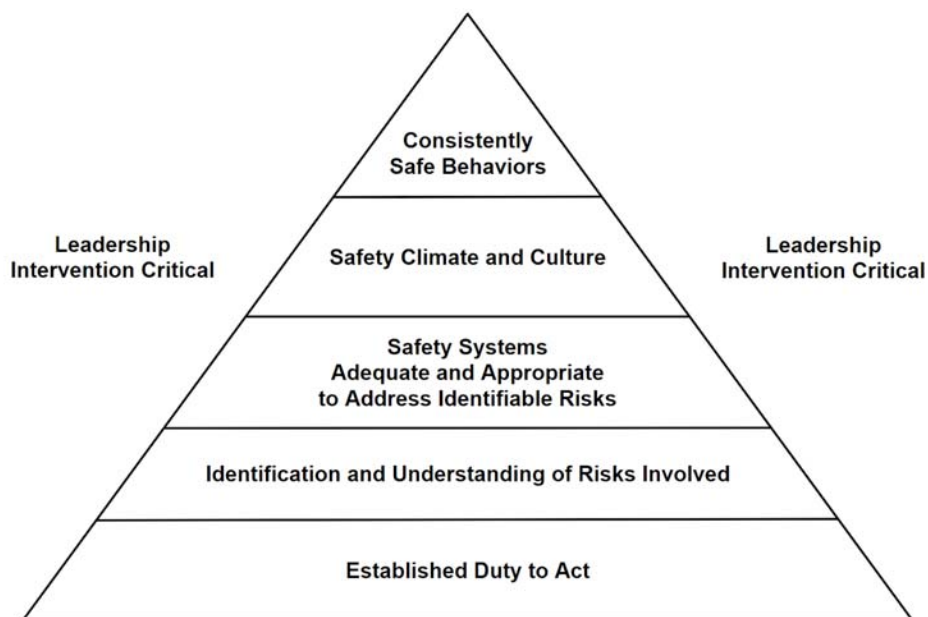


Figure 1. The progression to safe behaviors in the fire service. Based on Abraham Maslow's "Hierarchy of Needs" theory. (Figure adapted from Alder and Fratus, 83)

Can fire departments change their organizational safety culture? Pressemier and England argue fire service organizations are examples of "capable and well-intentioned people who are culture bound and unable to solve the problem of safety performance due to a limited

²⁸ Mike Alder and Mat Fratus, "The Impact of Department Culture on Fireground Safety," *Fire Engineering* Vol. 160 No. 6 (June 1, 2007).

²⁹ De Lisi, 119.

understanding of organizational culture.”³⁰ Byrne argues “when the fire service understands and believes that there’s more than one way to save lives and that common values bring us all together, we’ll be that much closer to establishing an organizational culture that supports the entire arsenal of public safety strategies. When we realize that there are sometimes cheaper, faster, and more effective combinations of strategies to provide for public safety, we’ll be responding to the changes the taxpaying public and our elected leaders are demanding. And when the fire service begins to pride itself on the fact that it’s collectively improved public safety, we will have improved our organizational culture.”³¹ Byrne says, “Take down the fire pictures, the melted helmets and the posters with sayings like ‘Real men don’t run from fire. They run into it!’ When your firefighters see these things all over your station, it instantly delivers a message to them that this is all they are expected to do and is what they need to believe in order to be accepted in your organization.”³² Byrne’s argues high-risk behaviors emerge in the organizational culture of the fire service as a result of cultural artifacts. As a result, “It sets up your firefighters for tragedy because they are now more likely to take unnecessary risks and put themselves in danger to ‘earn’ their right to be in your station.”³³ Alternatively, John Salka Jr. asks “Isn’t it exclusionary to view others who contribute to that goal in a negative fashion? Does lifting others up somehow drag one down? Of course not. And that’s the essence of the culture clash affecting the fire service today.”³⁴ Salka argues “We need to be careful not to paint our problems with a broad brush. The fire service culture is something we should be proud of and consciously defend it from being compromised on the basis of an individual or organization’s actions.” In Salka’s opinion, “I think we all need to spend more time on organizational discipline, effective leadership training and creating job-wide ‘esprit de corp’ to create a feeling of loyalty, enthusiasm and devotion to the department...I think the culture of the American fire service today is solid as a rock!”³⁵

³⁰ Pressemier and England, 11-12.

³¹ Crawford, 2.

³² Byrne, 99.

³³ Byrne, 99.

³⁴ Crawford, 2.

³⁵ Salka is a retired FDNY battalion chief, has instructed several FDNY training programs, and conducts training programs at national and local conferences. Salka operates Fire Command Training, a New York-based fire service training and consulting firm. John J. Salka Jr., “Defending the Fire Service Culture,” *Firehouse* (May 2016): 94.

In 2014, Siarnicki and Gist published a continuing education course program supported by an educational grant on “Changing the Culture of Safety in the Fire Service,” in which they argue implementing a consistent and systematic culture of safety depends on the individual. Siarnicki and Gist argue culture isn’t determined by what people say, but it is displayed in what people do: “When we make a significant and lasting change in what we do, we tend to change our attitudes to match our actions.” What is the relationship between attitude and behavior? “Start with something people already do and shape that incrementally into the behavior you need.”³⁶ For example, there was a time when firefighters arrived on scene and didn’t see the need for appropriate safety equipment; it took leaders to show them.³⁷ However, fire departments have experienced barriers to implementing a consistent and systematic culture of safety. “A big part of what holds us back may come from our aversion to criticizing our own actions, or worse yet, standing to criticism from others.”³⁸ Siarnicki and Gist explain “We take it apart, look at how we did things, dig into anything that might have made a difference, and strive to ensure that we don’t repeat whatever it was that got us into trouble. We convene blue ribbon panels; we commission elaborate recreations and simulations; and we publish detailed, ‘no-holds-barred’ reports...But all the while, we know in our hearts and in our guts that there is simply no amount of *ex post facto* exorcism that can undo stuff that’s already happened.”³⁹

Discussing the cultural anthropology of the fire service, in particular the organizational safety culture, is necessary because fire departments are high-reliability organizations. The progression toward safe behaviors in high-reliability organizations includes changing the safety culture. Culture is also used to determine how various organizations communicate and interact with each other. After defining the concept of “culture” it can be applied to understand why and how an organization, such as a fire department, changes.

³⁶ Siarnicki and Gist reference “Theory of Planned Behavior” by Icek Azjen, a model for the relationship between attitudes and behavior, including a series of factors that influence the path from attitude change to behavior change. Siarnicki and Gist reference B.F. Skinner, a behavioral scientist whose work on the most basic elements of behavior changed the way they think about learning and reinforcement. Skinner explored what it takes to move incrementally, through planned series of small changes, to create lasting patterns of complex behavior change.

³⁷ Byrne, 96.

³⁸ Siarnicki and Gist, 6.

³⁹ Siarnicki and Gist, 6.

The City of Worcester and Its Fire Department

A fire service culture is defined by its history, and consequently the tradition, of the fire department. As Worcester developed from a village to a small town in the eighteenth and nineteenth century, the number of fires resulting in complete loss of property and life increased in the commercial and residential community. In response, prominent members of the town formed the Worcester Fire Society, in which members purchased their own fire buckets, poles, and ladders. The Worcester Fire Society received its first hand fire engine in 1793. By 1828 Worcester had four engine companies and on February 25, 1835 the Worcester Fire Department was officially established. During the 1860s the Worcester Fire Department acquired steam engines pulled by horses and then complete motorization of its equipment in 1910. By 1935 the Worcester Fire Department consisted of ten engine companies, ten ladder companies, and ten hose wagons. Today, the Worcester Fire Department consists of ten stations, thirteen engines, and ladders serving a population of more than 182,000 over thirty-nine square miles.⁴⁰ The first member of the Worcester Fire Department to die in the performance of his duty died from his injuries on November 20, 1872. Since then there have been forty line of duty deaths in the Worcester Fire Department. The Worcester Cold Storage and Warehouse Company fire on December 3, 1999 was the worst structure fire in terms of loss of life to firefighters in the City of Worcester. In recent years, many of the firefighters who attended the memorial procession and funeral for the Worcester Six also attended the service for Firefighter Jon Davies who died in 2011. The Worcester Fire Department has been a career department since February 2, 1920. In December of 1999, the Worcester Fire Department provided fire protection and first responder level EMS to 172,000 residents in a 37.6 square mile area. The Worcester Fire Department was staffed by four-hundred and sixty-nine uniformed personnel at the time of the incident, who worked forty-two hours per week on a rotating schedule. In 1998, the Worcester Fire Department responded to 20,381 emergency calls of which over forty percent were first responder medicals and the department fought 459 structure fires in 1999.

⁴⁰ History of the WFD. City of Worcester, *WorcesterMA.gov*, accessed April 2018, <http://www.worcesterma.gov/fire/about-us/history>.



Image 26. Dating back to the 1700's, Worcester has had a rich history of the battle with fire. The Worcester Fire Department Museum will tell the story of what early citizens had to do to combat the threat; see Appendix for more information. (Worcester Fire Department Museum)

The culture of the fire service is also defined, in part, by the community in which it provides its services. During the nineteenth century the City of Worcester's economy depended on manufacturing. Factories produced textiles, shoes, and clothing. The manufacturing industry expanded with the opening of transportation services, such as the Blackstone Canal and Worcester and Boston Railroad in 1835. The industries attracted immigrants, who moved into three-floor apartments. These three-floor apartments, or "triple deckers," were the most common urban residence in the early 1900s. After World War II, Worcester's manufacturing industry declined as cheaper alternatives were available across the country. The City of Worcester developed urban areas as a result of a manufacturing dependent economy, and the decline of those industries during the mid-twentieth century affected the urban centers. As people moved

away from urban centers, the population decreased despite renewal projects and triple-decker apartments and commercial buildings were vacated and, eventually, abandoned. In the late twentieth century Worcester's economy recovered as the city expanded to biotechnology and healthcare fields. These vacant and abandoned buildings are artifacts of failed ownership.

