BOARD OF INQUIRY REPORT

298 BEACON STREET
BOSTON, MASSACHUSETTS

BOX 9-1579

INCIDENT # 14-16454

MARCH 26, 2014

Report on: The Line-of-Duty Fatal Fire on March 26, 2014
298 Beacon Street Boston, Massachusetts
District 4, Division 1
Incident # 16454 Box 9-1579

Acting Fire Commissioner John F. Hasson appointed the Board of Inquiry on March 28, 2014 to investigate the circumstances surrounding the deaths of Fire Lieutenant Edward J. Walsh, Jr. of Engine Company 33 Group 2 and Firefighter Michael R. Kennedy of Ladder Company 15 Group 2 which occurred on March 26, 2014.

Board of Inquiry

Deputy Chief Michael Doherty	Division 2 Group 1
Deputy Chief Bart Shea	Division 1 Group 1
Deputy Chief John Walsh *	Personnel Division
District Chief Richard Magee	Fire Investigation Unit (FIU)
District Chief James Lonergan **	District 6 Group 3
District Chief Curtis Holzendorf ***	Special Operations Command HQ
District Chief Paul Miller	District 9 Group 1
Fire Lieutenant Thomas Murray	Major Case Unit - FIU
Fire Lieutenant William Gillis	FIU Group 4
Fire Lieutenant Sean Kelly	Engine Company 18 Group 2
FPE Paul Donga	Fire Prevention Division
FPE Robert Zalosh, Professor Emeritus ****	Worcester Polytechnic Institute

* Deputy Chief Walsh was a District Chief when originally appointed to the Board. He was subsequently promoted to Deputy Chief and resigned from the Board on 3.09.15 due to his promotion to Chief of Operations - Support Services.

** District Chief Lonergan was assigned to the Safety Division Group 3 when he was appointed to the Board.

*** District Chief Holzendorf resigned from the Board on 3.01.15 upon his retirement.

**** The Board wishes to thank Professor Zalosh for volunteering a considerable amount of his time and effort to participate in the development of this report. His experience and expertise was critical in assisting the Board in understanding the more complex sections on fire development and summarizing the WPI test results on fire hose radiant heat exposure. His editorial suggestions in all areas of the report were invaluable. Professor Zalosh agreed to participate as a member of the Board of Inquiry without hesitation and has worked on behalf of the BFD as a technical expert numerous times in the past without any desire for accolades or acknowledgment. His involvement in each instance has/will lead to improvements in firefighter safety. He is a true friend of the fire service community and the BFD. The Board is truly grateful for his contributions to this report and for all his previous efforts on behalf of the Boston Fire Department.

ACKNOWLEDGEMENTS

The Board of Inquiry would like to acknowledge the following members of the Boston Fire Department for their assistance in preparing this report:

Fire Commissioner/Chief of Department Joseph Finn	Headquarters
Acting Fire Commissioner John Hasson	Headquarters
Chief of Operations Gerard Fontana	Headquarters
Deputy Fire Chief Robert Calobrisi	Division 1 Group 3
Fire Captain James Hoar & Staff	Fire Training Academy
Fire Lieutenant John Hardiman	Office of Field Services
Firefighter Stephen MacDonald	Public Information Office
Firefighter Marc Sanders	Engine 7
Firefighter Michael Dannaher	SCBA Technician
Superintendent Peter Clifford	Fire Alarm Division
IT Equipment Technician Jason MacDonald	Fire Alarm Division
FA Operator/Administrative Asst. Christine Dowling	Fire Alarm Division
CAD Project Manager Zachary Shark	Fire Alarm Division
Radio Supervisor Joseph Brooks	Fire Alarm Division
Senior Administrative Assistant Joanne Allain	Office of the Chief of Operations
Principal DP Systems Analyst John Perry	Information Technology
Investigator Richard Fullam	Fire Investigation Unit
Investigator Christopher Sloane	Fire Investigation Unit
Investigator Dennis Hester	Fire Investigation Unit
Logistics Manager Edward McCarthy	Maintenance Division
Procurement & Grants Manager John Foley	BFD Procurement & Grants Office
Maryann McHugo	Fire Prevention Division

The Board of Inquiry would also like to thank the following individuals and outside agencies for their assistance in preparing this report:

Mayor Martin Walsh	City of Boston
Police Commissioner William Evans	Boston Police Department
Sergeant Detective Paul McLaughlin	Boston Police Department
Detective James Sheehan	Boston Police Department
Detective Jeff Cecil	Boston Police Department
Sergeant Steven Cunningham	Massachusetts State Police
District Attorney Daniel Conley	Suffolk County District Attorney
Assistant District Attorney Darcy Kofol	Suffolk County District Attorney
Assistant District Attorney David McGowan	Suffolk County District Attorney
Assistant District Attorney Edward Zabin	Suffolk County District Attorney

Commissioner Thomas Gatzunis	Department of Public Safety
Deputy Commissioner Gary Moccia	Inspectional Services Department
Inspector David Johnson	Inspectional Services Department
Jeff Drake	Drake Exhibits
V.P of Field Operations Donald Bliss	National Fire Protection Association
Regional Director Robert Duval	National Fire Protection Association
Casey Grant	Fire Protection Research Foundation
John Tello	Boston Properties
Marta Crilley	City of Boston Archives
John McColgan	City of Boston Archives
Maureen Murphy	City of Boston, DoIT
Superintendent Paul Dennehy	City of Boston, Graphic Arts
Kenneth J. O'Donnell	Boston Fire Department (Retired)

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I. SCOPE OF REPORT

The Board of Inquiry focused on examining all information and facts that were available during the time period in which the Board was convened. All of the Board's findings and recommendations are based on information gathered, reported and verified during the course of the Board's investigation.

In instances where conflicting or insufficient information or differing perspectives occurred, the Board endeavored to determine the reason for such discrepancies. In instances where facts could not be determined with certainty, speculative conclusions have been omitted from this Report.

During the course of the investigation the Board of Inquiry cooperated and shared information with other agencies, including the Boston Police Department, Suffolk County District Attorney's Office and the National Institute of Occupational Safety and Health (NIOSH), all of whom conducted their own independent investigation into these line-of-duty deaths.

II. EXECUTIVE SUMMARY

Boston Fire Department
Board of Inquiry Report on the Line-of-Duty Deaths on March 26, 2014
298 Beacon Street Boston, Massachusetts
Box 9-1579
District 4 Division 1
Incident # 16454

On Wednesday, March 26, 2014 at 14:42 hours Box 1579 was struck for a building fire at 298 Beacon Street in the Back Bay section of the City of Boston. Engine Company 33 (E33) with an Officer, Chauffeur and two Firefighters responded to the alarm of fire from their quarters located at 941 Boylston Street, arriving on scene at 14:45 hours. Engine 33 was the first company to arrive and reported smoke showing from the first floor of a four story brick building. In their post fire interviews, the Chauffeur and Hydrant Man stated that before entering the building Lieutenant (LT) Walsh spoke to a tenant as she exited from the front door. This tenant was overheard telling LT Walsh that there was smoke in the basement outside her apartment. She stated that another tenant lived in the basement but she did not know if that tenant was home. As LT Walsh spoke with the tenant his Pipe Man, Firefighter (FF) Kennedy, advanced E33's 1 ¾ inch line of hose into the building via the first floor front door. Shortly thereafter he reported over the radio to LT Walsh that "it" was in the basement and that LT Walsh should go to the rear of the front hall and descend the basement stairs to where he was located.

At 14:49:45 E33 declared a MAYDAY in the basement of the building. Seconds before the MAYDAY, Engine Companies entering the first floor to back up E33 were driven from the first floor of the building as wind driven fire and superheated smoke came up the stairway that LT Walsh and FF Kennedy had descended in search of the fire. The Firefighters forced to evacuate the first floor sustained first and second degree burns in the seconds it took to escape to the exterior of the building.

Simultaneous with this spontaneous emergency evacuation, at 14:48:48, LT Walsh excitedly called for his line of hose to be charged. The District 4 Chief (D04) arrived on scene and assumed command approximately one minute after E33's arrival. The Chief observed the dramatic change in the smoke venting from the building and the forced evacuation of the Firefighters from the first floor. At 14:48:51 he struck a second alarm and ordered Fire Alarm (FAO) to announce an emergency evacuation of all members from the first floor of the building.

LT Walsh and FF Kennedy directed rescuers to their location in the basement over the radio several times. Multiple heroic rescue attempts using Rapid Intervention Teams (RIT) were attempted from both the Alpha (A) and Charlie (C) sides of the building, but the superheated smoke and fire conditions prohibited the Firefighters from reaching LT Walsh and FF Kennedy in time to rescue them.

The Board believes as LT Walsh and FF Kennedy searched for the source of the smoke in the rear basement apartment, they were suddenly trapped there by a sudden and dramatic change in conditions in the basement hallway. The apartment provided them temporary refuge from the superheated smoke and fire gases which flowed down the hallway from the rear of the building, up the basement stairway and vented turbulently from the front doors. Ultimately LT Walsh and FF Kennedy sustained fatal injuries when the conditions within the rear apartment deteriorated and became untenable and unsurvivable.

The fire at 298 Beacon Street that led to the deaths of Fire Lieutenant Edward Walsh and Firefighter Michael Kennedy was caused by an unpermitted and improperly performed welding operation that ignited a wood frame shed attached to 298 Beacon Street. The high wind conditions at the rear of the building increased the intensity and contributed to the rapid extension of the fire into the building, accounting for the resulting hot, dense, high velocity smoke venting from the front of the building during the initial stages of the fire. The Board has attempted to understand and interpret all of the information it has gathered during this investigation and describe, to the degree possible, the conditions that led to the deaths of LT Walsh and FF Kennedy.

In preparing the summary of this incident, the Board relied upon its extensive combined firefighting experience and a vast amount of information compiled from a multitude of sources. The sources listed here are described in a generalized fashion since the specific sources, documents, contacts et cetera are too numerous to mention in their entirety. In no particular order of importance or sequence they include: site visits, radio transcripts and recorded interviews; conversations with the FIU inspectors, BPD detectives and representatives from the District Attorney's office; inspection of physical evidence, inspection and functional testing of LT Walsh's and FF Kennedy's Personal Protective Equipment (PPE); review of numerous videos and photos from both Department and non Department sources; heat exposure testing of hose at Worcester Polytechnic Institute and at the Boston Fire Academy; fire modeling and an NFPA presentation on wind driven fires; NFPA standards, Underwriters Laboratory and National Institute of Standards and Technology research; BFD Standard Operating Procedures, memos and training records; web based literature searches; and permit and building history from Boston Inspectional Services Department and the City of Boston Archives.

The cause and origin investigation determined that the fire originated in the attached shed in the rear of 298 Beacon Street when windblown molten slag from an unpermitted and improperly performed welding operation at 296 Beacon Street made its way under the shed's exterior cedar shingle siding. This smoldering slag ignited the siding and sill plate and quickly extended into the shed's interior structure and its contents. The fire subsequently extended into 298 Beacon Street. The abnormally high winds coming from the direction of the Charles River intensified the rapid growth of the fire by increasing the amount of oxygen available to support combustion. The subsequent failure of the glass in the door between the entry foyer and the basement hallway, in conjunction with the opening or failure of the shed's exterior and vestibule doors, is believed to have been the catalyst that caused the sudden and dramatic change in fire conditions behind LT Walsh and FF Kennedy, leading to their entrapment as they searched for the source of the fire within the basement.

From a fire service perspective, ordinary Class III structures like 298 Beacon Street have an inherent fire safety design flaw resulting from an older structural framing technique known as balloon framing. This technique created open interior voids within the horizontal ceiling/floor assemblies and vertical stud bays extending from the basement to the attic. Additional voids were often created during renovations. These void spaces often lack proper fire stopping. When a fire occurs in a balloon frame structure these void spaces become pathways for smoke and fire to rapidly spread throughout the building.

Investigators observed that the fire had destroyed the plaster-on-wood lath ceilings and walls, exposing many formerly hidden vertical and horizontal void spaces. This was most noticeable in the basement exit hallway where there was no visible fire stopping in the joist bays above the original plaster ceiling between the hallway and the adjoining apartment. Also noted above the hallway's suspended gypsum drywall ceiling was a large open vertical shaft from the basement ceiling to the underside of the second floor. The shaft contained a large cylindrical heating duct that was abandoned in place when the heating system was converted to a forced hot water system. Although the preexisting plaster wall/ceiling assembly may have been adequate to contain a fire within the hallway from extending to the adjoining apartment, the lack of horizontal and vertical fire stopping above the ceiling likely allowed fire to travel unimpeded in the combustible joist bays once it extended into this space.

When questioned about a particular vertical penetration visible between the first and second floor, the property manager explained that a 4 inch PVC drain pipe had been located there for a first floor washing machine installation that was never completed. He stated that the open pipe had allowed visibility into the closet of the first floor apartment from the basement hallway. The closet was reported to have been filled with a considerable amount of stored combustible materials. This opening was another likely avenue of vertical extension of fire, smoke and gases to the upper floor.

Investigators also noted that one of the rear basement apartment windows faced directly into the shed's vestibule separated only by the window glass. Since the exit hallway passed through the shed, the shed vestibule would be considered part of the exit passageway. From interviews with the building's occupants it was determined that this glass window was intact prior to the fire. Since the window frame was the same type as the other apartment windows, it is believed the window had not been replaced with one having a fire rated glazing or other fire resistant material.

The Board believes with the assistance of the wind, the fire quickly extended from the shed into the basement ceiling/floor void space and then rapidly extended above the ceiling throughout the entire basement. The lack of horizontal fire stopping above the original ceiling between the hallway and the rear apartment likely contributed to the rapid fire extension above the ceiling in the apartment and subsequently to other areas of the structure via vertical openings and shafts. Due to the early extension of fire above the ceiling, the floor joists failed much sooner than would normally occur causing the heavy plaster on lath ceiling to fail.