In response to the Worcester Cold Storage and Warehouse Company fire, the City of Worcester—the tax paying public and elected leaders—and the Worcester Fire Department each implemented public safety strategies based on key issues related to the fire incident. The Worcester Fire Department and the City of Worcester shared common values and understood there was more than one way to establish an organizational culture that supported the public safety strategies. These cheaper, faster, and more effective combinations of strategies to provide public safety were implemented by both the City of Worcester and the Worcester Fire Department.

Engineering a Safety Culture

As a result of the Worcester Cold Storage and Warehouse Company fire, the Worcester Fire Department set an example for fire departments throughout the country with regard to implementing changes to the fire department based on the lessons learned from the fire incident. The Worcester Fire Department's progression to safe behaviors included an identification and understanding of the risks involved and safety systems adequate and appropriate to address the risks. The Worcester Fire Department changed its organizational culture, in addition to implementing a safety culture. The Federal Emergency Management Agency report recommended the fire service should initiate life safety activities early on at a fire scene. These safety activities included ensuring there was a separate Incident Safety Officer, establish a Rapid Intervention Team (RIT), and ensure appropriate equipment and training are accessible by the fire department.

Retired Worcester Fire Department District Chief Michael McNamee was incident commander during the fire incident and decided to evacuate the Worcester Cold Storage and Warehouse Company building as visibility and smoke threatened search and rescue operations.

McNamee recalled “They were mad, they were yelling at me. ‘What do you mean we’re not going up? What are you talking about? You can’t do that.’” In response, McNamee braced himself in the entrance and said “Look, we’ve already lost six, we’re not going to lose any more.” McNamee recalls, “It was like someone gave them a gut punch, the whole bunch. Their shoulders slumped, their heads went down.” McNamee said, “I love this job and I just tried to make the right decisions. It was a very, very clear decision, one that I have never second-guessed. One that I’m very glad I made because the number would have been higher than six. I don’t have a doubt about it.”⁴¹

Firefighter Frank P. Raffa, president of the Worcester Fire Fighters Local 1009, said “This is our battlefield. Until we bring them home, there’s going to be some level of frustration.” Lieutenant Donald J. Courtney, vice president of the Local 1009, said “I’ve cried enough at [the] scene. Firefighters do have to mourn. But it’s the hardest thing to mourn in public.”⁴² The deaths of the men constitute a testament to the willingness of firefighter to give up their lives for others. They go into buildings no matter who needs help.

McNamee used the risk-benefit analysis to evaluate whether or not to send more firefighters into the building. Since the fire incident the Worcester Fire Department made changes to improve firefighter safety through a combination of training and purchase of new technology. The Worcester Fire Department held a series of six seminars which dealt directly with firefighter safety and rescues inside the burning building.⁴³ What purpose does the fire service safety culture service in the Worcester Fire Department now? District Fire Chief Walter C. Giard said, “We are always asking ourselves what can we do training-wise, practice-wise, that might prevent this from happening again.”⁴⁴ But the fire service cannot operate fires like they used to.

The Worcester Fire Department made a significant change in their organizational culture by implementing fire safety strategies and, as a result, the fire department’s attitude toward safety changed. The fire department changed its command structure. They used to have a Deputy Chief

⁴¹ Ed Ballam, “A Minute Decided Worcester’s Fate,” *Firehouse* (December 2, 2009).

⁴² Mark Melady and Emilie Astell, “The building from hell,” *Telegram & Gazette* (December 7, 1999).

⁴³ Milton J. Valencia, “Worcester offers fire training; Exercises provide lifelike experience,” *Telegram & Gazette* (October 8, 2005).

⁴⁴ Shaun Sutner, “Safety is new priority,” *Telegram & Gazette* (December 01, 2009).

in each group. “It was like four fire departments because there was the Chief of the department and he let each Deputy run each particular group,” said Worcester Fire Department Lieutenant Joe Gaffney. “Group one Deputy would do things one way, group two and on, and it wasn’t good. It worked, we did it for years.” One singular Deputy Chief of Operations was created and a Safety and Special Operations Division was added. “We were national leaders. Rapid Intervention Crew or Rapid Intervention Team...on each reported structure fire we will send a ladder company and their only function is to standby in case one of us gets in trouble...If one of us has a problem, if there’s a ‘mayday’ they’re going to try to get us out. That was a huge thing.”

⁴⁵ The Worcester Fire Department hosted the Worcester Fire Safety and Survival Seminars for six years after the fire incident before they became difficult to sustain because firefighters retired. The seminars included nationally known speakers, lectures and hands-on training. The seminars were attended by firefighters from thirty-nine states and a few Canadian provinces. Gaffney recalls, “It was an awful event, but a lot of positive changes came from it.”⁴⁶

After the Worcester Cold Storage and Warehouse Company fire the City of Worcester recognized that the Worcester Fire Department did not have the necessary resources to reasonably deliver services to the community, including critical equipment, fire prevention programs and training. District Fire Chief Frank D. DeLiddo III said, "Once 9-11 happened, that was then the money for equipment upgrades to remedy all our shortcomings started to come in." The Worcester Fire Department benefited from homeland security funding because in the highest tier of financial recipients Worcester was among the one-hundred twenty biggest cities, receiving \$500,000 in a homeland security grant.⁴⁷ McGovern said, “Clearly, we need to make sure that firefighters who put their lives on the line have the very best equipment. This is a way to help communities pay for it.”⁴⁸

The Leary Firefighters Foundation was founded in 2000 by actor and comedian Denis Leary to finance the building of the Leary Firefighters Foundation and EMC Corporation Burn

⁴⁵ Joe Gaffney (Worcester Fire Department Lieutenant) in discussion with the author, March 29, 2018 at the Worcester Fire Department Training Center.

⁴⁶ Gaffney.

⁴⁷ Sutner, “Safety is new...”

⁴⁸ Melady, et. al.

Tower and Training Center, which is used to train firefighters through Central Massachusetts.⁴⁹ Leary said, “Jerry [Lucey] was very vocal about the lack of training facilities and the lack of equipment...The training center, and some of the other stuff, is a positive thing that came out of all this...When 9-11 happened, as least in the Northeast, people were very aware of what firefighters do and the sacrifices they make...Personally, though, there’s always a missing link for me. We’re missing a brother, a father, an uncle, a cousin. We don’t get to see Jerry. That resonates for the families every day...If there was some technology that could take us all back and make it never happen, I’d do that. I’d take Jerry back in a heartbeat over any of the good that’s come from this.”⁵⁰

Using the Burn Tower, Incident Commanders simulate various emergency situations that firefighters can encounter, using real heat and smoke conditions, including responding to hazardous materials and building collapses. In addition to funding half the cost of the new training facility, the Leary Firefighters Foundation provided the Worcester Fire Department with a Self-Contained Breathing Apparatus Response Unit and rescue boat.⁵¹ “SCBA is the most important equipment we own,” said Gaffney. “It keeps us safe and alive...we weren’t doing a very good job with maintaining them. They worked and everything, but now we have that’s sole

⁴⁹ The Leary Firefighter Foundation, “Foundation History,” *The Leary Firefighter Foundation*, accessed April 2018, <https://www.learyfirefighters.org/about/foundation-history/>.

⁵⁰ Leary presented a \$400,000 check on behalf of The Leary Firefighters Foundation; the money was raised by the Second Annual Celebrity Hat Trick presented by EMC Corp. The proceeds were used to build a new training facility and burn tower at the Grove Street headquarters for sixty fire departments in Worcester County. Leary was appointed an honorary fire chief by City Manager Thomas R. Hoover and presented with a white chief’s hat and firefighter’s coat by Deputy Fire Chief Clifton J. DeCourcy. These funds have been used to design and build a new burn tower, purchase a SCBA Response Unit (a mobile maintenance unit to service and repair air tanks), and a rescue boat. In October 2007, in partnership with EMC Corporation, we unveiled The Leary Firefighters Foundation and EMC Corporation Training Center. EMC Corporation Vice Chairman Bill Teuber said, “The loss of any firefighter or first responder in the line of duty is a tragedy. The recent passing of firefighters in Massachusetts emphasizes just how important it is that these brave individuals have the resources and protection they need to respond to any emergency situation. This is just one of the reasons EMC is proud to support firefighters in Worcester and throughout Central Massachusetts. These exceptional people keep us safe and deserve our commitment and support. The new training center in Worcester will provide them with vital technology and equipment for life-saving emergency training and response.” The Leary Firefighter Foundation. Nicodemus Aaron, “From ashes, progress,” *Telegram & Gazette* (December 2, 2009).

⁵¹ Leary planned the first Celebrity Hat Trick, “Hockey’s Greatest Skate for America’s Bravest,” a two-day event that featured two teams comprised of former players from the Boston Bruins and Hollywood celebrities. Thousands of New England residents turned out to enjoy the game and honor the memory of the “Worcester 6.” The first Celebrity Hat Trick raised \$350,000, which paid for demolition of the area where the burn tower training facility was constructed.

responsibility to take care of our equipment.”⁵² The Leary Firefighters Foundation directed funds to the Worcester Firefighters Local 1009 Equipment Fund to support the equipment and training needs of firefighters in Central Massachusetts. Frank Raffa, president of Worcester Firefighters Local 1009, said “This puts the Worcester Fire Department on the map. What we can do with this money is make this a better department, and it enables us to better serve the community that we protect. None of this would be possible without The Leary Firefighters Foundation. None of it.”⁵³ The training facility now contains the Emergency Operations center as a command center for statewide emergencies.⁵⁴ Leary said, “It is an honor for the Foundation to be able to give the firefighters of Worcester this state-of-the-art training center that will not only help them fight fires and perform rescue operations but will allow them to perform their duties with increased safety for their own lives. When we are able to have a positive impact on the lives of firefighters, give them the tools that they need to serve and protect, and help to ensure that they return home to their families each night, we know that we have accomplished our mission.”⁵⁵ Most basic firefighter skills are hands-on skills and need practice to keep up the level of proficiency.⁵⁶ Recruits receive four hundred eighty hours of training at the department’s fire academy, coordinated by the Training Division which is headed by a District Chief.⁵⁷

⁵² Gaffney.

⁵³ Richard Duckett, “Leary presents \$400,000,” *Telegram & Gazette* (January 22, 2010).

⁵⁴ Programs & Grants: Worcester, The Leary Firefighter Foundation, <https://www.learyfirefighters.org/programs-and-grants/worcester/>.

⁵⁵ “Training Facility Phase II.” *The Leary Firefighter Foundation* (September 23, 2013).

⁵⁶ Browne, 26. There are National Fire Protection Association (NFPA) standards for professional qualifications for many positions within the fire service. There is a wide range of what passes for training throughout the country, and the level of training required locally will depend on whether or not the department is progressive, if it is required by state or local law to provide training, or simply what training is available.

⁵⁷ John R. Anderson, “Abandoned Cold Storage Warehouse Multi-Firefighter Fatality Fire: Worcester, Massachusetts,” *U.S. Fire Administration/Technical Report Series USFA-TR-134/December 1999*: 3.



Image 27. Worcester Fire Department firefighters conducting exercise in the new “burn building,” or Leary Firefighter Foundation and EMC Corporation Burn Tower. (Jim Collins, *Telegram & Gazette*, December 1, 2009)

Fire departments are like standing armies; You can’t plan for fires, but you have got to have the people in place for when they do occur. Giard said, “The emphasis for federal funding has gone to education and law enforcement in recent years. We don’t hear about putting 100,000 firefighters on the street.”⁵⁸ In 2010, the Worcester Fire Department received a \$2.2 million federal grant from the Staffing for Adequate Fire Emergency Response, or SAFER, to hire thirty-nine new recruits in an effort to decrease the current average age of forty-six and increase the staffing level to the desired 406 employees.⁵⁹ The class was the largest since the 1970s. The maximum pension allowance for Worcester Fire Department firefighters is eighty percent of pay

⁵⁸ Mark Melady, “Fire officials want floor plan access,” *Telegram & Gazette* (December 21, 1999).

⁵⁹ Scott Croteau, “Firefighting legacy lives on in new class of recruits,” *Telegram & Gazette* (October 26, 2010).

and is acquired at fifty-five years old or thirty-two years on the job. Accordingly, the Worcester Fire Department retained older firefighters. U.S. Representative James P. McGovern said, "It is an aging department, and we need some new blood that can not only respond to the challenges of present day but who will be us with us to deal with the challenges down the road."⁶⁰ Gaffney said, "We have a lot of young guys, and we've got some really quality candidates. A lot of military people, veterans. But over the last ten years the department is definitely getting younger. But the bad thing about that is—when I came on I was learning from guys who came up in the seventies when there were way more fire. Now we don't have as many fires and it's like any other skill...If you're a firefighter and you don't go to a fire, you lose your skills. That's why training is so important." In recent years, the Worcester Fire Department has implemented training days dedicated to reviewing the basics. For examples, on Thursdays the fire department holds "Back to Basics" which is weekly training that reinforced the skills recruits learn in drill school. Firefighters use to maintain these skills on the line because they did it everyday. However you can't simulate a structure fire and you can not replace experience.

Worcester Fire Department Fire Chief Gerard A. Dio said, "It's good to see some third-generation members. There are numerous generations of families whose children aspire to be firefighters."⁶¹ City Manager Michael V. O'Brien said, "It is a proud tradition, from grandfather to father, from father to son. There are those in our community that serve and have so through generations...They know firefighting; they know our community and I think that kind of continuity and that kind of connection makes Worcester what it is."⁶² Worcester Fire Department Deputy Fire Chief Geoffrey Gardell said, "People ask, 'Why would kids come on the job after their fathers got killed doing the job?' But their fathers died heroes. It's a very noble job. They follow in their father's footsteps...I don't know why. I think it's in their blood."⁶³

⁶⁰ Croteau, "Firefighting legacy..."

⁶¹ Croteau, "Firefighting legacy..."

⁶² Croteau, "Firefighting legacy..."

⁶³ Samantha Allen, "Firefighting has changed; heartache remains in Worcester," *Telegram & Gazette* (December 2, 2014).

Evolving City Policies Regarding Vacant and Abandoned Structures

Vacant and abandoned buildings remain a serious threat to the fire service and a danger to the communities in which they stand and they are an indication of a neighborhood in decline. What is the difference between a vacant and an abandoned building? A vacant building has a known owner and taxes are current, but the it is “unoccupied.” An abandoned building has no viable owner, taxes are not paid, and it is not legally occupied. If the building is identified early in the process of becoming unoccupied, an owner may be identified and held responsible for the maintenance of the property. When a property is abandoned, it typically becomes the responsibility of the community to maintain and secure the building. The real estate market, the financial cost for renovations and repairs, fire insurance, and a declining economy contribute the abandonment. Abandoned buildings affect the community, crime, and public safety. Firefighters are more likely to be injured fighting fires in vacant properties than any other property type. From 1990 to 1999, twenty-three firefighters died while operating at fires in vacant or abandoned buildings.

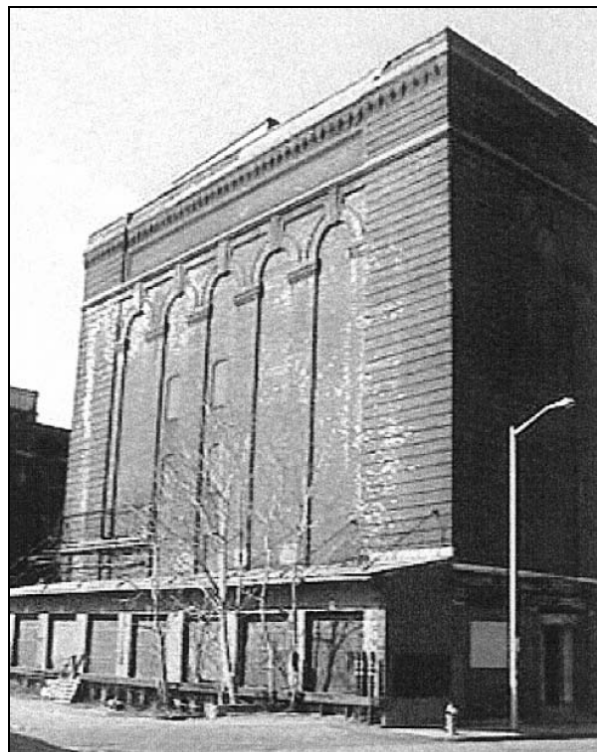


Image 28. Worcester Cold Storage and Warehouse Company building in 1998. (Federal Emergency Management Agency)

When the Worcester Cold Storage and Warehouse Company was constructed in 1906, there was no standard building code in Worcester.⁶⁴ The building was located at the heart of Worcester's former warehousing and cold storage district. In the first half of the twenty-first century, cold storage warehouses were vital to the preservation and delivery of food before refrigerators became commonplace in kitchens. The location was ideal with rail service provided by the former Boston and Albany Railroad. There were six storage levels and basement and only one means of egress from all floors above the first. There were no records of major renovations that would have mandated a life safety upgrade throughout the warehouse and an additional structure was constructed in 1912. Worcester Cold Storage occupied the structure from 1906 until 1983 when it was sold to Chicago Dressed Beef. After 1989, the structure was illegally entered on many occasions, resulting in vandalism, occupancy by homeless individuals, and a number of small campfires. Significant amounts of garbage and human waste was scattered around the structure. There was no functioning suppression system working at the time of the fire and no detection system in place.⁶⁵ "It was a death trap," recalled the witness Yvon Brisson, a Worcester resident who worked fifteen years for Chicago Beef when it was housed in the warehouse. "For years the timbers [had] been rotting. Whenever I drove by on 290, I would think about a fire there. It was waiting to happen." Brisson continued, "If you didn't know where you

⁶⁴ Leonard D. Albano, a Worcester Polytechnic Institute Civil and Environmental Engineering Associate Professor, advised the students during their research. Adding fireproofing, sprinklers and fire and smoke detectors would increase to two to three hours the time it would take a fire to spread between most of the building's walls. The spread of the fire was in part due to a flammable polyurethane coating on the walls that used to hold in cold air when the building was a cold-storage warehouse. The brick facade was built on a frame of heavy timber. The students' inspection of part of the physical plant were limited by their fear that they would run into squatters or animals living in the unlit building. The structure required mechanical and electrical system updates. Wire conduits would have to be put in and proper voltages assigned to handle different appliances throughout the building. Old, failing water and sewer lines would have needed replacing, and a heating, ventilation and air-conditioning system installed in the unventilated, windowless building. In the proposed renovation the building would have been retrofitted to meet the sixth edition of the Massachusetts Building Code, estimated cost of \$7.8 million. The Worcester Redevelopment Authority awarded a \$89,000 grant to the Maguire Group in Foxboro to study the feasibility of bioscience park in the area. Shaun Sutner, "Warehouse's deficiencies cited WPI report noted need to modernize building," *Telegram & Gazette* (December 16 1999).

⁶⁵ John R. Anderson, "Abandoned Cold Storage Warehouse Multi-Firefighter Fatality Fire: Worcester, Massachusetts," *U.S. Fire Administration/Technical Report Series USFA-TR-134/December 1999*: 4-6.

were going, you could get lost in the daytime. Imagine what it was like in there with the heat and the smoke.”⁶⁶

The Federal Emergency Management Agency report recommended fire and public safety strategies related to vacant and abandoned buildings. If questionable structural integrity, unknown hazardous material, unusual dangers to firefighters, or other extreme risks exist, the buildings should not be entered. To assist arriving crews, a placard system should be instituted which clearly defines the risks at an abandoned building. The Federal Emergency Management Agency report stated firefighters must make a concerted effort to know the buildings in their response districts. Even temporarily vacated properties can be at risk if utilities like water for a sprinkler system or electricity for an alarm system are disconnected. Therefore, fire prevention efforts needed to be maximized in abandoned and temporarily vacated building to avoid fires and fire departments should continue to grow their file information on buildings in their communities.