Through fire modeling, it is also known that the window between the apartment and shed vestibule failed very early due to the direct exposure to the fire in the shed. Whether the ceiling collapse or the window failure occurred first is unknown and somewhat irrelevant since each scenario allowed fire to extend into the apartment, setting the stage for the apartment to transition to full involvement.

It is difficult to determine whether the lack of fire stopping, the lack of a fire rated window, the window grates, or the combustible materials present in the basement hallway and stairway were code compliant due to the complexity in determining which building code(s) was applicable at the time building alterations occurred. This requires an ability to identify whether provisions of the applicable building code(s) would have allowed the building official discretion to approve existing conditions that did not meet the prescriptive code but may have met the equivalent performance criteria. A thorough code analysis performed by a professional will be required to make that determination. Whether code compliant or not, the Board has identified these deficiencies as factors in the extension of the fire into 298 Beacon Street followed by extension into the rear apartment where LT Walsh and FF Kennedy likely sought refuge from the extreme fire conditions in the hallway.

The Board believes when LT Walsh and FF Kennedy initially reached the foot of the basement stairs they found a smoke condition with no visible fire because the fire had not yet breached the window in the door separating the entry foyer from the basement hallway. The hallway ceiling above them had a double layer created by the suspended gypsum ceiling covered with fiberglass insulation beneath the original plaster on lath ceiling. This double layered ceiling likely insulated the fire fighters from the heat of the fire that had extended above the original ceiling very early in the fire due to the increased wind pressurization.

It is believed that LT Walsh and FF Kennedy then entered the rear basement apartment in search of the source of the fire led by the increasing temperatures they detected. The apartment was likely hotter than the hallway since the fire had already extended above the apartments original single layered plaster ceiling which lacked the additional insulation of the suspended ceiling layer found in the adjacent basement hallway.

The early extension or fire into the ceiling void is further supported by testimony of a first floor tenant who, upon being alarmed to the fire in the building by the basement tenant, was initially puzzled by what she thought was steam coming from her dishwasher when in fact her dishwasher was not operating. This is believed to have been smoke under pressure exiting the joist bays through the penetrations created for the plumbing and wiring for the dishwasher.

There were at least two other pathways for heated smoke and gases to have extended into the rear basement apartment: the window facing into the rear vestibule, which fire modeling indicated would have failed very early in the fire; and the apartment door left unlocked by the escaping tenant, who stated that this door rarely remained closed when left unlocked. This door was further obstructed from fully closing by the line of hose which was stretched into the apartment by LT Walsh and FF Kennedy.

Shortly after they entered the apartment, it is believed a triggering event for the sudden intensification of the fire occurred. This intensification is believed to have been caused by the sudden failure of the window in the entry foyer door. This created a pressurized flow path of superheated fire and gases driven by the high winds entering through the open shed exterior and vestibule doors. This sudden and dramatic deterioration of conditions trapped LT Walsh and FF Kennedy in the apartment as the hallway became untenable.

The stairway acted as a chimney for the superheated fire, smoke and gases which ignited the stairway carpeting and the numerous combustibles located in the basement hallway, stairwell and cabinet at the top of the stairs. The elevated temperatures created from this wind driven event quickly destroyed E33's line of hose as it lay on the stairway. Since the hose was directly in the flow path, the extreme heat passing over the hose was enough to destroy it very quickly. Hose tests conducted at Worcester Polytechnic Institute (WPI) and the Boston Fire Academy both demonstrated that hose failure will occur very quickly at the temperatures believed to have been generated during that initial event. (See XIII. Hose Tests.)

When E33 called for their line of hose to be filled, E33's pump operator opened the gate valve and observed the line of hose fill with water. However, because the hose had been burned through, the water never reached the nozzle. The water flowed freely from the burned breach in the hose located near the top of the stairway.

Based on the interviews with E33's pump operator and several other Officers and Firefighters, the Board concluded that E33's 1 ¾ inch line of hose was immediately charged when LT Walsh requested it. Firefighters who made attempts to rescue the trapped members from the front of the building reported that E33's hose was free flowing water in the first floor hallway at the top of the stairs. One Officer stated that the hose appeared to pulse as it trailed away from the pump discharge toward the building. This pulsing is consistent with what is seen when water flows through a hose without a nozzle.

Engine 7, the second due Engine Company, advanced their 2 ½ inch line of hose to back up E33 by following E33's hose into the building. Engine 7's Officer stated that the smoke and heat conditions initially appeared to be unremarkable. As E07 was about to charge their 2 ½ inch line of hose before heading down the stairs, the interior fire conditions dramatically changed. Fire, along with hot, black, "sooty" smoke mixed with embers and intense heat, suddenly extended over their heads from the basement stairway. The extreme conditions drove them away from the top of the stairway and caused them to scramble to evacuate the first floor.

In the seconds it took to exit the twenty feet back out to the front exterior stairway, all of E07's Firefighters sustained first and second degree burns to their ears and exposed skin. Their uncharged 2 ½ inch line of hose, which had been dragged out behind them, was destroyed in the time it took to evacuate. (See figures XV27, XV28) The outer lining was charred away and the elastomeric bumper on the nozzle was distorted and melted from the heat.

This supports the Board's belief that the conditions were severe enough to have quickly compromised E33's 1 ¾ inch hose. Tests conducted by the Board at the Boston Fire Academy demonstrated that a charged line of hose will fail less than 30 seconds later than an uncharged line of hose.

Despite valiant and heroic attempts to enter and rescue LT Walsh and FF Kennedy from the front of the building, Firefighters were repeatedly forced to back out of the building by the extreme temperatures of the superheated smoke violently exiting through all openings in the front of the building. The smoke then transitioned into free burning, wind driven fire from the basement windows in the front of the building. The extreme heat at that location forced rescue operations to shift to the windward/rear side of the building.

Within seconds of the onset of the wind driven event, LT Walsh reported increasing temperatures in the rear apartment and repeatedly called for his line to be charged. There is a radio transmission in which he is heard saying that they needed to get the smoke out. This statement leads the Board to believe these members were exposed to highly elevated temperatures and increasingly deteriorating conditions in the apartment as the fire continued to grow overhead and in the hallway. The Board believes, based on the description of increasing heat and smoke, and the specific lack of mention of "fire", that LT Walsh and FF Kennedy were never directly exposed to open fire until just prior to their last radio transmission. The Board believes that fire eventually breached into the apartment either through the window facing into the vestibule or when the ceiling collapsed. With the rapidly expanding hot gas and smoke layer accumulating within the apartment, this area quickly became fully involved in fire.

Subsequent to the rear basement apartment becoming fully involved, Engine Companies obtained sufficient water supply in the rear of the building to make an aggressive attack into this apartment. With the wind at the back of the advancing Firefighters the heavy fire was quickly knocked down in the apartment. As they slowly advanced, they simultaneously conducted search operations but were interrupted when the ceiling collapsed on the first floor. This collapse shook the building and caused an evacuation of all members. Shortly after this event a smoke explosion occurred and a large volume of fire erupted from the rear windows of the first floor apartment. The pressure wave created by this event caused Firefighters operating in the vicinity of the front stairway to be blown down the stairs onto the sidewalk.

Additional attempts were made to rescue LT Walsh and FF Kennedy. FF Kennedy was located and removed within a short period of time. The fire conditions then worsened and the Incident Commander determined that no further rescue attempts could be made. Defensive firefighting operations were established and continued for the next three and a half hours. At approximately 1900 hours, LT Walsh was recovered and removed from the building.

The Board of Inquiry investigation supports the Boston Fire Department's Fire Investigation Unit's (FIU) conclusion that the unpermitted and improperly performed welding operation at 296 Beacon Street initiated the fire when windswept slag ignited the shed attached to 298 Beacon Street.

The Board has further concluded that once the shed became involved, the severity of the fire was drastically increased by the high wind conditions that fed its growth and extension into the interior of 298 Beacon Street. The subsequent failure of the shed doors allowed wind driven fire to extend throughout the basement hallway, following the flow path up the interior basement stairway and venting through the front door on Beacon Street. The fire also extended into a number of concealed spaces that allowed rapid extension of fire throughout the building and contributed to the fire phenomena witnessed that day.

Although 298 Beacon Street was never required by code to install an automatic sprinkler system, new apartment buildings are now required to have these systems. Based on the success of automatic sprinkler systems in residential occupancy fires and the extensive testing with these systems to control wood and furniture fires, the Board believes that voluntary installation of an automatic sprinkler system in the basement and shed of 298 Beacon Street would have prevented the tragedy and destruction that occurred on March 26, 2014. The Board also noted that the successful operation of the building smoke detection system notified the residents of the fire and allowed their escape and rescue.

The Board wishes to stress that it considers the unpermitted and improperly performed welding operation to be the primary cause of the fire but the wind driven conditions were the primary contributory factor to the entrapment and subsequent deaths of LT Walsh and FF Kennedy. Additionally, the high wind conditions were responsible for the extreme and rapidly deteriorating fire conditions, the extreme fire phenomena, as well as the difficulty in controlling and extinguishing the fire. The Board encourages the fire service and the Boston Fire Department to continue to research ways to more effectively control and extinguish such wind driven fires.

III. OBJECTIVES

The most important objective in every line-of-duty death investigation is to prevent the same situation from occurring in the future.

The objectives of this Board of Inquiry are as follows:

1. To determine the direct and indirect causal factors which resulted in a line-of-duty death, particularly those factors that could be used to prevent future occurrences of a similar nature, including:

   Identifying inadequacies involving apparatus, equipment, protective clothing, standard operating procedures, supervision, training or performance. *

   Identifying situations that involve an unacceptable risk. *

   Identifying any previously unknown or unanticipated risk. *

2. To ensure that the lessons learned from the investigation are effectively communicated to prevent future occurrences of a similar nature. (When appropriate, this should include dissemination of the information through the fire service organizations and professional publications.)*

* The above excerpts were taken from the International Association of Fire Chiefs “Guide for Investigation of a Line-of-Duty Death.”

IV. GUIDELINES

1. Guide for Investigation of a Line-of-Duty Death - International Association of Fire Chiefs

2. Firefighter Line-of-Duty Death and Injury Investigation Manual - International Association of Firefighters

3. Boston Fire Department Standard Operating Procedures (SOPs):
   - 201 Response to Fire and Other Emergencies
   - 202 Fire Duty and Emergency Operations
   - 205 Engine Company Operations
   - 206 Rapid Intervention Team
   - 207 Personnel Accountability System
   - 208 Personnel Accountability Report (PAR)
   - 212 Search and Rescue
   - 280 Radio Procedures
   - 610 Respiratory Protection Policy
   - 615 Personal Alert Safety Systems
   - 620 Personal Protective Clothing

4. Boston Fire Department Incident Command System

5. NFPA 1500 Standard on Fire Department Occupational Safety and Health Program

6. NFPA 1971 Standard on Protective Ensembles for Structural Firefighting

7. NFPA 1981 Standard on Open Circuit Self Contained Breathing Apparatus (SCBA) for Emergency Services

8. NFPA 1982 Standard on Personal Alert Safety Systems

V. INVESTIGATION METHODOLOGY

The Board of Inquiry divided the investigation into several manageable sections. These sections included:

* Document retrieval and analysis
* Personal Interviews
* Building History
* Fire Operations
* Personal Protective Equipment
* Fire Simulation
* Findings and Recommendations
* Report Preparation
* Legal Analysis

Personal interviews were conducted by two Board members who have been trained in the proper methods of interviewing. The Board was assigned an attorney to advise them on legal and procedural matters. All Board members participated in gathering and analyzing information that was considered relevant to the investigation. The findings and recommendations from the above mentioned sections were jointly considered by the entire Board and integrated into the final report.

During the course of this investigation the Board reviewed the following sources of information:

1. Fire scene site visits
2. Interviews of Boston Fire Department (BFD) members who responded to the scene of the fire.
3. Interviews of civilians who lived or worked in the building.
4. Building plans and permits.
5. Boston Fire Alarm radio tapes and transcriptions.
6. Presentation by NFPA on wind driven fires.
7. Photographs and videos of the fire, the building and the area.
8. BFD National Fire Incident Reporting System (NFIRS).
9. BFD Training records.
10. Computer Aided Dispatch (CAD) times and text of the incident.
11. Weather Underground report for March 26, 2014.
12. BFD Standard Operating Procedures.
13. Hose test reports.
14. Tour reports of responding companies.

Based upon the information obtained from some of the material listed above, the Board created a timeline from the initial dispatch to the incident at 14:42 hours on March 26, 2014 through the removal of LT Walsh from the fire building at approximately 19:00 hours on the same date. All sources of information available to the Board were analyzed to determine whether there were any identifiable factors that through act or omission could have contributed to or prevented the line-of-duty deaths.

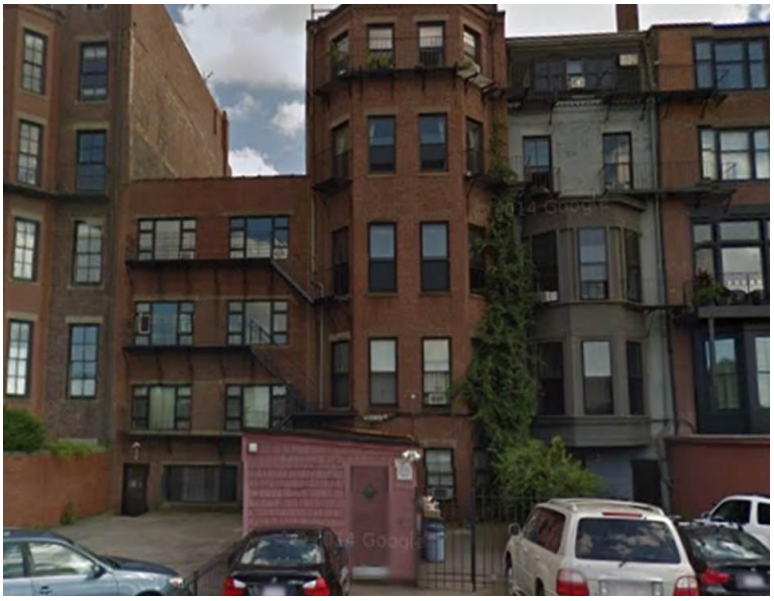
VI. BUILDING HISTORY AND CONSTRUCTION

Front of Building

298 Beacon Street was constructed circa 1871 during the expansion of the Back Bay. Assessing records from the city archives indicate it was completed by 1874 and purchased by 1879. It first appeared as an owner occupied single family home in the assessing record and map in 1880. Although there was no evidence of an attached structure on an 1874 map, an archived map from 1890 did show an attached accessory structure (shed) in the rear of the property. Since that time, Assessing and Building Department records indicate that the attached shed existed continuously until March 26, 2014 when its combustible construction became a factor in the ignition scenario.