What becomes of these abandoned and vacant residential and commercial buildings? First, the community has to have an accurate listing of the vacant or abandoned buildings in the community. Critical information related to the number of vacant or abandoned buildings may not be available and the “paper chase” to identify owners is time consuming and may prove difficult. The process is also ongoing and constantly changing. The International Association of Arson Investigators argues the properties that are critical to address are those that are vacant or abandoned and open to, or potentially open to, unauthorized access because they represent the most significant threat to public safety. However, most communities do not know exactly what the problem is in their jurisdiction. In the long term the community must decide if the structure can be redeveloped or renovated or if it should be demolished. Demolition is often the most viable option, but also the most expensive. Dealing with vacant and abandoned buildings is an expensive proposition. With proper codes and ordinances, communities should be able to intervene in the process earlier.

Worcester is an example of towns and cities that exist throughout the United States: “Like all cities of its size, Worcester has many vacant buildings that pose a threat. Many are

⁶⁶ Emilie Astell and Mark Melady, “One body found in warehouse ruins,” *Telegram & Gazette* (December 6, 1999).

abandoned, making the situation worse. But it is not just a “big-city” problem. Even in the smaller cities near the northern edge of Worcester County you find neglected buildings.” According to local residents and commuters, vacant and abandoned buildings is a prevailing problem in the City of Worcester, as well as Massachusetts, which threaten the lives of both the homeless who find shelter in them and firefighters, who are called to extinguish the fires in them. State Representative John J Binienda said, “Take a ride from Holy Cross College to Webster Square and look at some of those buildings that have been abandoned for fire or six years. It’s sickening.”⁶⁷ But vacant and abandoned buildings are a community problem.

The Worcester Cold Storage and Warehouse was one of nearly two hundred vacant buildings on a list compiled by the Worcester Fire Department that included many dilapidated and fire-damaged structures considered dangerous. Prior to the fire incident the Fire Prevention Unit compiled a list of thirty commercial buildings and one-hundred sixty-two dwellings in June 1999 in anticipation of the Fourth of July, which typically brought many deliberately set fires. The list included vacant apartment buildings, triple-deckers, and houses on ninety-six different streets in Worcester. Community activists and elected city officials who represent those areas said abandoned and gutted buildings encouraged arson, furthered an atmosphere of neglect and decay, and lowered property values. Some property owners renovate vacant buildings or sell them to other investors, such as the Centers for Disease Control and Prevention, who redeveloped the buildings into residential or commercial properties (see Image 29 and 30). Alternatively, State Representative John J. Binienda argued some property owners take the insurance money from a fire and abandon their half-secured, half-burned building which the homeless are going into.⁶⁸ Vacant residential or commercial buildings which have not been occupied or maintained are abandoned by their owners because they have been vandalized or neglected to the extent by which they cannot be redeveloped and must be demolished. Binienda states opposition for redeveloping abandoned or vacant buildings comes from owners who speak of good intentions but have failed to follow through, from preservationists who are rightfully concerned some architectural treasures may be lost through demolition, and from people worried

⁶⁷ Shaun Sutner, “Deadly warehouse was already on watch list,” *Telegram & Gazette* (December 23, 1999).

⁶⁸ Sutner, “Deadly warehouse...”.

about how the demolitions will affect people. The City of Worcester has invested in the redevelopment of historical buildings, such as Union Station which is located across from the former Worcester Cold Storage and Warehouse Company and reopened in 2000 after twenty-five years of neglect and a thirty-two million dollar renovation. Passenger service to Union Station ended by 1974 and the abandoned station fell into despair, but it was acquired by the Worcester Redevelopment Authority and completely renovated.



Image 29 and 30. Paris Cinema in August 2010 (right) and July 2017 (left). (*MassLive*)

“Neglect should not be allowed to continue if it endangers the lives of others. If there is no owner who can be reached, the buildings should be considered abandoned, and there should be a simple process for cities and town to take the buildings over and sell them or tear them down.”⁶⁹ Binienda, was also the lead sponsor of the proposed bill to require property owners to file floor plans of vacant buildings with local police and fire departments. “They went into that building not knowing where the exits were or how to get down from the top floor. If they had known more about the building, it may have saved some lives.”⁷⁰ The floor plan would be only one of several building characteristics that could be critical to arriving firefighters. Others include information on the presence of hazardous materials, construction materials used, whether sprinkler systems and smoke and fire detection units are functioning, and the location of utility

⁶⁹ George Barnes, “Vacant buildings should not be tolerated anymore,” *Telegram & Gazette* (December 13, 1999).

⁷⁰ Mark Melady, “Fire officials want floor plan access,” *Telegram & Gazette* (December 21, 1999).

cutoffs and hose connections.⁷¹ Retired Worcester Fire Department Deputy Chief Walter C. Giard said “The department already has compiled a great deal of structural and other information on city buildings, but the department is unable to quickly transmit specifics such as floor plans to commanders at fires...Chances are there’s a paper copy of a building plan in a drawer in a station in one part of the city that’s needed by the incident commander in another part of the city. That’s the problem.”⁷² Retired Worcester Fire Department Fire Chief Dennis L. Budd said, “When a building is abandoned, we make sure that each company knows about it. Most of the time you can’t get in, because it is boarded up and secured...As you’re pulling up, sure you’re going to be a little more careful because it’s on the list, but you’re still going to go in there. You’re still going to locate the seat of the fire. It’s just a guide to be a little more cautious.”⁷³



Image 31. (Photo by Paul Kapteyn, *Telegram & Gazette*, November 30, 2009)

⁷¹ Melady, “Fire officials...”

⁷² Melady, “Fire officials...”

⁷³ Worcester Fire Department Fire Captain William P. Meterville headed the Fire Prevention Unit that prepared the list and was released by City Manager Thomas R. Hoover to the *Telegram & Gazette* under the Freedom of Information Act. Sutner, “Deadly warehouse...”

How has the City of Worcester managed vacant and abandoned commercial and residential buildings in recent years? The real estate market crash in 2008 led to lower home values and foreclosures. The number of vacant or abandoned buildings in the city increased. Retired Worcester Fire Department Deputy Fire Chief Timothy J. Gray said, “There are buildings that have just been deteriorating. The redevelopment plans are on hold because of the economy.” A Property Review Team of city workers conducted “neighborhood sweeps” looking for code violations. Gray said, “We’re more in tune with the problem. We’re out there in the backyards looking at things in more detail.” Over the years, the Worcester Fire Department has marked buildings with red-and-white “X” or “/” signs, which denote unsafe buildings with potential hazards to firefighters. The “X” designation means the incident commander should consider fighting the fire from the outside rather than sending firefighters inside or on the roof. The “/” designation warns firefighters to use extreme caution.⁷⁴ In addition to marking vacant and abandoned structures, the International Association of Arson Investigators recommend developing interdepartmental cooperation, increased public awareness, and enforcing codes aggressively to prevent deterioration. Without the involvement of community departments and individuals, such as the City Manager and Fire Department, it is difficult to deal with the problem. To deal with the problem the community has to have the authority to act and require property owners to be responsible. The Abandoned Housing Initiative uses the State Sanitary Code to identify abandoned properties in residential areas, which create safety hazards, attract crime, and lower property values. Property owners are encouraged to voluntarily repair and secure their properties. If property owners refuse, a receiver is appointed by a court to bring the property up to code.⁷⁵ Over the years, buildings on the Worcester Fire Department’s list of unsafe structures have been torn down or renovated. City Councilor Janice L. Nadeau said, “We need an ordinance in place that forces them to board up those buildings. The city needs to understand that an abandoned three-decker is...a tragic issue.”

Vacant and abandoned buildings are inherently more dangerous than occupied structures. Deterioration is due to exposure to elements and vandalism, which can contribute to the potential

⁷⁴ Thomas Caywood, “Firetraps across city rated ‘X’ for danger,” *Telegram & Gazette* (November 9, 2009).

⁷⁵ “Abandoned Housing Initiative,” *Commonwealth of Massachusetts*, accessed April 2018, <https://www.mass.gov/service-details/abandoned-housing-initiative>.

for unexpected collapse, rapid fire development, and open shafts and pits. These hazards are of particular interest to the firefighters who must respond to fires in them. Fire departments and other community personnel are trained in dealing with vacant and abandoned buildings. The Worcester Fire Department is also learning to adapt to new fires. Gaffney recalls, “What I was a young guy on the job, one of the things that was a lot easier back then was the fires were different. There were more of them, but...we call it ‘your grandmother’s living room.’”⁷⁶ Grandmother’s living room consisted of wool, wood, and natural products that burned differently. Today, everything is made from petroleum products.⁷⁷ Where as you use to see grey and brown at a structure fire, now you see black smoke, which burns hotter. Firefighters can not operate like they used to because the fires have changed.

On December 8, 2011 the Worcester Fire Department responded to a triple-decker fire at 49 Arlington Street. While searching for a missing occupant of the abandoned building, the roof, attic and third floor collapsed onto the lower floors, trapping two firefighters under debris. Firefighter Jon Davies was pulled out of the rubble by his colleagues but did not survive.⁷⁸ The similarities between the 49 Arlington Street fire and Worcester Cold Storage and Warehouse Company fire are difficult to ignore. Fire Marshal Stephen D. Coan said, “(As someone) who stood at this particular site 12 years ago, that was a very sad, sad day in the history of the fire service in Massachusetts, and here we return again for a sad occurrence in Worcester.”⁷⁹ Coan said he was “well-assured, in my mind, that the Worcester Fire Department did everything right. They lead by example, and their example led to a safer, and a better, method for firefighters working in these unsafe buildings.”⁸⁰ The building was well known to city code inspectors and police has been there multiple times. There were no fire code violations, which would have required immediate abatement. Despite code violations, the structure was deemed habitable and the people living in the house were tenants, not squatters. Lieutenant Governor Timothy P.

⁷⁶ Gaffney.

⁷⁷ The Worcester Cold Storage and Warehouse Company building walls were covered with insulating cork, tar, and polystyrene foam.

⁷⁸ Davies was a seventeen-year veteran of the Worcester Fire Department and left behind three sons, two of who were in the military and one serving as a member of the Worcester Fire Department.

⁷⁹ Scott J. Croteau, Linda Bock, Aaron Nicodemus and Steven H. Foskett Jr., “Fire marshal: ‘Intensive’ probe into killer blaze,” *Telegram & Gazette* (December 8, 2011).

⁸⁰ Croteau, et. al.

Murray said, “We just need to be thankful that we have men and women like that, who in a moment’s notice go in without hesitation.”⁸¹

Changing Ideas About Chronic Homelessness

The Federal Emergency Management Agency report recommended the fire department implement fire safety strategies with regard to vacant and abandoned buildings, but these safety strategies are not limited to the fire service. City officials estimate there are nearly two-hundred dangerous, vacant structures in Worcester, and shelter providers estimate that on any given night dozens of people are without a place to sleep. Vacant and abandoned residential and commercial buildings are “are temporary refuges, holding pens for people whose lives have bottomed out. There is no joy in these buildings, no rest for troubled souls. The conditions in the buildings disgust even the most caring person.”⁸² Executive Director of Friendly House Gordon P. Hargrove said “This is a group that is mobile, noncompliant, often but not always with substance abuse and mental illness problems, who fall between (cracks in) the programs. They might be in a rooming house one week, sleeping in a car the next and out on the street the next. There are the people we have to find ways to help. We can’t let another Cold Storage fire happen.”⁸³ “Asking them to stay away from the buildings is fruitless. They need shelter and it is available. The buildings need to be secured by the owners.”⁸⁴ Is Worcester sufficiently equipped to handle its homeless population?

Norma Wilmore, a service coordinator and client advocate at the Public Inebriate Program, said, “We don’t turn away anybody who shows up. We don’t let anyone sleep outside in the cold.”⁸⁵ Raqib Graham, a nightside coordinator at the Central Massachusetts Shelter for Homeless Veterans on Grove Street, said “People who stay here have to be functioning and

⁸¹ Croteau, et. al.

⁸² Barnes, “Vacant buildings...”

⁸³ Telegram & Gazette Staff, “Shelters fill as cold sets in Workers scramble to find space, beds for homeless,” *Telegram & Gazette* (December 29, 1999).

⁸⁴ Barnes, “Vacant buildings...”

⁸⁵ The Public Inebriate Program shelter has eighty-four beds and another twenty mattresses available. When all beds are occupied the shelter provides blankets and space on the lobby floor. Telegram & Gazette Staff.

stable. That doesn't mean they didn't have problems with alcohol or drugs, but they have to be able to do things for themselves."⁸⁶ The majority of the chronic homeless are dealing with either or both substance abuse, including drug addiction and alcoholism, and mental illness conditions. Augustus said, "if I quickly take you from the shelter and put you into an apartment, you're probably not staying there that long because of the fundamental issues that created your homelessness in the first place – your bizarre behavior, your drug dealing or drug use – you'll probably be thrown out of the apartment and back into this cycle of homelessness."⁸⁷

Veterans Inc. is one of many shelters that are private or targeted to certain groups. For many homeless in Worcester, there is only one option for temporary housing, the South Middlesex Opportunity Council Triage Center on Queen Street. The shelter is the only "wet" shelter in the area, meaning it takes anyone, regardless of demographics or active substance abuse problems. It only has twenty-five beds. The Greater Worcester Housing Connection Triage Center has seen an increase in groups that were previously statistically negligible, including young adults and women.⁸⁸ In the winter, more than one-hundred people need shelter. Rivera said, "This isn't just a one organization issue. We cannot have this one organization be the be-all end-all for this population, and we have to think creatively about this."⁸⁹

The Quality of Life Task Force estimates fifty to sixty "chronic homeless" in Worcester. The interdepartmental program makes trips to homeless encampments. "Some individuals, they don't know where to go. So we're there to guide them. [But] some don't want services," said Crisis Intervention Team Officer Angel Rivera of the Worcester Police Department.⁹⁰ The task force also polices illegal dumping and inspects vacant buildings. The City Manager Edward M. Augustus Jr. explains how chronic homelessness has a "human toll." He said, "There's a face behind every one of those people. They're human beings. But they can also create challenges for

⁸⁶ Telegram & Gazette Staff.

⁸⁷ Tom Quinn, "Homeless in Worcester: Does the city need more shelters?" *Worcester Magazine* (February 4, 2016).

⁸⁸ "Our historical average is about 80 percent men and 20 percent women. There has been an increasing amount of women as a proportion of our entire population over the last two or three years. The 30-plus years of data we had [from the Public Inebriate Program shelter] said it would be around 17 percent. Right now it's between 30 and 40 percent," said Greater Worcester Housing Connection Director Jayde Campbell. Quinn, "Homeless in Worcester..."

⁸⁹ Tom Quinn, "For homeless, a 'place of last resort' in Worcester," *Worcester Magazine*, February 4, 2016.

⁹⁰ Quinn, "For homeless..."

us ... they go to the bathroom outside, they're leaving debris, sometimes needles, that create issues for our community. So we want to help the person and mitigate the consequences of when people are doing this stuff and living on the street.”⁹¹ District 4 City Councilor Sarai Rivera, an advocate for increased shelter capacity, said, “They're doing the rapid rehousing, but we're seeing these encampments, we're seeing this overflow – as a nation, we're struggling with homelessness ... you have to look at whether it's working.”⁹² The South Middlesex Opportunity Council's main position is that increased access to permanent housing is more important than more shelter beds. 97.5 percent of Triage Center clients are rehoused within ninety days, half leave within a week, and the building hosted about 1,450 clients in 2015 despite a listed capacity of only twenty-five. Rather than expanding the Triage Center, the Greater Worcester Housing Connection argues accessibility to low income housing is more effective.⁹³



Image 32. Rows of cots, chairs and tables in the basement of St. John's. (Elizabeth Brooks, *Worcester Magazine*)

⁹¹ Quinn.

⁹² Quinn.

⁹³ Quinn.

Main Street residents were dead-set against putting it by the site of the old Public Inebriate Program shelter on Main Street, and West Side residents were equally leery of a shelter in their neighborhood. The city has enough a problem with Not In My Backyard syndrome when placing a parking lot without also dealing with real or perceived problems caused by dozens of homeless residents wandering around a neighborhood, but eventually South Middlesex Opportunity Council settled on a location on Queen Street.

How has the City of Worcester assisted the chronic homeless population differently in recent years? The Department of Health and Human Services was reinstated in 2015 and the City Manager is currently establishing a task force to take an in-depth look at the community's needs and resources and develop a plan to sustain a long-term system of permanent supportive housing for those in need. The City Manager's Task Force for Sustaining Housing First Solutions will consist of twenty to twenty-five members and include leaders from housing, social services, health care, philanthropic, government, and religious sectors. August stated there is more than sixty chronically homeless adults living on the streets or in a shelter and chronic homelessness increased forty-six percent from 2016 to 2017, while unsheltered homelessness increased by ninety-seven percent. The City of Worcester committed to end chronic homelessness in 2007. In 2011 the U.S. Interagency Council on Homelessness recognized Worcester as the first city of its size to effectively end chronic adult homelessness. Augustus takes such praise in stride: "We know what we need to do because we have done it before. The difference this time is the emphasis on sustainability and projecting the resources required over time to continue our success."⁹⁴ The fire incident prompted the City of Worcester to reevaluate the issue of chronic homelessness with regard to the two homeless occupants inside the vacant building. The City of Worcester has demonstrated the issue cannot be solved in a day.

⁹⁴ August said, "There is a great new energy to reinstate a plan to reverse the trend of adult chronic homelessness. I look forward to your support in reinvigorating our efforts to sustain a level of 'functional zero' among our adult chronic homeless population in Worcester and continue to serve all homeless constituencies across our community." The planning and assessment period will be from March to June and include a series of five to six full-group meetings, two public forums and the formation of three subcommittees to facilitate specific information regarding data, housing and support services for the homeless. Nick Kotsopoulos, "New push sought for housing the homeless in Worcester," *Telegram & Gazette* (February 12, 2018).

Developing Fire Protection Engineering Expertise at Worcester Polytechnic Institute⁹⁵

Rescue 1 and Engine 3 had difficulty communicating their positions which complicated and delayed rescue attempts. Despite all the firefighters wearing PASS alarms on their SCBAs, no surviving firefighter recalls hearing them at the time. The use of Thermal Imaging Cameras should be further developed. Thermal Imaging Cameras are a useful rescue tool for the fire service, but it's high cost prevented the purchase by many departments. The camera used at the fire incident failed to operate properly, attributed to a thermal overload. At high heat levels, the cameras will often "white out" because in its view is hot enough to affect the imager. If a victim was down in elevated heat, he would absorb the thermal energy of his environment.

Fire protection engineering developed as a profession in the late twentieth century to identify risks and design safeguards that aid in preventing, detecting, controlling and mitigating the effects of fires, but the profession is decades behind other disciplines. The development of cities, especially during industrialization, caused fire safety to become more critical. In 1800 most people in the United States resided in small communities, but by 1950 two-thirds lived in cities: "No other environmental danger jeopardized the entirety of the city-building process-encompassing human life, property, and the dreams of city boosters-in such a sweeping or intense fashion."⁹⁶

Fire Administrator Ernest Mitchell Jr. said, "Out of that came the need to look at technologies that would avoid losing firefighters and, if they were in fact somehow lost, to help to quickly locate them and save them. That's our basic mission, is to save lives, both civilian and

⁹⁵ In 1989 Professor and Director of the Center for Fire Safety Studies at Worcester Polytechnic Institute published "Coming of Age" in the Journal of Fire Protection Engineering, a review of the history and development of FPE from the late 1800s to the late 1980s. The National Fire Protection Association (NFPA) was established in 1896 as a non-profit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. FPE developed as a profession to identify risks and design safeguards that aid in preventing, detecting, controlling, and mitigating effects of fires. The Society of Fire Protection Engineers (SFPE) was established in 1950. The SFPE represents those practicing the field of FPE and contributes to advancing FPE education.

⁹⁶ Mark Tebeau, *Eating Smoke: Fire in Urban America, 1800-1950* (Baltimore, Maryland. John Hopkins University Press, 2003): 4.

firefighters. This is a great step. It's nice to see the technology moving forward and we look toward getting to the completion point in the near future."⁹⁷

The memorial service for the six Worcester firefighters who died in the fire incident inspired Worcester Polytechnic Institute Professor James Duckworth and his colleagues, Professor John Orr, David Cyganski and Kathy Notarianni to see what they could do to improve firefighter safety, which included three projects that improved firefighter safety: the Precision Indoor Personnel Location and Tracking system (see Image 33) has addressed difficult technological barriers to locating firefighters inside a building during a fire; the Flashover Prediction project will help predict the most dangerous situation for a firefighter when everything in a room reaches the same temperature and ignites; and the Immediate Danger to Life and Health (IDLH) Situational Awareness project will help to detect deadly gases such as cyanide, that can be absorbed through the skin and contaminates protective clothing.