The property was originally owned and occupied by an affluent Boston family. Building and assessing records show the property was occupied by members of this family for a number of decades until a change of ownership occurred in 1928. Subsequently, the property went through a number of ownership transfers and occupancy changes, transforming it from a single family home, to a lodging house, and finally an eight-unit apartment house.

The property was designed as an attached four story single family Victorian townhouse. Although the property is commonly referred to as a “brownstone” and shares many of the features of those homes made popular in the later part of the nineteenth century, 298 Beacon Street lacks the brown sandstone façade necessary to truly classify it as one. Nonetheless, the term “brownstone” has become a generic description for any bow front townhouse located in the Back Bay regardless of the façade material. This period design included what was known as a “garden floor” at the basement level characterized by a front entrance underneath the front exterior staircase and a walk out rear exit that often led to a garden at the back of the house. At 298 Beacon Street this arrangement effectively created four identifiable floors when viewed from Beacon Street, and five floors when viewed from Back Street. More recently, the rear walk out exit allowed occupants direct access to the parking lot and Back Street by passing through the attached shed.



Rear of Building

The dimensions of the building are approximately twenty-three feet wide by sixty-five feet deep. The highest point of the roof listed on permits is forty-five feet. The building was considered “Ordinary/Class III” construction, composed of brick masonry exterior walls and wooden structural members. The structural bearing support was derived primarily from the adjoining double width firewalls shared on the right with 296 Beacon Street and on the left with 300 Beacon Street. Additional bearing support was carried by the combustible interior bearing walls that ran perpendicular to the 2 inch x 12 inch floor joists. The front and rear walls were non-load bearing. There was a flat rubber membrane roof over wooden joists and planks accessible by a roof hatch.

The fourth floor, as seen from the front, had a faux mansard style roof and dormers with slate shingles. There was no attic space above the fourth floor, only a cockloft. There were two large skylights; the larger one was located directly over the interior stairs.

Even though each floor was redesigned as the occupancy changed from a single to a multi-family, many of the original architectural details survived these renovations and were still visible. The apartments on the first and second floors still had the original heavy ¾ inch decorative plaster-on-wood-lath ceilings and moldings.

There were eight apartments in the building on the day of the fire. There were two studio apartments in the basement; one located in front and one in the rear. There were individual front to back apartments on the first and second floors. Floors three and four each had two apartments that were situated front and rear. All eight apartments had individually controlled thermostats, electric stoves, and electrical service separately metered in the basement.

On the first floor front to back apartment there were three (3) 36 inch x 82 inch windows in the front as well as three (3) 36 inch x 82 inch windows in the rear looking out to the Charles River. The front basement apartment windows faced Beacon Street. There was one (1) 36 inch x 48 inch window flanked by two (2) 30 inch x 48 inch windows in this apartment. The three windows in the rear basement apartment were 38 inch x 63 inch. Two of these windows faced Back Street while the third window faced into the rear shed.

Similar to the upper floors, the basement apartment's main living areas also had exposed plaster ceilings. Although less decorative, they were also made of ¾ inch plaster-on-wood-lath. Between this ceiling and the subfloor there was a 12 inch void. The basement kitchen, bathroom and common hallway plaster ceilings were covered by suspended gypsum drywall ceilings. The framework for these ceilings was composed of metal studs installed horizontally and suspended by metal wire hangers. The gypsum drywall was attached to the metal studs and was of undetermined thickness. The void space between the suspended ceiling and the original plaster ceiling was insulated with fiberglass insulation.

The front entrance to the first floor had two large wooden doors that opened into a small vestibule before entering through a second set of doors into the entry hallway. A large open staircase supported by the bearing wall abutting 296 Beacon Street was set back about twenty feet from the entrance. This staircase was the primary egress stair for tenants living on the second, third and fourth floors. After passing the door to the first floor apartment on the left, the hall angled slightly left of the staircase. Ten feet beyond the newel post and located under the main staircase was the stairway leading to the basement. This was the egress stair most often used by the tenant in the rear basement apartment; while the tenant in the front basement apartment primarily used the doorway situated under the front stairs to come and go. There was no door at the top of the basement stairway separating the basement apartments from the first floor. It is unknown if this was always the case or whether it had been removed at some point in time.

Life Safety Systems and Features

Fire Alarm System

The existing fire alarm system was installed under a permit in 1994. The system was a local alarm with five zones. It was composed of eight devices connected to an ESL 1500 panel located on the wall inside the front door. There was a smoke detector in each common hallway from the basement to the fourth floor, (5 devices/zones). There was a heat detector in the boiler room. Pull stations were located at the rear basement door and the front door. Individual units were required to have both local smoke detectors as well as carbon monoxide detectors. It was undetermined whether all of these local unit devices were in place or operative.

After the fire, the Boston Fire Department (BFD) requested the annual fire alarm inspection and testing records from Fire Alarm Service Company, Walpole Ma. The records indicated that the required annual inspection and testing was performed in October of 2009, 2010, 2011. No annual inspection or testing was performed in 2012.

In September of 2013 the property manager scheduled a service call due to a trouble signal in the panel, (as opposed to an annual system inspection and testing). The trouble alarm was investigated by the technician who determined that the zone card needed replacement.

The new zone card was installed, the system was reset, and the technician's report indicates the panel was operating in normal status upon his departure. No further calls for service or annual testing were made after September 2013.

Post fire interviews with tenants indicate they were first alerted to a smoke condition by the common area fire alarms going off in the stairwell and hallways. This indicates the system was active and operated as designed allowing tenants to escape and to call 911 in a timely manner.

Egress, Fire Escapes and Balconies

When the property transitioned from a single family to multi-tenant use, the interior configuration changed. These changes ultimately led to the requirement to add additional fire escape balconies and ladders so that each apartment had code compliant egress. Permits were issued in 1946 to add party balconies connecting the rear second floor apartment to 296 Beacon Street and 300 Beacon Street. The two basement studio apartments each had separate exits in addition to the main entrance used by tenants on the upper floors. The front basement apartment had direct egress from the front door located under the front entrance stairs. This apartment had a second means of egress through the back door of the apartment down the connecting hall. This route allowed that tenant to exit up the stairway to the main first floor entrance or to continue along the basement hallway to the rear exit through the shed to Back Street. The rear basement apartment exited directly to the common hallway. This provided access to two means of egress; either up the stairs to the main entrance, or along the hallway to the rear exit through the shed to Back Street. This tenant did not have access to the doorway under the front stairs since that would have required accessing the adjoining tenant's apartment.

The first through fourth floor apartments had direct access to the main exit out to Beacon Street via the front stairway. The second means of egress for the rear apartments was by the fire escape stairs or party balconies located in the rear of the property. The first floor apartments had access to the rear fire escape stairs, which terminated behind 296 Beacon Street. The second floor apartment had a rear party balcony connected to 296 Beacon Street.

The rear apartments on the third and fourth floors had party balconies that connected to 300 Beacon Street. The third floor rear apartment also had an additional stand-alone balcony. This balcony was once attached to 296 Beacon Street but that adjoining level no longer existed. Now it only provided escape from the apartment to the balcony where assistance would be required from the fire department to descend via a ladder. The front apartments on floors three and four had window balconies leading to a fire escape ladder that descended to Beacon Street.

The building file contained two five-year fire escape inspection certificates dated 2006 and 2013. These documents certified that the fire escapes and balconies were maintained and functional at the time of those inspections. On the date of the fire, the tenants from the third floor front apartment deemed the stairwell impassable due to smoke and self-evacuated using the fire escape ladder on the front of the building. The tenant from the third floor rear apartment exited to her fire escape balcony and was rescued by Ladder 26.

The tenant in the front apartment on the fourth floor immediately exited her apartment when the alarm sounded and was able to exit using the front entrance. She encountered smoke upon reaching the second floor, which grew thicker by the time she exited from the first floor.

The condition of the fire escape ladders and balconies did not hinder or prevent the safe escape of the building tenants.

Automatic Fire Sprinklers

- In 1872 when 298 Beacon Street was originally constructed, automatic sprinkler design was in its infancy. There was no requirement for the property to be sprinklered. In Massachusetts there has never been a code requirement for single-family dwellings to install sprinklers.

- The Boston Building Code in effect in 1942 (1929 edition), when the property converted to a lodging house, did not require lodging houses with ten or fewer residents to have sprinkler systems unless there was a basement or cellar workshop, storage room, or kitchen, not associated with an apartment. The property had none of these spaces that would have required a sprinkler system to be installed.

- Massachusetts General Law Chapter 148 Sections 26 & 26 A ½ govern the sprinkler installation requirements for buildings and structures over seventy (70) feet in height. 298 Beacon Street was measured at forty-five (45) feet and fell below the threshold height for retroactive installation of automatic sprinklers under section 26A ½.

- MGL Chapter 148 section 26I requires properties having four or more dwelling units to install automatic sprinkler systems retroactively if there have been substantial renovations to the property since the date this law was enacted.

There is a similar requirement for properties with three or more dwelling units in the Massachusetts State Building Code 780 CMR (8th edition). There is no evidence or permit history that indicates 298 Beacon Street underwent any substantial renovations that would have required the installation of an automatic sprinkler system.

Common Hazards

Heating system

The building's heating system was converted from coal to a gas-fired system in 1930. At some later undocumented date it was converted to an oil-fired central heating system. The heating system was located in a basement boiler room under the interior basement stairway. The fuel oil was stored in an above ground supply tank located in the attached storage shed at the rear of the building. The fuel line extended overhead from the shed to the heating unit via the interior basement hallway. Whether the conduit was exposed or hidden within the ceiling structure is unknown.

The tenants of each apartment regulated their own heat with a thermostat that controlled separate circulator pumps attached to the central heating unit in the boiler room. When interviewed, some tenants stated that the heating system was always noisy and frequently made loud clanking sounds. They stated that it was common for the wind coming off the Charles River to rattle and flow through the large drafty windows at the rear of the building. On the day of the fire some tenants stated that the draft seemed more extreme than usual, making it difficult to maintain a comfortable temperature inside their apartments. There were conflicting reports that earlier in the day a tenant's movers had chocked the front doors open to facilitate their task. This allowed heat to freely escape from the building.

The heating system was ruled out as a possible cause of the fire by the Fire Investigation Unit.

Electrical System

The electrical service was upgraded in 1974 from a 100 amp service to a 200 amp 220 volt service. These meters were wall mounted and centrally located in the basement hallway leading from the front apartment toward the rear common hallway. There were ten (10) circuit meters; one meter for each of the eight apartments, plus one common area meter and one house meter. There were no reports of electrical malfunctions by any tenants on the days leading up to the fire.

Through the 1970s-1990s there were a number of electrical permits issued for routine work throughout the building. There were no reports of recent electrical work taking place. There were no outstanding electrical permits at the time of the fire.

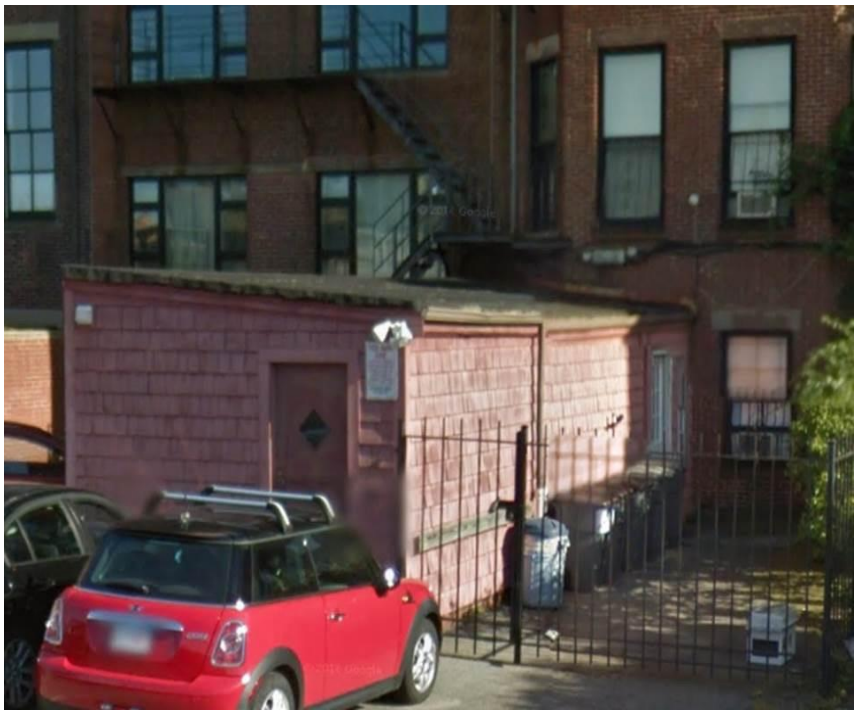
Electrical was ruled out as a possible cause of the fire by the Fire Investigation Unit.