Retired Professor John Orr and Professors David Cyganski and James Duckworth set out to develop technology to help incident command locate firefighters precisely, in three dimensions, inside buildings, and guide them to safety or rescue them, if necessary. Prototypes for a precision personnel locator device had been developed and extensively tested, but the plan was to develop a device firefighters could wear. The incident commander managing the fire scene would be equipped with a computer to intercept the radio signals and display each firefighter's location on a screen. If a firefighter needed to be located, the incident commander could radio the victims location to a rapid intervention team. Such a device would also have to be lightweight, tough, and inexpensive enough for the nation's 30,000 fire departments to afford. Since the precision personnel locator would be used in near-zero visibility, the device also had to be highly accurate. The rapid intervention team had to be within three feet to touch the victim and the device had to calculate altitude in order for the firefighters to locate the victim on the correct floor. Police Officers could also use the device to keep accountability of each other while searching a building, and the military to track soldiers in house-to-house combat. Worcester Polytechnic Institute has worked closely with the Worcester Fire Department and the Massachusetts Firefighting Academy, and benefitted from several grants from various federal

⁹⁷ "Ernest Michell Interview: WPI Technology Workshop 2012," *Firehouse* (May 21, 2015).

agencies, including the U.S. Department of Homeland Security and Federal Emergency Management Agency. McNamee said, “When it gets bad, it gets bad quickly...For years, we always trained to get the civilian out. We never thought of us because we always got out.”⁹⁸

The research and development of fire service innovations is costly and, while manufacturers are willing to develop new ideas, they need fire departments to assist in testing applications. As a result, companies and departments are largely inadequately protected. The equipment used to provide exit guidance and locate firefighters —ropes and personal alert safety system (PASS)—was inadequate.⁹⁹ State Fire Marshal Stephen D. Coan said, "We can put a man on the moon, but we can't find a firefighter in a building."¹⁰⁰ In August 2010 with support from the U.S. Department of Homeland Security Science and Technology Directorate and Federal Emergency Management Agency, Worcester Polytechnic Institute hosted the fifth annual technology workshop on “Precision Indoor Personnel Location and Tracking for First Responders.” The workshop provided a forum for researchers and developers working in the area of indoor location and tracking of emergency response personnel to share technical knowledge. The Worcester Fire Department conducted a simulated search and rescue mission with a rapid intervention team in a large building on the Worcester Polytechnic Institute campus using each system. The simulated search and rescue scenario assumed a firefighter had become lost and incapacitated when evacuation was necessary during a primary search at the scene of a fire. All three systems successfully allowed the rapid intervention teams to locate the firefighter and faster than the unaided baseline result.¹⁰¹

⁹⁸ Milton J. Valencia, “Worcester offers fire training; Exercises provide lifelike experience,” *Telegram & Gazette* (October 8, 2005).

⁹⁹ James R. Duckworth, “Tracking lost firefighters: Firefighter search & rescue systems demonstrated at WPI workshop,” *Firehouse Magazine* (October 2010, 94).

¹⁰⁰ Sutner, “Deadly warehouse...”

¹⁰¹ The workshop developed from WPI’s research to develop a location and tracking system. The scenario assumed the last known location of the firefighter was somewhere on the top floor and this was the information provided to the rapid intervention team (RIT). Prior to workshop, WFD used classical search techniques to search the floors and rooms by hand to find the lost firefighter. During the workshop, three fresh crews repeated the exercise, but this time each crew used one of the three location and tracking technology systems and the information they provided, to guide the RIT directly to the location of the firefighter (24 minutes requiring 2 RITs). In previous years, the technology provided erroneous information and sent the RIT to the wrong floor or room. Duckworth.



Image 33. Rapid intervention team members, with masks obscured to simulate smoke conditions, begin simulated search and rescue mission, which assumes that a firefighter is lost and incapacitated. (*Worcester Polytechnic Institute*)

Worcester Polytechnic Institute was honored at the twenty-third annual “Firefighter of the Year” award ceremony with the 2012 State Fire Marshal’s Award, which recognizes significant contributions to the fire service made by those outside of the service.¹⁰² Former Worcester Polytechnic Institute President Dennis Berkey said, “For more than a decade now, a group of WPI faculty has been diligently working to develop technologies to protect our first responders. They have worked closely with the Worcester Fire Department, with federal researchers and with industry to move this important work forward. This award recognizes their hard work and it echoes the pride that the entire WPI community feels for this exceptional team.”¹⁰³

¹⁰² Worcester Fire Department Firefighter John Davies received the 2012 “Firefighter of the Year” Award for responding to a 3-decker fire at 49 Arlington Street. While searching for a missing occupant of the building, the roof, attic and third floor collapsed onto the lower floors, trapping two firefighters under debris. Davies was pulled out the rubble by his colleagues but did not survive. “23rd Annual Firefighter of the Year Heroic Awards,” Commonwealth of Massachusetts (December 18, 2012).

¹⁰³ Martin Luttrell, “Locator technology improving,” *Telegram and Gazette* (August 4, 2010).



Image 34. (Left) 2012 State Fire Marshal's Award awarded to (left to right) Professor John Orr, Kathy Notarianni, James Duckworth and David Cyganski for their fire safety projects at the 23rd Annual Firefighter of the Year Heroic Awards. (Right) Worcester Fire Department Deputy Chief John Sullivan in 2013 alongside exhibit at the Smithsonian Institution displaying a prototype of the WPI Precision Personnel Locator.¹⁰⁴ (Photos by Worcester Polytechnic Institute)

Worcester Fire Department Deputy Fire Chief John F. Sullivan said “If we tried this same thing a few years ago, none of you would have made it.” “Every year we make it more challenging...When we’re searching for someone...if you can get us there a few minutes faster, that’s what we’re looking for.”¹⁰⁵ But a precision indoor personnel location and tracking device is not available for firefighters on the market today, why? David Cyganski said "We've seen more progress than in the previous three or four years that preceded it. It's all beginning to add up now. We all get together and share this information with one another, and we have the companies and universities that were brave enough to step up and actually show everybody how it's working...Everyone’s work is adding up to an actual solution.”¹⁰⁶

Other research efforts have produced technology for alerting firefighters to flashover and the presence of toxic gases in or near the fire ground. Worcester Polytechnic Institute Fire Protection Engineering Professor Kathy Notarianni developed a sensor that would give a firefighter advance warning of flashover conditions, in which combustible materials in a room simultaneously erupt in flames, and are working on a new device that will warn firefighters of

¹⁰⁴ Worcester Polytechnic Institute, “Pioneering WPI Technology for Locating Firefighters Inside Buildings Featured in New Exhibit at the Smithsonian Institution,” Worcester Polytechnic Institute (April 10, 2013), <https://www.wpi.edu/news/pioneering-wpi-technology-locating-firefighters-inside-buildings-featured-new-exhibit>. Smithsonian, “WPI Precision Personnel Locator (PPL),” Smithsonian, accessed April 2018, <http://timeandnavigation.si.edu/multimedia-asset/wpi-precision-personnel-locator-ppl>.

¹⁰⁵ Luttrell.

¹⁰⁶ Duckworth.

the presence of toxic gases. Notarianni said, "What's exciting about this work and what keeps us focused and hard-driven is that we know with absolute certainty that our research and technology development will have the impact of saving firefighter lives and improving long-term health of firefighters."¹⁰⁷

Ranellone worked with the Massachusetts State Firefighting Academy in Stow where they built a compartment and burned combustibles to simulate a flashover with the sensor. Eventually, they were able to predict flashover with thirty to sixty seconds of warning. While they demonstrated the use of the technology, "the firefighters said that's great technology, that's a great tool, but we'll never use it as a deployable sensor."¹⁰⁸ The deployable sensor developed into a wearable sensor, the Burn Saver Unit or the Burn Saver Helmet, based on the feedback. Ranellone said, "If you have the best idea in the world [and] if you don't make it so that a firefighter can use it and it doesn't operate in a firefighter's life, then it's a useless technology."¹⁰⁹ Ranellone explains sometimes you need to educate the fire service because they do not see the value in what you are doing, but you still need to have a conversation and make sure their opinions are heard and the way they are going to use the technology is taken into account. The students and faculty in the Fire Protection Engineering department also worked on a carbon monoxide and hydrogen cyanide gas sensor. There are drawbacks and benefits to using a self-contained breathing apparatus (SCBA) because firefighters can only work as long as the oxygen bottle allows you:

Let's say you're a firefighter that wants to keep working, when you get inside the building you'll take off your air pack since you're not using that air. You're trying to conserve it, because you want to be in there, you want to be working. That's what you trained to do. You don't want to be the guy who leaves first because he's out of air so you try to go as deep as you can without going on air because you don't want to have to leave or you know that the victim you are trying to get to or the fire that you're trying to get to

¹⁰⁷ Martin Luttrell, "Worcester Polytechnic Institute Honored for Developing Technology that Increases Firefighter Safety," *CISION PRWeb* (December 18, 2012). Fire Engineering Staff, "New Grant Allows WPI to Advance Work Aimed at Safeguarding Firefighters," *Fire Engineering* (September 26, 2014).

¹⁰⁸ Raymond Ranellone (Worcester Polytechnic Institute Fire Protection Engineering Laboratory Director) in discussion with the author, March 19, 2018 at Worcester Polytechnic Institute Gateway Park II.

¹⁰⁹ Ranellone.

is really deep seeded or it's really far in so you try to go through as much smoke as you can before you put on your air because you know once you put on you've started the timer.¹¹⁰

Ranellone explains how firefighters were very accustomed to completely smoked out environments and breathing in "scrud." "They have continued to do that into today," said Ranellone "where you have new firefighters coming on seeing the older firefighters who say, 'No. You don't need that stuff, take it off.' Whereas what we are trying to tell firefighters is 'No. You should always be wearing it.'"¹¹¹ They partnered with the Worcester Fire Department and had fourteen devices for firefighters to wear twenty-four seven for three months, while they were sitting in the stations collecting information and as soon as they got into their turnout gear they were wearing the sensor and it was logging information. They found firefighters were exposing themselves to elevated levels of carbon monoxide in situation that they did not feel they needed to be wearing SCBA. They found most firefighters put their SCBA on when they saw heavy smoke conditions, but even in light smoke conditions or conditions where there were no smoke at all, there were still elevated levels of carbon monoxide that the firefighters were not aware of. Ranellone said the device was like a teaching tool for the firefighters; smoke is not the only indicator that there are toxins in the air and you should always use SCBA when inside a compartment when there's fire inside a building. Ranellone said sometimes they get resistance from firefighters on these new tools and technologies and need to convince the firefighters they are conducting the research for their health and safety. "We had a number of firefighters who said we'll do anything you tell us because you're just looking out for our health," said Ranellone. "Once we can convince them were they can see the value in what we are trying to do, it's not just an academic pursuit for us, it really is a way we are trying to improve their lives."¹¹² "If you tell a firefighter you need to go to rehab because you need the rest, they'll say 'No, no, no, I'm fine.' But if you can show them on paper, 'Okay. If you skip rehab, this happens' or 'Look at all these injuries or deaths that occurred because the person wasn't fit to go back to work,' that's how I think you can shock people into doing it."¹¹³

¹¹⁰ Ranellone.

¹¹¹ Ranellone.

¹¹² Ranellone.

¹¹³ Ranellone.



Image 35. Equipment under development at WPI. (Photo by *Telegram & Gazette*)

The research conducted by the Worcester Polytechnic Institute Fire Protection Engineering department has affected fire departments throughout the United States. March 26, 2014 in a four-story brick row house at 298 Beacon Street in the Black Bay of Boston, two Boston Fire Department personnel, Lt. Edwards J. Walsh and Firefighter Michael Kennedy, died fighting a nine-alarm fire.¹¹⁴ As a result of Boston's Beacon St. fire, Worcester Polytechnic Institute was contacted by The Last Call Foundation, started by Kathy Crosby-Bell the mother of fallen Boston Firefighter Michael Kennedy, to begin research on a fire hose that will not burn

¹¹⁴ The fire was suspected to have been started by welders working on a nearby iron railing. Firefighters rescued residents from the upper floors while Walsh and Kennedy ran a hose down to the basement, where the fire was to have originated. A broken basement window caused the fire to spread upward from the basement fanned by winds. It took about half an hour to recover Kennedy, who was transported to Massachusetts General Hospitals and pronounced dead. It took until the evening to recover Walsh, who was pronounced dead at the scene. The fire injured eighteen others, including thirteen firefighters. National Institute for Occupational Safety and Health, "Lieutenant and Fire Fighter Die and 13 Fire Fighters injured in a Wind-driven Fire in a Brownstone—Massachusetts," *Death in the line of duty: A summary of a NIOSH fire fighter fatality investigation* (March 2, 2016). Board of Inquiry, "298 Beacon Street Boston, Massachusetts Box 9-1579 Incident # 14-16454 March 26, 2014," *Board of Inquiry Report*.

through.¹¹⁵ The co-principal investigators for the project were Worcester Polytechnic Institute's Fire Protection Engineering department, Associate Professor Kathy Notarianni and researcher Raymond Ranellone. "The Last Call Foundation is committed to helping ensure that Boston's firefighters have access to the most innovative and effective tools to keep themselves and the community safe," said Crosby-Bell, mother of Firefighter Kennedy and president of the foundation. "WPI engineers and scientists work tirelessly to advance the field of fire safety, and we look forward to supporting them in their work."



Image 36. Officials and family members at Last Call Foundation ceremony. Kathy Crosby-Bell, mother of Michael Kennedy, and then Worcester Polytechnic Institute Dean of Engineering David Cyganski. (Photo by *Fire Engineering*, September 26, 2014)¹¹⁶

¹¹⁵ The Last Call Foundation announced that Worcester Polytechnic Institute will receive its initial grant to fund the development of a fireproof attack hose. The Last Call Foundation is committed to supporting the scientific and academic communities working the field of fire safety research. The Last Call Foundation will provide \$75,000 to Worcester Polytechnic Institute. Boston Herald Staff. "WPI Works on Fire Hose Safety with Last Call Foundation of Boston," *Boston Herald* (November 28, 2014).

¹¹⁶ Fire Engineering Staff, "New Grant Allows WPI to Advance Work Aimed at Safeguarding Firefighters," *Fire Engineering*, (September 26, 2014).

The Fire Protection Engineering department is looking at all aspect of the fire hose problem, including redefining the testing standards for how hoses are manufactured, but it's not a simple problem according to Ranellone. What are the multi-uses of fire hoses? How does a firefighter use a hose? How much hose is a firefighter able to handle or manipulate? What are the cost restraints? What are the abrasion requirements? Ranellone has worked with the National Fire Protection Association to set codes and standards, in particular fire hoses: what minimum requirements and what minimum performance does a fire hose have to have? Currently, there is not method to discern the difference between two hoses. Students and faculty made phone calls throughout the country, asking firefighters "What do you need your hose to do? What is the life of a hose?" Ranellone said, "we got a phone call from a firefighter who said 'it's not an equipment problem, it's a tactics problem. You can give everyone the best hose in the world and if they use it wrong it doesn't make a difference. We have to train people better.' We then had firefighters call and say 'You're absolutely right. We need better hoses.' So, it's hard to say there's a universal attitude toward fire hoses."¹¹⁷ Fire hose burn throughs don't always lead to firefighter deaths, but they lead to an impact on operations which could lead to an injury, which could lead to a delay in suppressing a fire, which could lead to a civilian death or injury. Ranellone recalls there was a burn through at the Worcester Fire Department the week they started the fire hose project. Previously there was no method to record a burn through occurs. As a result, a database was created to collect that information. Ranellone said, "I think that there are plenty of times were we [the fire service] just brush things off—that's firefighters—because firefighters are always taught to adapt and overcome. If there's an issue in front of you, figure out how to get around it and move on. You don't necessarily tell other people that you're having the issue, and you might think that it's just your department that's experiencing it."¹¹⁸ Ranellone said, "I think the fire service is—in today's connected day and age—coming more and more to terms with cost and evolution." As a result, fire departments are asking "What should be be doing differently or what hoses should we be purchasing or not purchasing?"

¹¹⁷ Ranellone.

¹¹⁸ Ranellone.



Image 37. Worcester Fire Department Lieutenant John Beahn of Engine 3 supervises the hose station. (Photo by Steven King, *Worcester Magazine*, April 9, 2015)

In developing a solution to the fire attack hose and other challenges faced by the fire service, Worcester Polytechnic Institute has worked closely with the Worcester Fire Department and Massachusetts Firefighting Academy, and benefitted from funding from federal agencies, such as the U.S Department of Homeland Security and the Federal Emergency Management Agency. In 2015 Notarianni and forty students in the fire protection engineering program visited the Worcester Fire Department Grove Street Station where they learned how to put on equipment, suit up with the breathing apparatus, climb ladders and discharge large water lines. Raymond Ranellone said, “We’ve decided to come to our backyard. Today, (students) learned, ‘Who is Worcester? What is Worcester Fire and what are the duties and responsibilities of the fire department?’...A lot of these students have never seen a firefighter in action and don’t know what they do.” Deputy Fire Chief Geoffrey Gardell said, “It’s great to get the students over to get a hands-on feel for what they’re doing with their development and studies. It was a joint effort to get them over and to get a little hands-on action.”¹¹⁹ The multi-hour program held by Worcester

¹¹⁹ Samantha Allen, “Three-alarm research,” *Telegram & Gazette* (April 10, 2015).

Fire Department volunteers is an example of the Worcester Fire Department reciprocating with Worcester Polytechnic Institute, Ranellone said, “We always bring them in to tell us how to do things, then they brought us to them to show us how they do it.” Ranellone said, “I think that the Worcester Fire Department, for as long as we’ve been working with them, has been fantastic about engaging with us in research, helping us understand where our research goes in the world of firefighting, and overall just being very supportive of all the work we do. We could not accomplish what we’ve accomplished without the Worcester Fire Department.”¹²⁰

¹²⁰ Ranellone.

Communities Affected by the Fire: Then and Now

In 1999, officials from the City of Worcester and the state of Massachusetts expressed their views within the immediate aftermath of the fire. Mayor Raymond V. Mariano said ““Worcester may be the second-largest city in New England, but it’s still a small town in more ways than one. This is like a death in the family. This has touched so many people in this city because they knew the firefighters, their wives, their children, or their brothers and sisters. Everyone was crying today.” In 2008, the Franklin Street Station opened at 266 Franklin Street, location of the former Worcester Cold Storage and Warehouse Company. City Manager Thomas R. Hoover recalled the fire incident that led to opening of the new station: “It seemed as if the city had almost shut down. Not many people could put their mind on their day-to-day work. The fact that so many citizens came to the site each day and night showed how much of an impact this tragedy had on our community. A lot of people, including myself, simply felt the need to be there. It was as if people needed some kind of closure to this tragedy.”¹²¹ The new building serves as a living legacy to the six firefighters. Former Governor Paul Cellucci said, “A generation later the City of Worcester has seen six men who reached across the years and demonstrated that same uncommon courage and selflessness. The same qualities that defined the ‘Greatest Generation’ define the greatness in the six men we recognize today.”¹²² The fire incident is an example of the tradition that defines the Worcester Fire Department today. The tradition of the Worcester Fire Department was not affected by imposing a safety culture on the fire service. The City of Worcester, in particular the Worcester Fire Department, learned from the fire incident. “It’s a very moving tribute to six brave men who put their lives on the line; not for me, not for the governor, but for homeless people. It’s a reminder to all of us what they stood for, that every life is as important as everyone else’s is. It’s a tremendous loss.” said Attorney General Thomas F. Reilly.¹²³ The City of Worcester collaborated with the Worcester Fire Department to implement public safety strategies related to vacant and abandoned buildings and

¹²¹ Nick Kotsopoulos, “New fire station on Franklin Street is a fitting tribute,” *Telegram & Gazette* (November 16, 2008).