Special Hazards

There was evidence that a number of items had been stored in a cabinet at the top of the basement stairs. Investigators noted a number of ruptured paint, aerosol and flammable or combustible liquid containers within the debris found at the base and within the stairwell. The building manager stated that the cabinet had contained what he thought was an accumulation of old paints, lacquers, spray cans and other unknown household maintenance substances. He thought they may have been stored there by the previous owner before the building manager assumed management of the property for the Trust. Although he was aware of them, he said that he had never touched anything in that cabinet.

The specific contents of the cabinet and the degree they may have contributed to the extension or severity of the fire remains undetermined.

Storage Shed



The structure attached to the rear of 298 Beacon Street was shown in assessing maps as early as 1890, but the map from 1874 did not show that it was an original part of the main structure. The new building code adopted in 1873 after the Great Boston Fire of November 1872 required all buildings constructed within the geographical “fire limits” set by the City Council, (including the Back Bay and 298 Beacon Street), to be made of non-combustible material.

The new code did allow attached combustible accessory structures, provided they were limited to one story, no higher than fifteen (15) feet, and no greater than five hundred (500) square feet in area. The shed, as originally drawn on the 1890 map, met the requirements of the code at the time of construction. It is evident when looking at the old assessing maps that these accessory structures were very common additions throughout the Back Bay.

According to the property manager and current tenants, in recent years the shed was primarily used as the rear entrance and exit to the parking area and Back Street. The rear storage section of the shed was separated from the entry foyer by a solid door. The storage area was used to store miscellaneous items that were rarely used or moved from the space. It also housed the fuel oil storage tank for the central heating system.

The exterior of the shed was sided with ¾ inch tongue and groove planks, covered by ¼ inch plywood finished with cedar shingles extending to the pavement. The shed interior was finished with ¾ inch tongue and groove planks. The shed style roof was constructed of an asphalt or rubber roofing system attached to tin sheeting over wooden decking.

There were five doors within the shed. Viewed from Back Street, there was an exterior side entrance door on the right side of the shed. This exterior door opened into the vestibule; the second interior door opened into the entry foyer. On the right was the entrance door to the basement hallway and on the left was the door to the storage section of the shed. There was an additional door facing Back Street that opened directly into the storage section of the shed.

The two doors in the storage area were solid wood construction, while the three entry doors had paned windows to allow light and visibility into the vestibule and entry foyer. There was a 38 inch x 63 inch double hung glass window that faced into the rear apartment from the vestibule. The tenant kept a covering over this window to provide privacy from people passing through the adjoined vestibule. Directly beneath the window was a recessed area that was referred to as the old coal chute. Its true original function remains undetermined.

Combustible Framing and Void Spaces

Victorian era structures like 298 Beacon Street were built using a construction technique known as balloon framing. This technique created combustible interior voids within the horizontal ceiling/floor assemblies as well as the vertical stud bays leading from the basement to the attic. Additional voids are frequently created during renovations. Both the original construction and renovation voids often lack fire stops. When a fire occurs, these voids become potential pathways for smoke and fire to travel throughout a building.

Many formerly hidden vertical and horizontal spaces in 298 Beacon Street became visible after the fire destroyed the plaster ceilings and walls. This was most noticeable in the basement exit hallway. Above the plaster ceiling between the hallway and the adjoining apartment, there was no visible fire stopping in the joist bays. A vertical shaft was discovered that extended to at least the underside of the second floor. This shaft was previously covered during renovations by the suspended ceiling. Although the pre-existing plaster wall/ceiling assembly may have been adequate to temporarily contain a fire within the hallway from easily extending to the adjoining apartment, the lack of horizontal and vertical fire stopping above the ceiling would likely allow fire to travel unimpeded in the combustible joist bays once it had extended to this space.

Conversations with the property manager also revealed that there was an open 4 inch PVC conduit above the basement hallway ceiling for future connection to a washer to be installed in the first floor apartment closet above the basement hallway. This opening would allow vertical passage of heated smoke and gases to the first floor closet.

Security Grates

The first floor apartment had fixed decorative security bars in place over the windows in both the front and rear of the building. Both basement apartments had security grates on all windows that were designed to hinge when opened. These grates were likely installed for security purposes and are very common in the Back Bay and South End. The records indicate the grates had been properly permitted for installation in 1985 by the previous owner.

After the fire, keyed padlocks were noted on the front basement apartment window grates. The rear apartment window grates were forcibly removed from the rear windows during fire attack and rescue operations. It was undetermined whether there were padlocks on the rear basement apartment window grates.

Based on the Massachusetts State Building Code in effect in 1985 when the security grates were installed, studio apartments of this size would have been allowed to have one exit door provided the exit opened into a common hallway leading to two remote exits from the structure within fifty (50) feet. Both of the basement apartments met the number of egress requirements under the building code.

Separate from the number of required exits, the use of grates over windows in sleeping areas was specifically covered in the Massachusetts State Building Code 780 CMR s. 609.4 (1985 edition). The code required that grates in sleeping areas be easily opened without the use of a tool, e.g. a key.

Furthermore the Boston Fire Prevention Code 11.08(b) also prohibited obstructions over windows that would hinder escape**.** Even though window grates using padlocks would not have been allowed under the Boston Fire Prevention Code the enforcement of this falls under the jurisdiction of the Building Department.

When the Fire Department discovers compliance issues of this nature, the concern is referred to the Building Department for resolution. The resulting decision is based on the building official's review of the building code edition under which the grates were installed as well as other characteristics of the specific property. In this case, the board was unable to determine if the window grates were a factor that may have prevented escape from the rear apartment by Lieutenant Walsh and Fire Fighter Kennedy. The Board was also unable to determine whether the window facing into the vestibule was approved for use in an exit passage way.

References used for this section of the report

- Statutes Relative to the Survey & Inspection of Buildings in the City of Boston 1873; p.8 (7) Wooden Buildings.
- The Building Law of the City of Boston (1929).
- Http:backbayhouses.org/298-Beacon/
- The Commonwealth of Massachusetts State Building Code (effective January 1, 1975).
- The Commonwealth of Massachusetts State Building Code (in force and effect September 30, 1985).
- Boston Fire Prevention Code.

  Commonwealth of Massachusetts and Boston Building Codes were viewed at the Boston Public Library Government Documents E-collection

Notable Permits and Building History:

Based on available permits located at the Inspectional Services Department and the City of Boston Archives in West Roxbury, it appears that between the 1870s and approximately 1930, there were no major renovations documented except for a 1920 remodel of the fourth floor into four maid's quarters. There was also mention of the shed in a 1918 "Building Inspection Hazard Report" which referred to the attached combustible "ell" storage.

In 1942 the owner was issued a permit by the Building Department to change the occupancy from a dwelling to a lodging house. In 1946, new party balconies were installed most likely to comply with egress requirements. Between 1947 and 1974 there is very little documentation of renovations or repairs in the Building Department records.

In 1974 the Building Department cited a previous owner for failure to legally change the occupancy from a lodging house to an eight-unit apartment. Based on the violations written in 1974, it is believed that some of the "illegal" improvements that were made to the property occurred between 1947 and 1974. This included the installation of additional fire balconies as a second means of egress for the upper floors, bathrooms and kitchens.

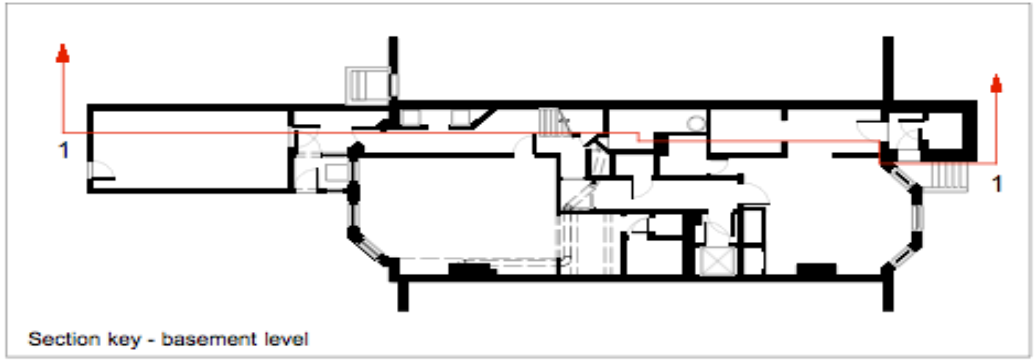
1974: The Building Department ordered the owner to make the property legal. Shortly after the violation order was written, a letter from the Boston Assessing Commissioner to the Building Commissioner indicated the city had been taxing the property as an eight-unit apartment house from 1955 to 1974. The Assessing Department had records of the property having two studio apartments in the basement, one full apartment on each of the first and second floors, and two apartments each on the third and fourth floors, for a total of eight units.

1974-75: The property was transferred to new owners who assumed the responsibility of clearing the occupancy violation and legally changing the occupancy from a lodging house to a rental property. During that time plans were submitted to the Building Department to legalize and update the "illegal" bathrooms and kitchens and to ensure the building and egress requirements were code compliant. Although the drawings submitted to the Building Department showed the addition of increased fire separation between the common hallways from the adjacent apartments on the upper floors, there was no documentation of any improvements in the fire separation between the basement hallway and adjoining apartments. These plans showed the layout of the apartments as they were arranged at the time of the fire.

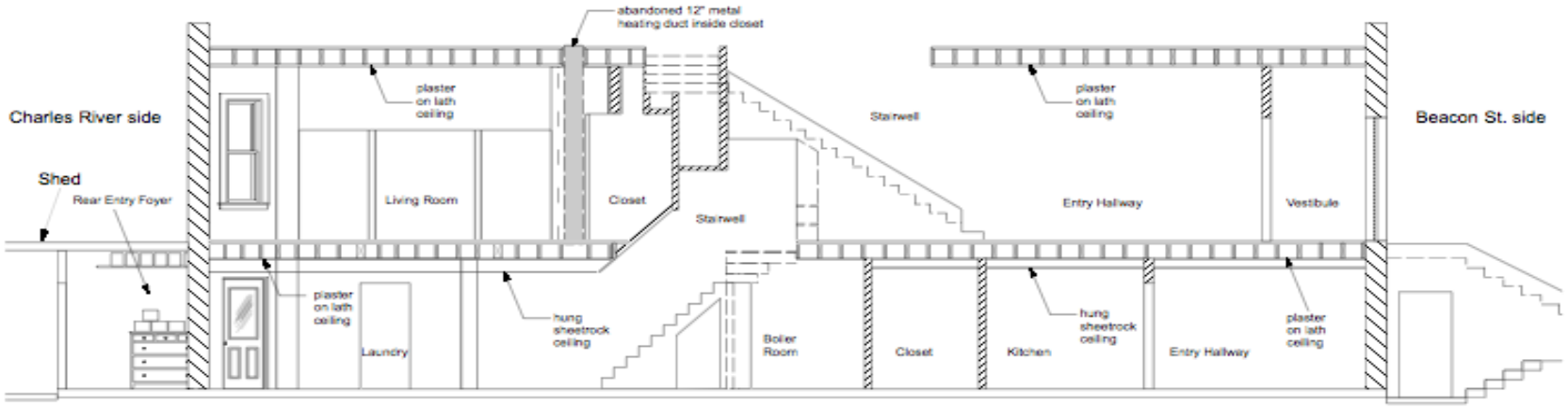
The last owner resided in the property from 1975 until his death in 2002. At that time the property was transferred to a Trust.

From that time on the property was professionally managed by a property manager on behalf of the estate pending dissolution of the Trust upon the sale of the property.

March 26, 2014: 298 Beacon Street was the scene of a tragic 9 alarm fire that took the lives of Fire Lieutenant Edward Walsh, Engine 33 and Firefighter Michael Kennedy, Ladder 15.



Section key - basement level



298 Beacon Street
Boston, MA
Section view 1 Looking East

scale: 0' 5' 10' 15'
date: 5-13-15 rev 7-30-15
rev 6-26-15

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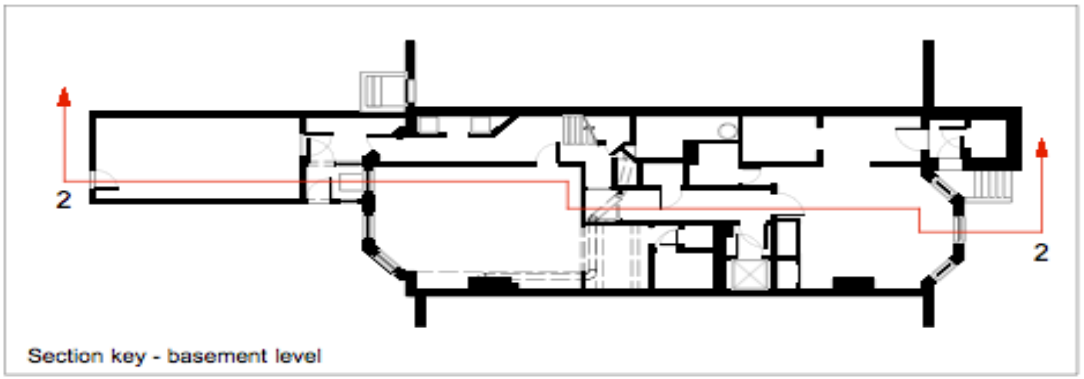

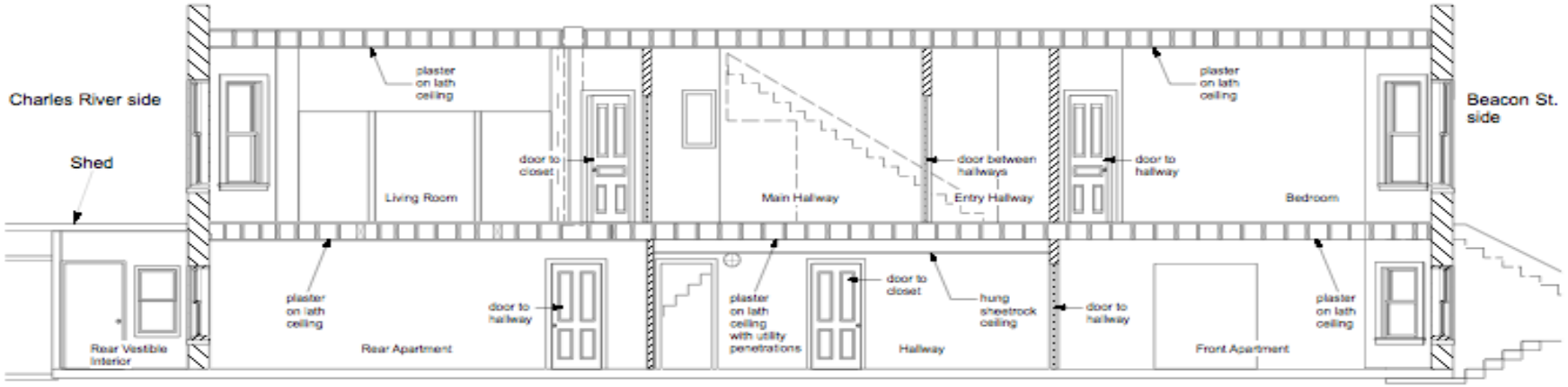

298 Beacon Street
Boston, MA
Section View 2 looking east

scale: 0' 5' 10' 15'
date: 6-25-15 rev 7-30-15
rev 6-26-15

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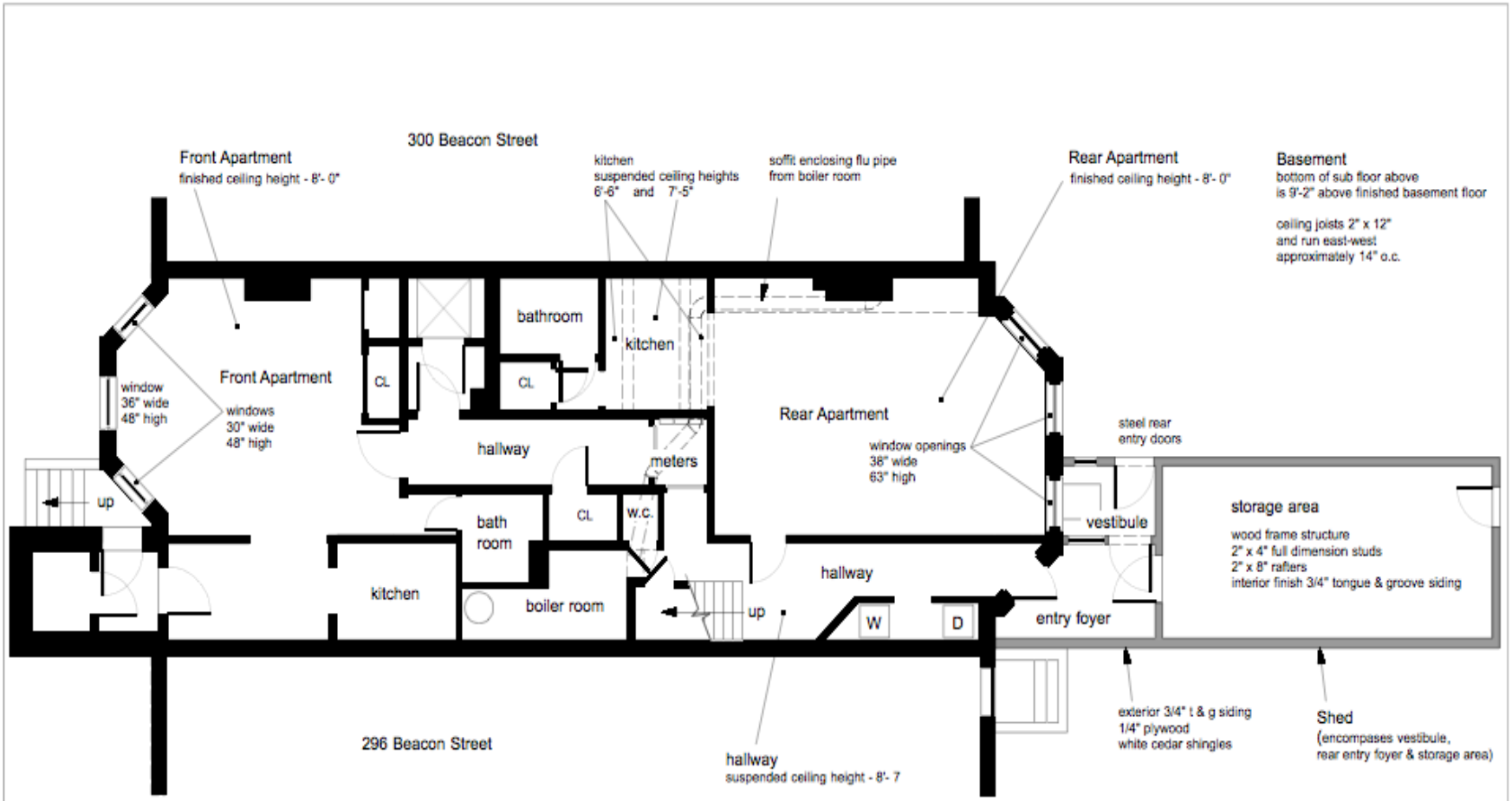

298 Beacon Street
Boston, MA

Basement Level Plan View

scale: 0' 5' 10' 15'

date: 4-23-14 rev: 5-12-15
rev: 4-25-14 rev: 7-30-15
rev: 5-6-14 rev: 7-31-15

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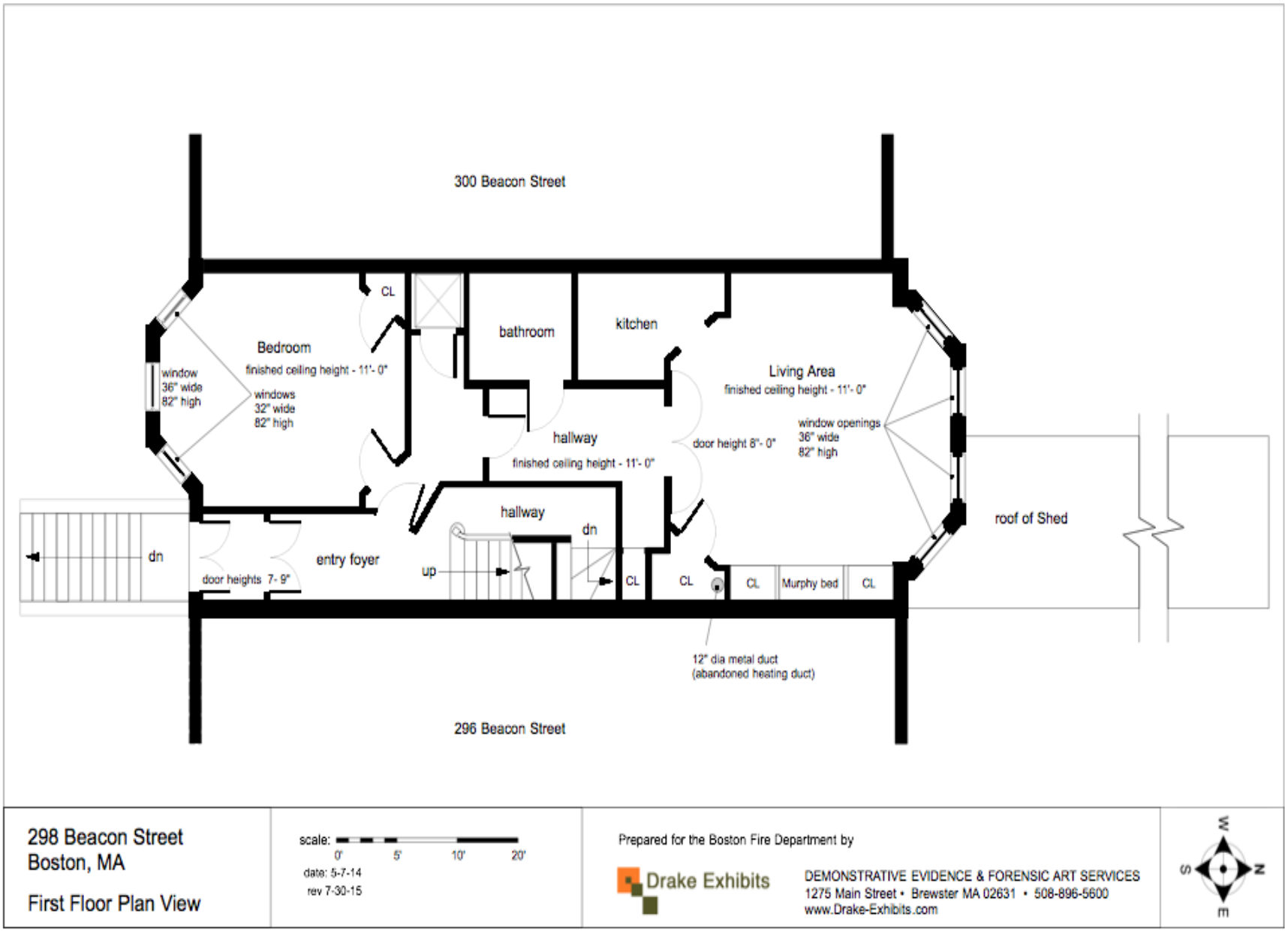

298 Beacon Street
Boston, MA

First Floor Plan View

scale: 0' 5' 10' 20'

date: 5-7-14
rev 7-30-15

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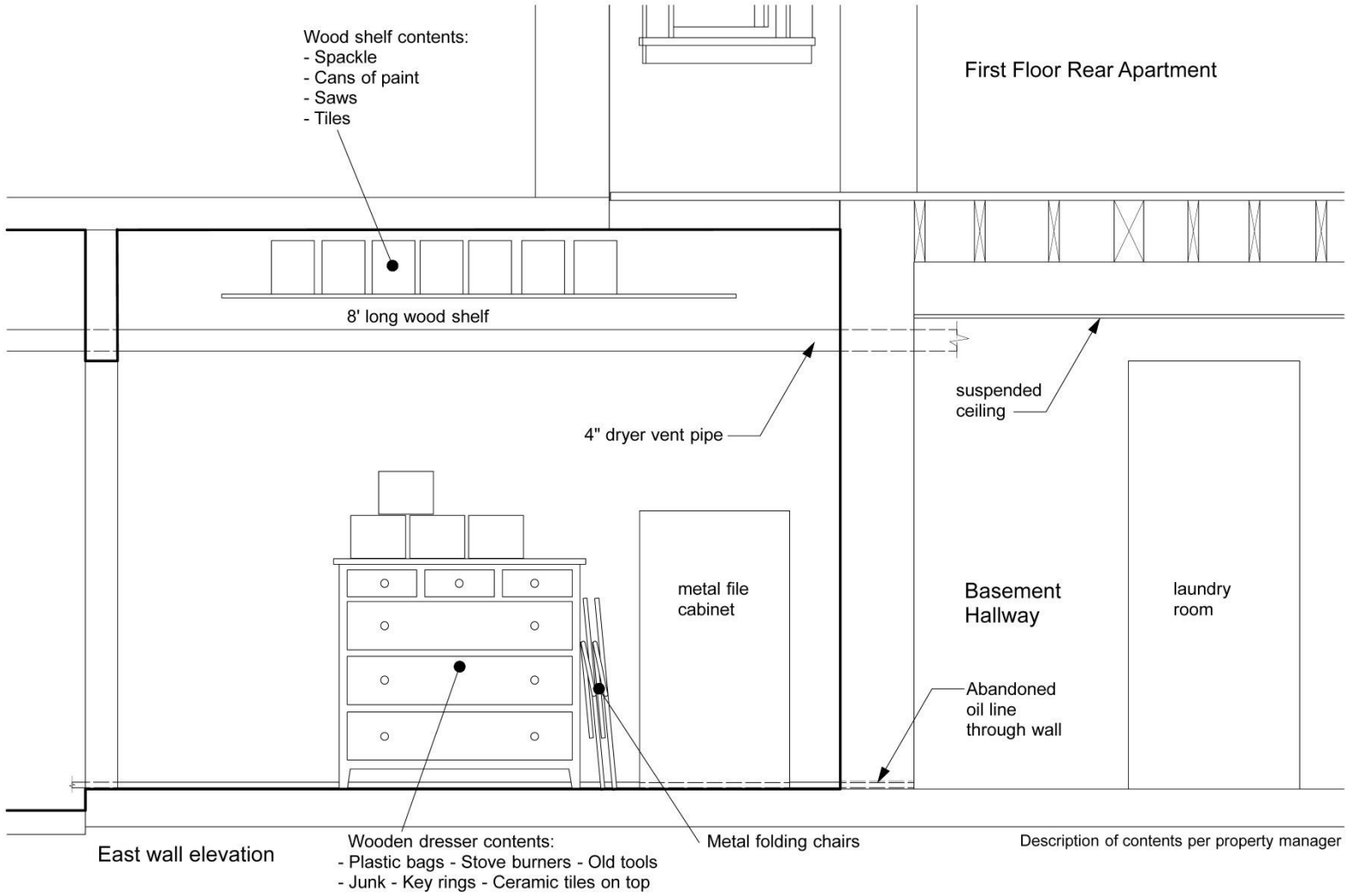