¹²² Brian McNiff, “State, local officials grieve as ‘one family,’” *Telegram & Gazette* (December 10, 1999).

¹²³ McNiff.

shelters for the chronic homeless. The students and faculty at Worcester Polytechnic Institute have benefited from their relationship with the Worcester Fire Department. Former Worcester Fire Department Chief Sullivan said, “We’re light years ahead of where we were in our abilities to fight fires...We’ve come from the 18th century to the 21st century in a very, very short period of time.”¹²⁴ The fire service is continuously adapting to new research and technology developed by fire protection engineers, however fire incidents continue to occur as long as the fire problem exists. Worcester Fire Department District Fire Chief Walter Giard explained the Worcester Cold Storage and Warehouse Company fire was about how they approached the tragedy and made changes in the fire service.¹²⁵

From the viewpoint of nearly two decades later, the memory of the historic fire continues to bring heartache to the City of Worcester, but evidence of positive change and healing as well. The fire incident incited the implementation of new policies and procedures in the Worcester Fire Department. It led to the formation of Worcester Polytechnic Institute’s Center for First Responder Technology. And several organizations formed to help in the aftermath of the devastating fire incident, which still bring in funding. The Leary Firefighters foundation has donated hundred of thousands of dollars to those in the fire service. Ann T. Lisi, President and CEO of the Greater Worcester Community Foundation, said the Dec. 3 Scholarship Fund, which goes to Worcester high school seniors whose families are in the public service, was set up with a \$1.3 million endowment and continues today. The James “Jay” Lyons Memorial Road Race fund, set up by friends in 2001, is also managed by the foundation. The Worcester Firefighters 6K honors the seven line-of-duty-deaths since 1999. The Lieutenant Tommy Spencer House, located at 62 Elm Street, was built as a Home Again initiative to address chronic homelessness in Worcester by providing in-house or immediate access to counseling, health care and education programs such as job training and developing life skills.¹²⁶

Towns and cities throughout the United States discuss the consequences of the Worcester Cold Storage and Warehouse Company fire. In conducting a historical analysis of the event, we identified how the cultural characteristics of the fire service, local community, and private

¹²⁴ Nicodemus Aaron, “From ashes, progress,” *Telegram & Gazette* (December 2, 2009).

¹²⁵ Valencia.

¹²⁶ Aaron.

institutions affect how they communicate and interact with each other through shared values. The City of Worcester grieved as one family. Through collaboration the Worcester Fire Department and the City of Worcester and Worcester Polytechnic Institute responded to the key issues that contributed to the fire incident. The learning process is ongoing, but the culture of safety has redefined our response to solving these issues.



Image 38. In 2008 Franklin Street Station opened, located at the former Worcester Cold Storage and Warehouse Company. (Photo by Chris Cresta, Worcester Firefighters IAFF Local 1009)

Appendix

Worcester Fire Museum and Education Center

In 2014, then-Fire Chief Gerard Dio proposed the idea for a Worcester Fire Museum. The Worcester Historical Fire Society was created in June 2015 as a non-profit tasked with creating the museum.¹²⁷ An agreement with the Worcester Redevelopment Authority to house the museum in 4000-square-feet of undeveloped space inside Union Station. The city has to conduct repair work at Union Station to address water infiltration issues. The repair work could cost up to \$6.5 million, but the Federal Transit Administration will fund eighty percent of the work.

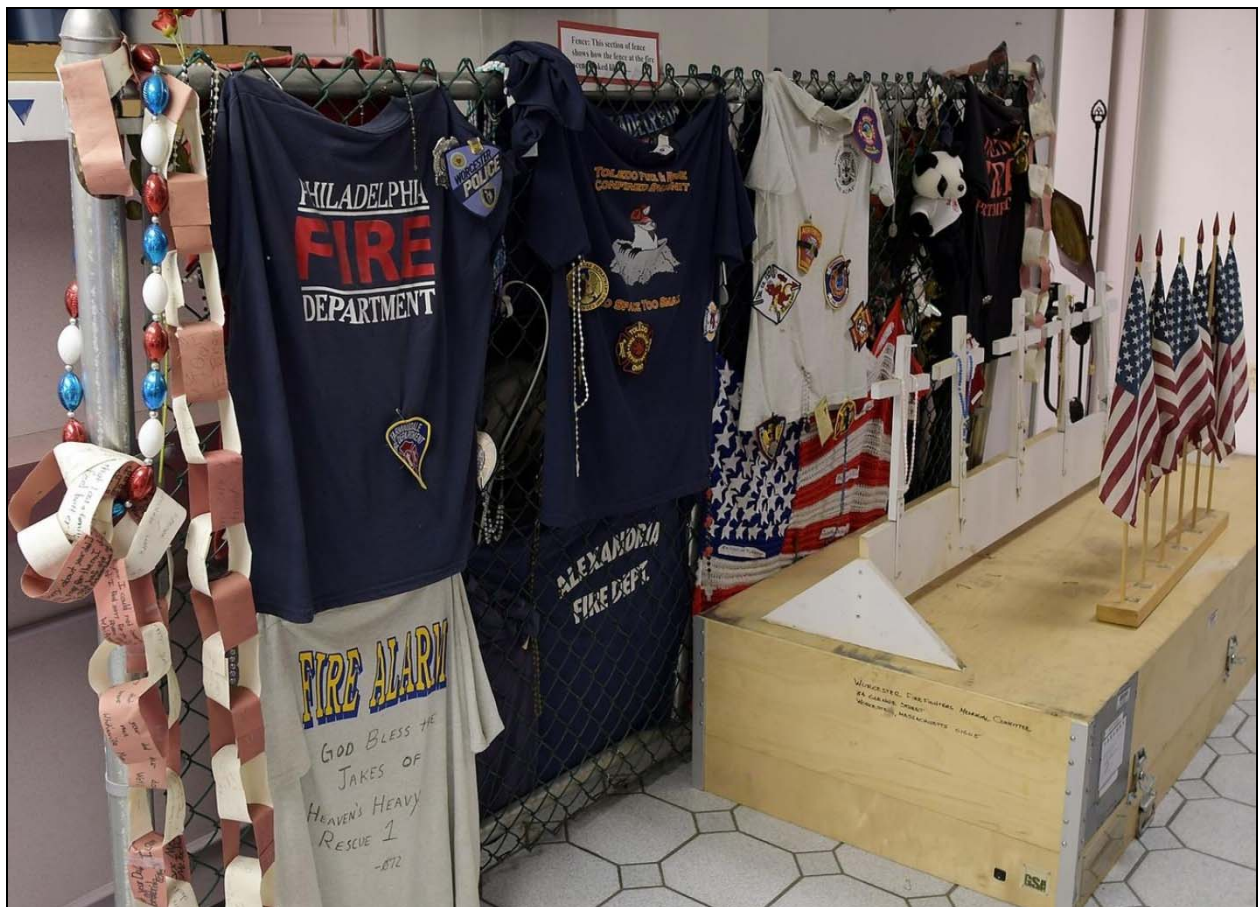


Image 39. A section of fence that once surrounded the fire scene is among the stored mementos of the Worcester Cold Storage and Warehouse fire. The archive, consisting of eighty-two containers of “stuff,” was moved to its current location at Saint-Gobain Corp. (Photo by Rick Cinclair, *Telegram & Gazette*, December 2, 2017)

¹²⁷ Worcester Sun Staff, “Editorial: Plans for fire museum on track, deserve support,” *Worcester Sun* (April 2, 2017).

The Worcester Historical Fire Society was a non-profit created to support the museum. People can receive a membership for \$25 that will give people access to museum meetings, admission, access to museum events and the use of the classroom facility. "It's not only going to be a fire museum, but also an educational center for public safety." Classroom that seats 90 people, include equipment for presentations for area students. The Fire Department's Public Education Department will move into the museum.¹²⁸ The Worcester Fire Department Fire Museum will be a one-story portion of Union Station located on the Grafton Street side that used to be a boiler room. Two members of the Public Education Division of the Fire Department's Fire Prevention Unit would relocate to the space at Union Station from their current location at the Department of Inspection Services on Meade Street. Worcester Fire Department Fire Captain Gary Fleischer said, "We want to educate our youth about fire safety and be able to present our history...This will be a good way to get more traffic into Union Station and we feel tis had the potential of being an award-winning museum. We're not interested in having the city fund this project or have it become a (financial) burden on the city."¹²⁹ The non-profit will be in charge of running the museum and funding day-to-day operations which will be funded through group memberships, revenue from museum shop, and a small admission fee. Public money will be spent on preparing the space for tenancy and provide the necessary infrastructure. City's chief development officer Michael E. Traynor said the public money will be spent no matter what goes into the space. In January 2017 a memorandum of understanding approved by the Worcester Redevelopment Authority to establish a Worcester Museum of Fire History, not a binding agreement but allows for the museum to be created by the Worcester Historical Fire Society. Retired Fire Lt. Donald Courtney is the official keeper of "the stuff." An archive of 82 containers containing notes, stuffed animals, handcrafted items and artworks where moved to the Saint-Gobain Corp. in 2000.¹³⁰ The leased space in Union Station is expected to open in 2018 with the mission to educator visitors about fire prevention. The 4,000 square foot quarters will

¹²⁸ Scott J. Croteau, "With a location now found, the Worcester Fire Museum and Education Center is seeking donations," *MassLive* (March 13, 2017).

¹²⁹ Nick Kotsopoulos, "Politics and the City: Another step closer for Worcester fire-history museum," *Telegram & Gazette* (November 13, 2016).

¹³⁰ George Barnes, "Sorting through memories of '99 Worcester Cold Storage fire," *Telegram & Gazette* (December 3, 2017).

contain 90 seat meeting room to be used for presentations to area school children on field trips and office space for the Worcester Fire Department's Public Education Division.¹³¹

¹³¹ Worcester Sun Staff.

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¹³² To access complete interview transcripts, refer to <https://sites.google.com/view/wpi-mqp-sarahstuart/>.

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