298 Beacon Street
Boston, MA
Rear Entry Foyer Elevation

scale: 0' 1' 2' 3' 4' 5'

date: 5-13-15 rev 7-30-15
rev 6-26-15 rev 8-3-15

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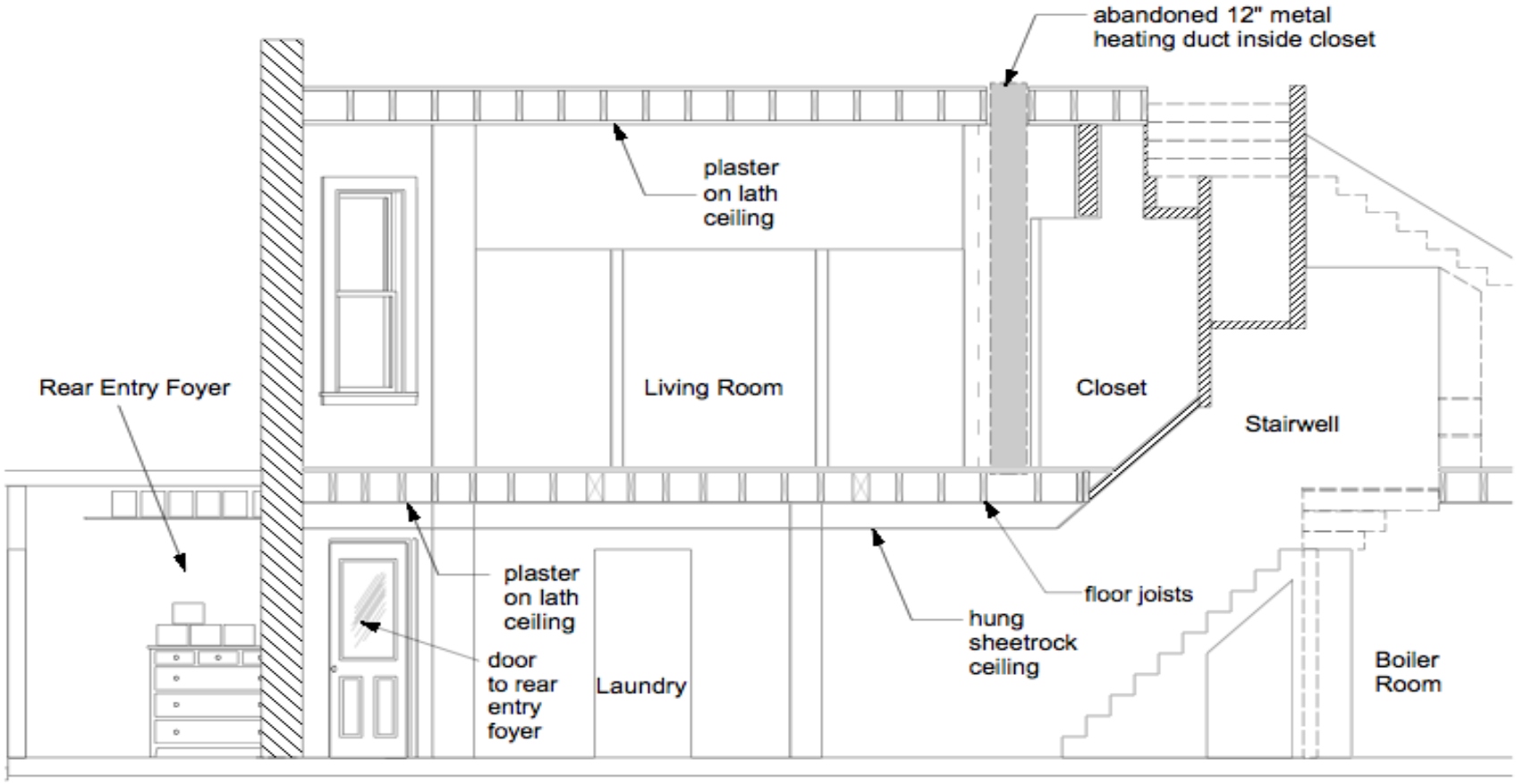

Section view detail through basement hallway looking east

298 Beacon Street
Boston, MA

Section Detail Looking East

scale: 0' 5' 10'

date: 5-13-15 rev 7-30-15
rev 6-26-15

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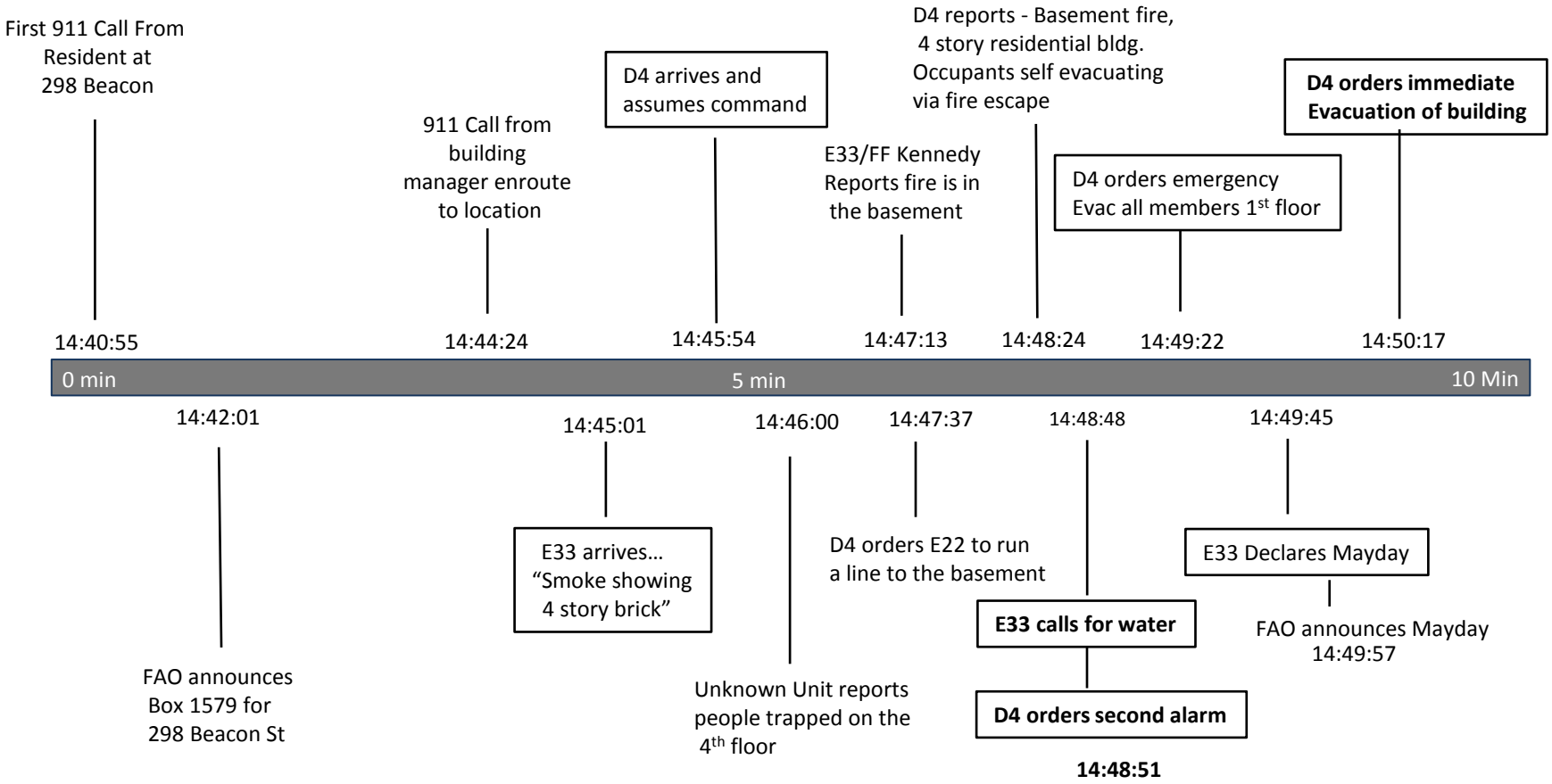
VII. TIMELINES

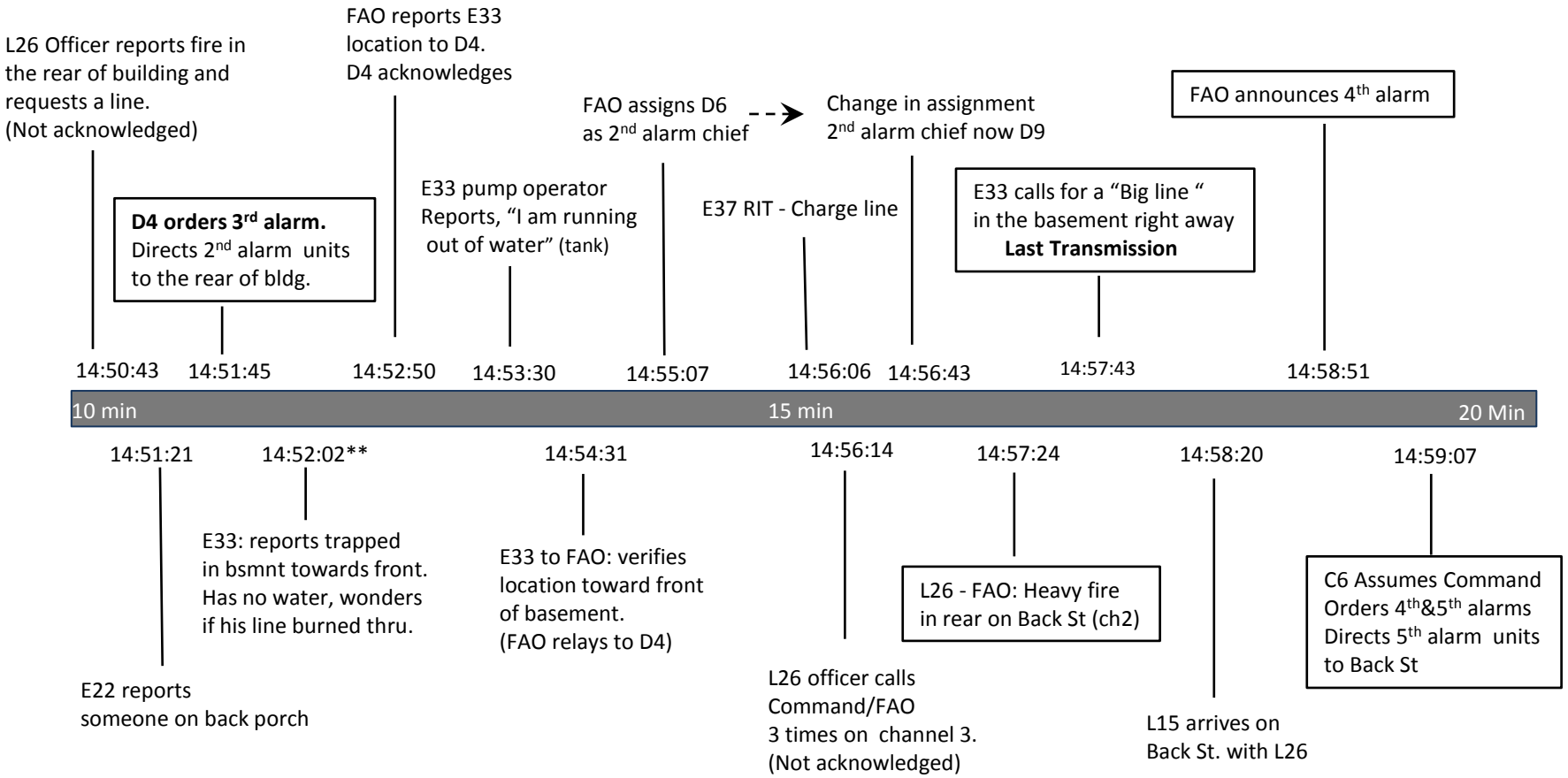
A. Event Timeline

B. Communications Timeline

Event Timeline



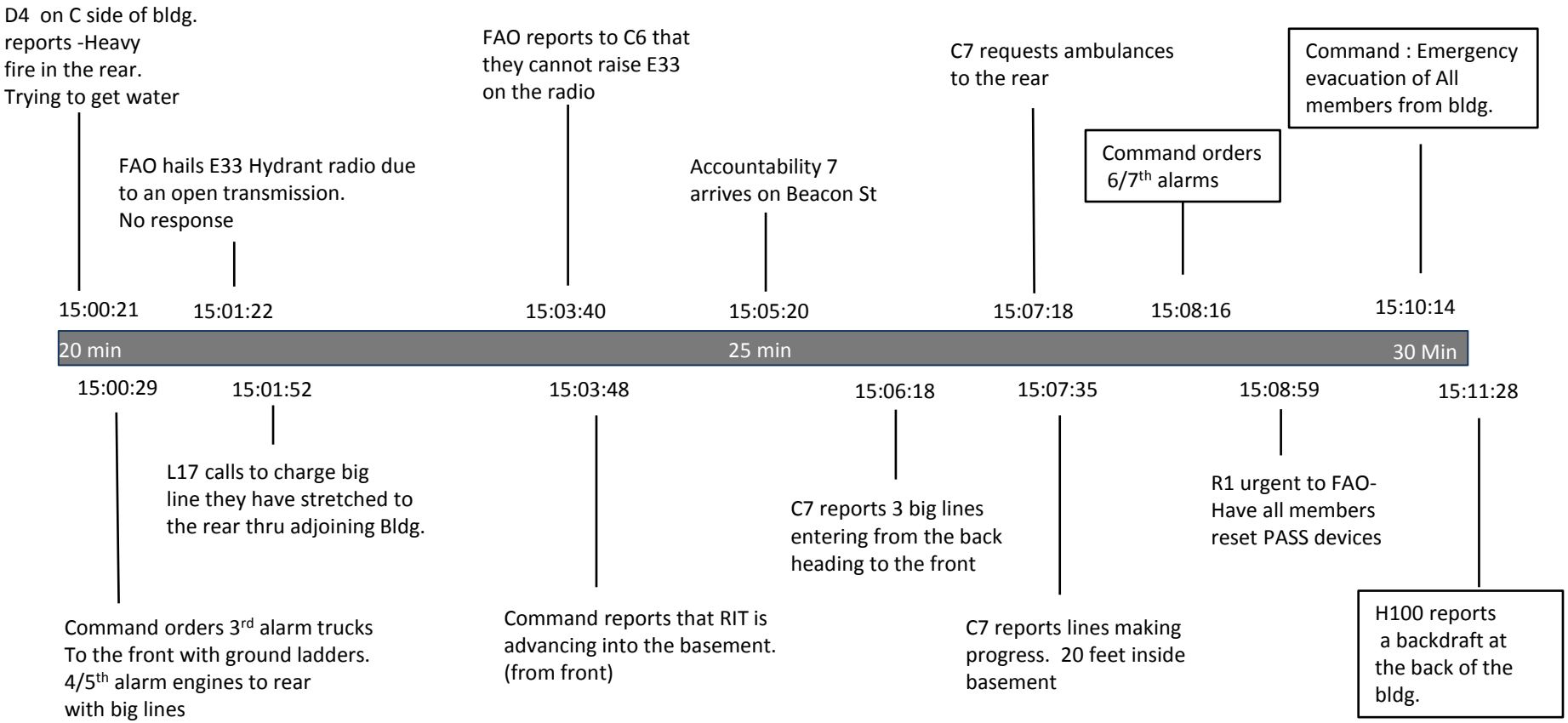
Event Timeline



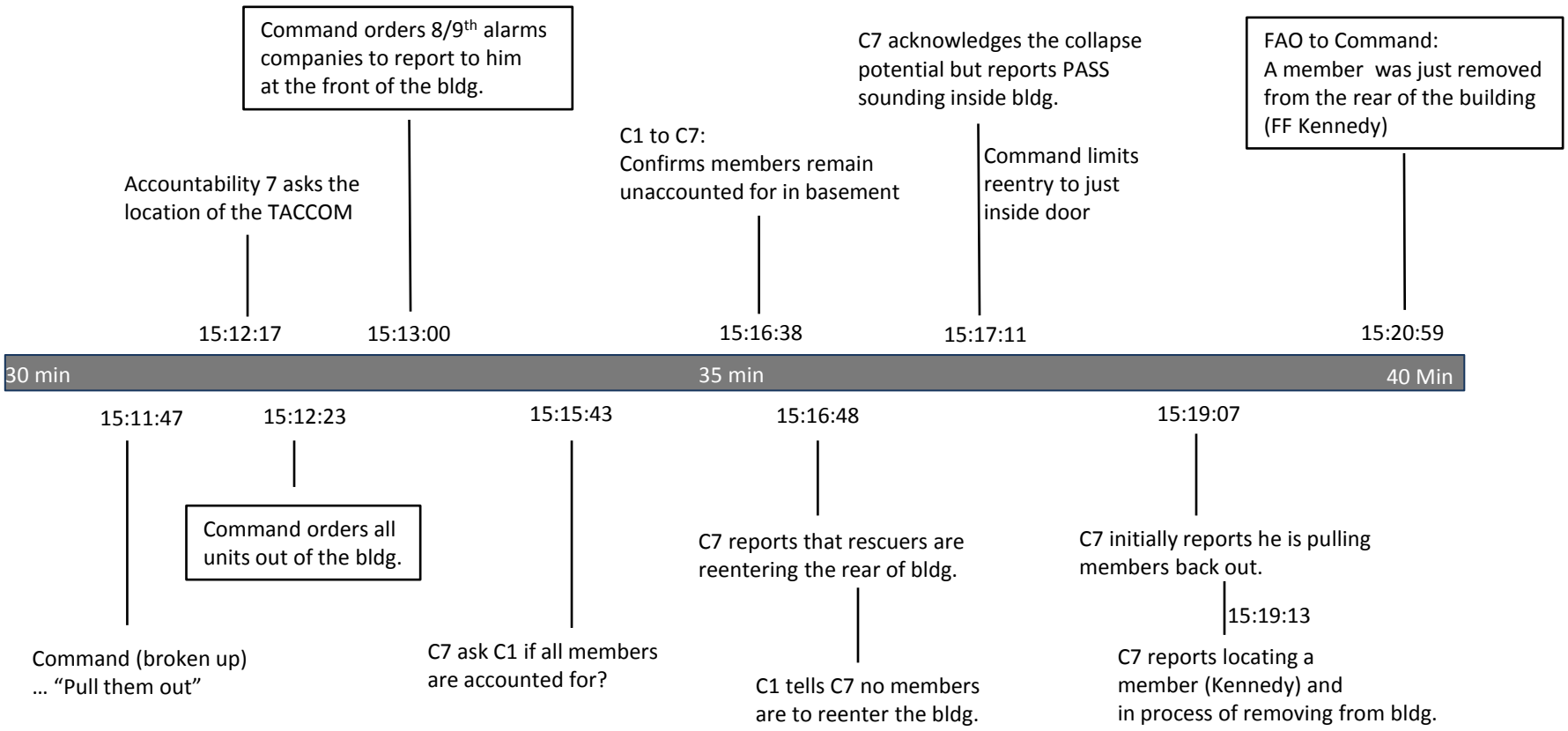
**

14:52:02: From interviews, Rescue 1, E22, H1 assisted by RIT E37 with a 2 ½" line make multiple rescue entry attempts over the next minutes until decision is made that the front rescue is not possible

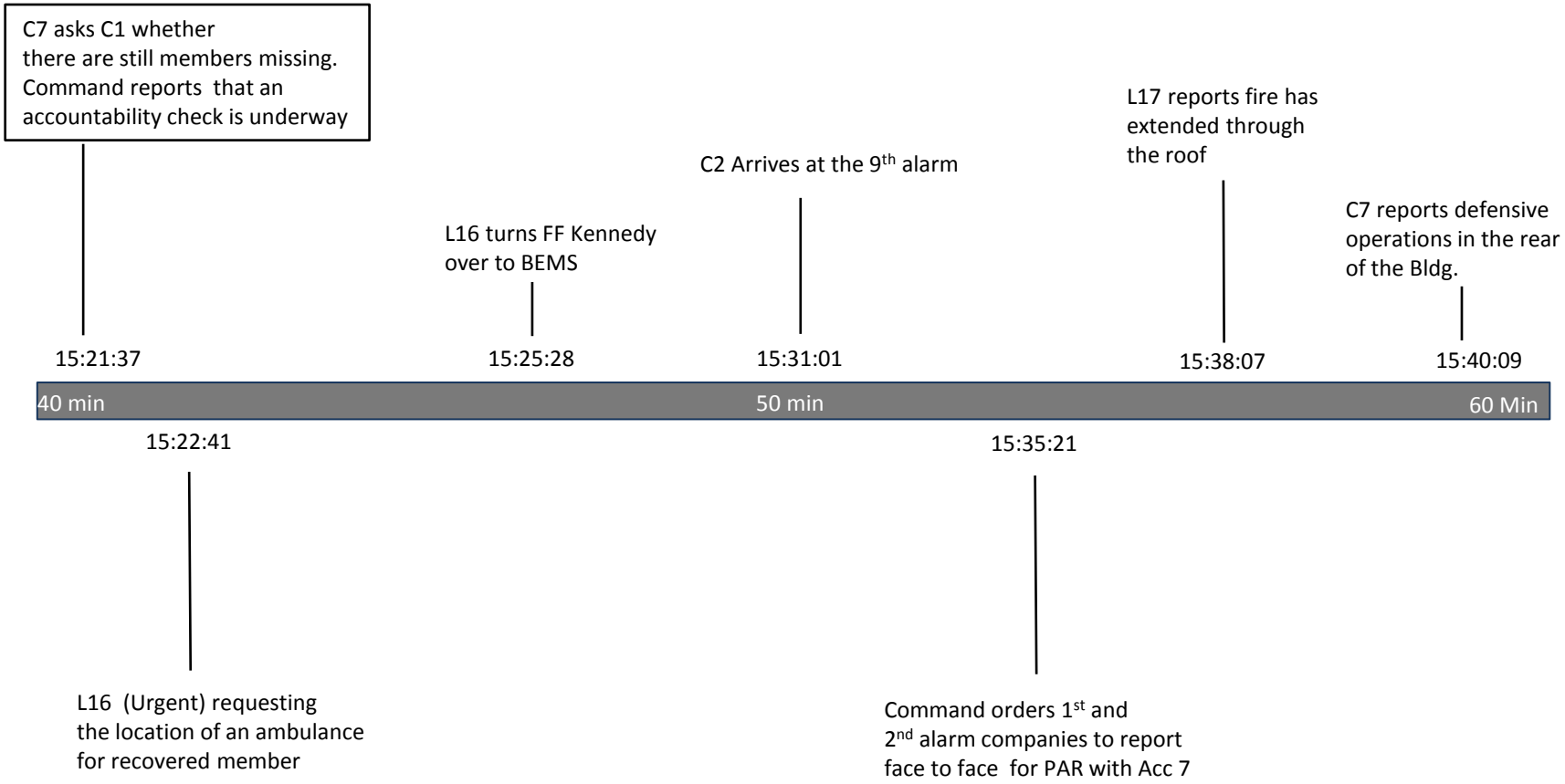
Event Timeline



Event Timeline



Event Timeline



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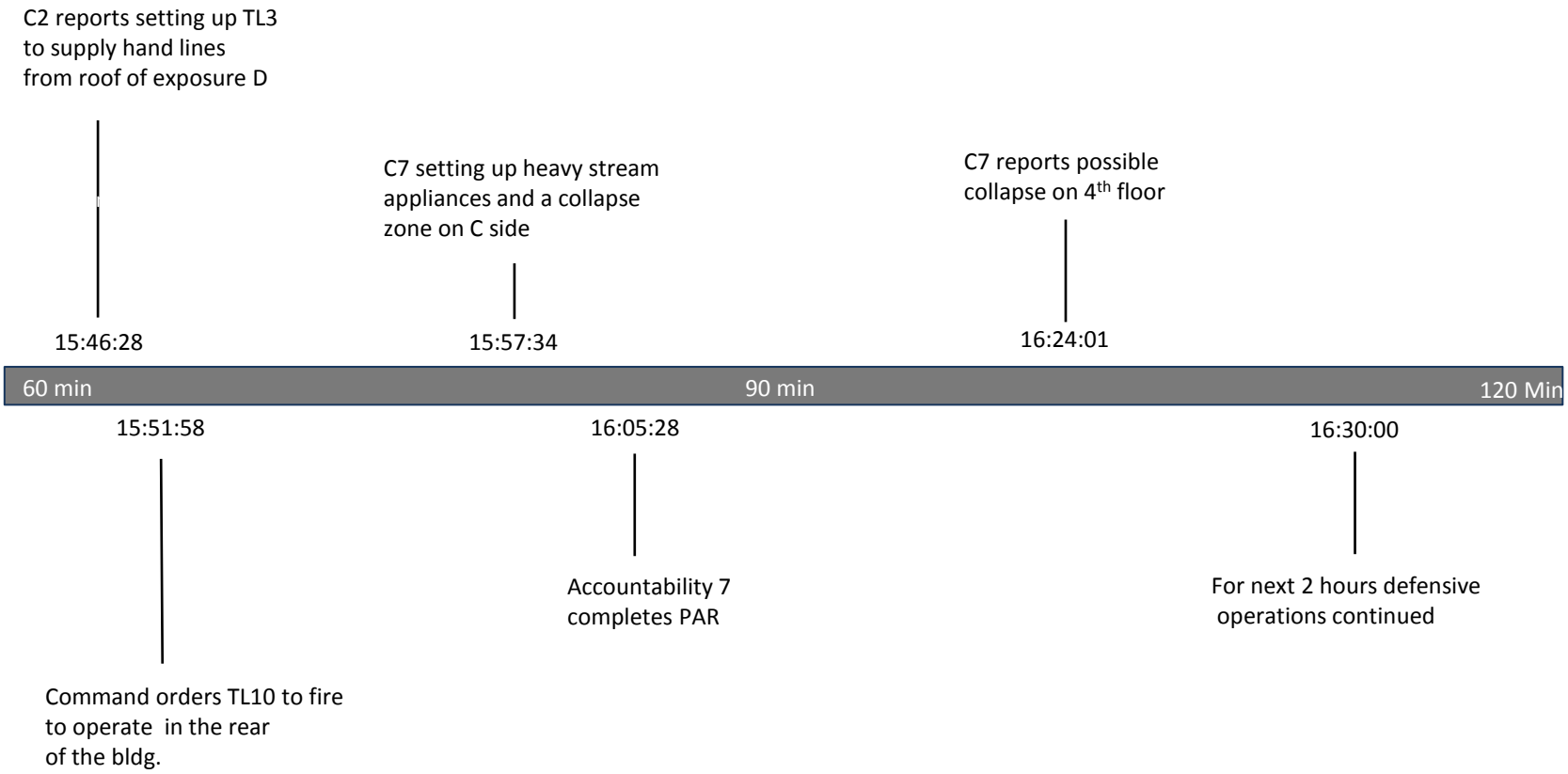
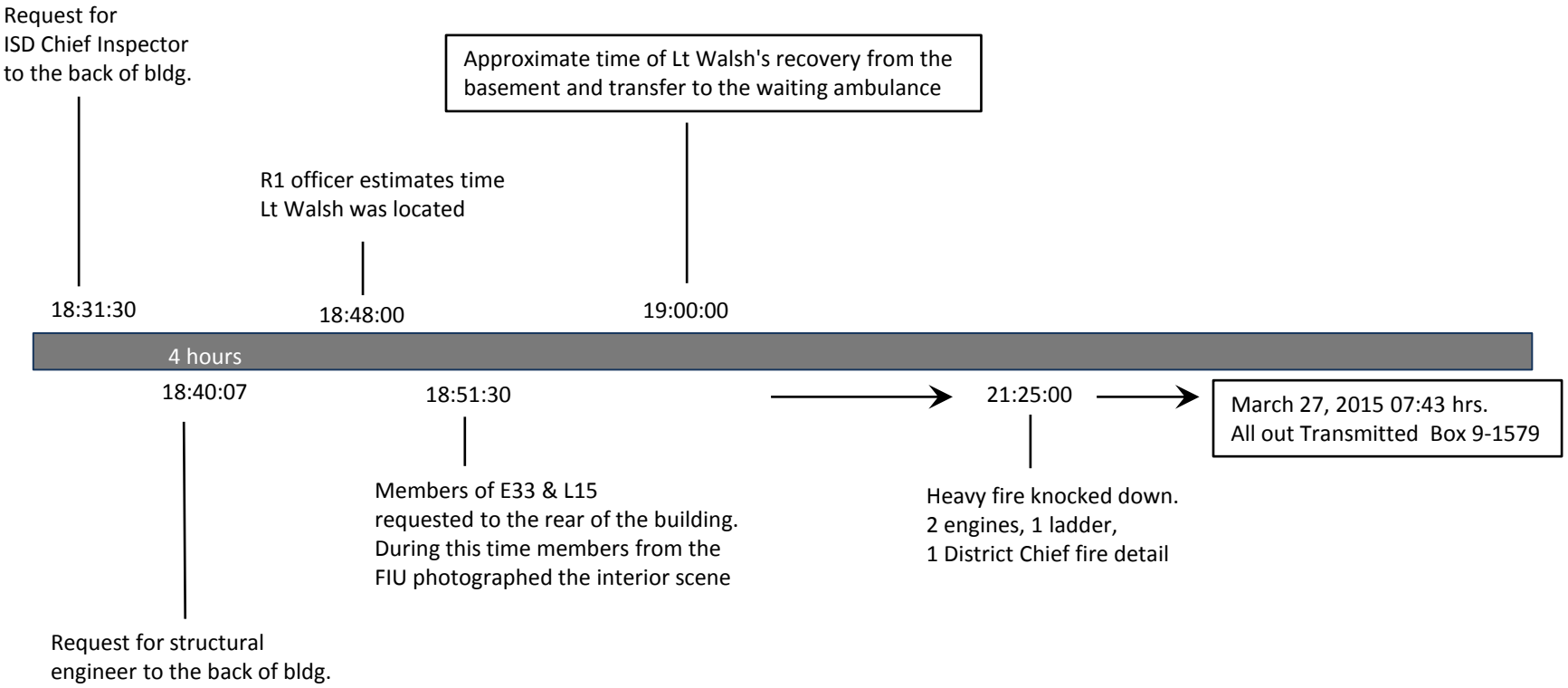


Event Timeline

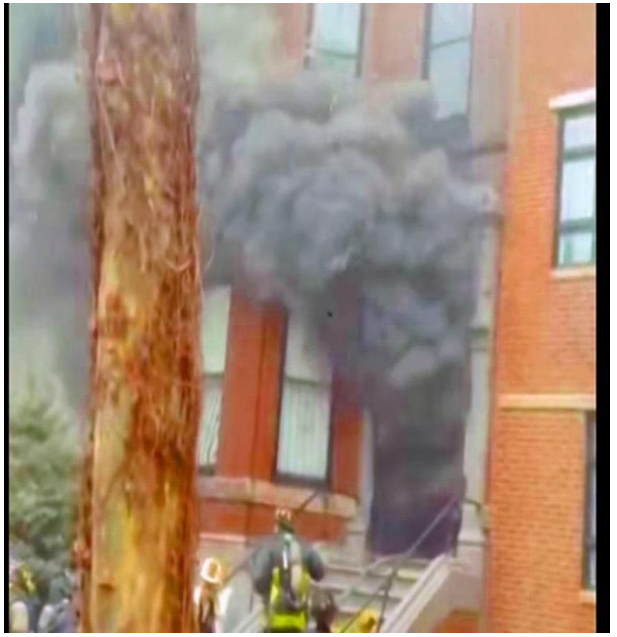


B. COMMUNICATIONS TIMELINE

The following timeline was created using transcripts from BFD radio communications and Computer Aided Dispatch documentation. Boston Fire Department radio channels 1, 2 and 3 were used at 298 Beacon Street. Channel 1 is the BFD general apparatus communications and dispatch channel. Channel 2 was assigned as the primary fire ground channel. When the MAYDAY was declared, Channel 2 became the Rapid Intervention Team/MAYDAY channel. All other fire ground communications were then assigned to Channel 3, which became the primary fire ground channel for non-MAYDAY/RIT communications.

This timeline is not a verbatim record of all communications. In the interest of clarity, only those transmissions deemed pertinent have been included in the timeline. In some instances, messages have been abbreviated or paraphrased in order to fit the format of this timeline. Wherever this occurred every attempt was made to ensure the original message was not changed. Transmissions deemed redundant, unclear or unrelated have been excluded from this timeline to assist the reader in more easily following the critical communications.

TIME	MESSAGE/ACTION
14:40:55	FIRST 911 CALL FROM RESIDENT AT 298 BEACON STREET
14:42:01	FAO ANNOUNCES BOX 1579 FOR 298 BEACON STREET
14:44:14	FAO ANNOUNCES CHANNEL 2 AS FIRE GROUND CHANNEL
14:44:24	911 CALL FROM BUILDING MANAGER ENROUTE TO LOCATION
14:45:01	E33 TO FAO: SMOKE SHOWING FOUR STORY BRICK
14:45:14	E33 TO FAO: E33 WILL BE COMMAND, SMOKE SHOWING FLOOR 1
14:45:54	CAR 4 TO FAO: ON BEACON STREET, I AM BEACON COMMAND
14:46:00	UNKNOWN UNIT REPORTS PEOPLE TRAPPED ON 4TH FLOOR
14:47:13	E33 (FF Kennedy):IT'S IN THE BASEMENT. I AM IN THE FRONT HALLWAY, GO TO THE BACK, COME DOWN STAIRS… UNREADABLE
14:47:37	COMMAND TO E22: I NEED YOU TO RUN A LINE TO THE BASEMENT
14:48:24	D4 COMMAND REPORTS 4 STORY BRICK RESIDENTIAL BUILDING. FIRE IN THE BASEMENT. 4TH FL OCCUPANTS EVACUATING VIA FIRE ESCAPE
14:48:48	E33 CALLS FOR WATER
14:48:51	D4 COMMAND ORDERS 2ND ALARM
14:49:12	E33 OFFICER TO E33 PUMP: CHARGE THE LINE E33, CHARGE THE LINE
14:49:22	D4 COMMAND: EMERGENCY EVACUATION OF ALL COMPANIES ON 1ST FLOOR
14:49:28	E33: CHARGE THE LINE 33, CHARGE IT
14:49:45	E33: MAYDAY E33 MAYDAY E33….UNREADABLE
14:49:57	FAO TO ALL UNITS: E33 HAS A MAYDAY ON CH 2 IN THE BASEMENT (announced twice on channel 1 and channel 2)
14:50:08	D4 COMMAND ACKNOWLEDGES THE MESSAGE
14:50:09	ENG 33: CHARGE THE LINE, CHARGE 33'S LINE NOW
14:50:17	D4 COMMAND TO FAO: I WANT ALL MEMBERS OUT OF THE BUILDING, ALL MEMBERS OUT OF THE BUILDING IMMEDIATELY
14:50:32	E33: CHARGE 33'S LINE NOW, CHARGE 33'S LINE



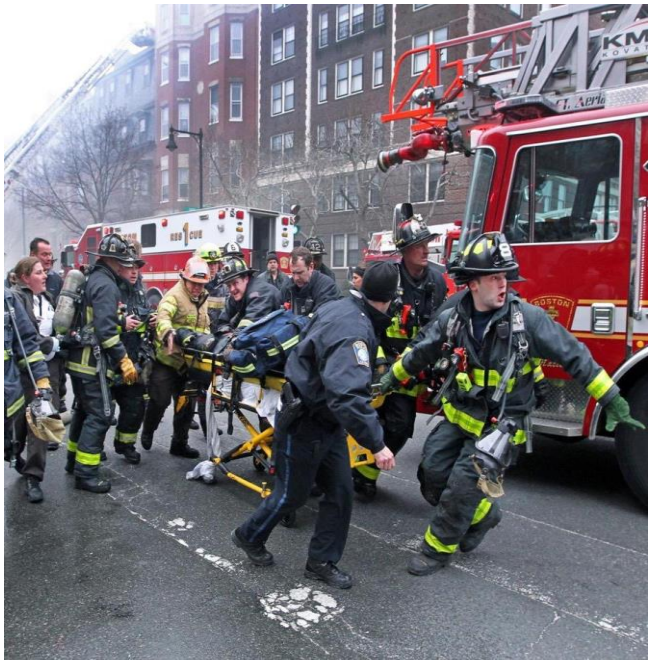
14:50:43	L26 TO FAO: TELL COMMAND WE NEED A LINE TO THE BACK. WE HAVE FIRE SHOWING ON THE FIRST FLOOR (basement). HAVE COMPANIES COME AROUND BACK STREET. COMPANIES CAN ATTACK IT
14:51:04	E33: CHARGE THOSE LINES NOW
14:51:07	FAO TO ALL UNITS: SWITCH TO CH 3. CH 2 IS MAYDAY CHANNEL ONLY
14:51:21	E22 PUMP TO COMMAND: BPD REPORTS SOMEONE ON BACK PORCH
14:51:42	E33 (FF KENNEDY): 33 WE NEED WATER NOW, CHARGE 33'S LINE
14:51:45	D4 COMMAND TO FAO: GIVE ME A 3RD ALARM, HAVE 2ND ALARM COMPANIES REPORT TO THE REAR
14:52:02	E33: BOTH OF US ARE TRAPPED IN THE BASEMENT TOWARDS THE FRONT OF BUILDING. WE GOT NO WATER, I WONDER IF MY LINE BURNED THROUGH. YOU GOT TO CHARGE OUR LINE
14:52:34	FAO TO COMMAND: E33 IS TRAPPED IN THE BASEMENT, HEADING TOWARD THE FRONT OF THE BUILDING. THEY NEED WATER
14:52:50	D4 COMMAND ACKNOWLEDGES THE MESSAGE
14:52:59	E33: ON THE STAIRWAY, GETTING HOT DOWN HERE
14:53:07	FAO TO E33: HOW MANY GUYS DO YOU HAVE WITH YOU?
14:53:10	E33: 33’S CREW CHARGE THE LINE, CHARGE THE LINE
14:53:30	E33 PUMP: 33 I AM RUNNING OUT OF WATER, RUNNING OUT OF WATER
14:53:37	UNK TO E33 PUMP: FILL THE LINE…. UNREADABLE
14:53:54	D4 COMMAND TO FAO: WHAT IS THEIR LOCATION?
14:53:58	FAO TO COMMAND: THEY ARE IN THE BASEMENT HEADING TOWARDS THE FRONT OF THE BUILDING. I WILL VERIFY
14:54:02	FAO TO E33: E33 WHAT IS YOUR LOCATION IN THE BASEMENT? THEY ARE TRYING TO GET YOU WATER
14:54:31	E33 TO FAO: WE’RE IN THE BASEMENT TOWARDS THE FRONT OF THE BUILDING
14:54:37	FAO TO COMMAND: E33 IS IN THE BASEMENT, FRONT OF THE BUILDING
14:55:06	D4 COMMAND ACKNOWLEDGES MESSAGE FROM FAO
14:55:07	FAO DISPATCHES D06 AS THE 2ND ALARM CHIEF

14:55:20	E33: E33 …UNREADABLE… ITS GETTING HOT DOWN HERE GETTING HOTTER ... UNREADABLE
14:55:35	FAO TO E33: OK 33 THEY ARE GOING TO GET YOU WATER
14:55:52	FAO: CH 2 IS MAYDAY CHANNEL. ALL OTHERS SWITCH TO CH 3
14:56:06	E37 (RIT) TO E37 PUMP: CHARGE THE LINE
14:56:13	E33: BREAK THE WINDOW RIGHT THERE….UNREADABLE
14:56:14	L26 TO COMMAND……NOT ACKNOWLEDGED
14:56:26	L26 TO FAO……NOT ACKNOWLEDGED
14:56:38	E33: UNREADABLE MESSAGE….ARE THEY COMING TO GET US?
14:56:38	L26 TO FAO….NOT ACKNOWLEDGED
14:56:43	FAO TO E33: ENGINE 33 THEY ARE COMING TO GET YOU
14:56:43	FAO ASSIGNS D09 AS 2ND ALARM CHIEF
14:56:46	FAO TO COMMAND: E33 WANTS TO KNOW IF YOU'RE COMING TO GET THEM
14:56:49	E37 (RIT) TO E37 PUMP: CHARGE THE LINE
14:56:56	D4 COMMAND TO FAO: COMPANIES COMING IN THE FRONT OF THE BASEMENT NOW. TELL HIM IF HE CAN FIND A WAY OUT TO GET OUT
14:56:59	E33……..UNREADABLE SHORT MESSAGE
14:57:16	FAO TO E22 PIPE: YOU HAVE AN OPEN MIC(ROPHONE)
14:57:24	L26 TO FAO: TELL COMMAND WE NEED A LINE ON THE BACKSIDE OF THE BUILDING. ON BACK STREET HEAVY FIRE
14:57:36	FAO CONFIRMS A LINE IS NEEDED IN THE BACK OF THE BUILDING
14:57:43	ENG 33: NEED A LINE IN THE BASEMENT, RIGHT AWAY A BIG LINE (last transmission)
14:57:51	FAO TO COMMAND: L26 REPORTS THEY NEED A LINE IN THE REAR AND E33 IS STILL CALLING FOR WATER
14:58:06	D4 COMMAND TO FAO: ARE THEY CALLING FOR WATER AND NEED A LINE OR CALLING FOR WATER DOWN THE BASEMENT?
14:58:08	FAO TO E33: COMMAND HAS SOMEONE COMING IN FOR YOU
14:58:19	FAO TO E29: RESPOND AS THE SECOND RIT ENGINE
14:58:20	L15 TO FAO: L15 IS IN THE REAR WITH L26

14:58:42	L17 TO FAO: A 2ND LINE TO THE REAR OF THE BUILDING
14:58:51	FAO ANNOUNCES 4TH ALARM, CH 2 FOR MAYDAY AND CH 3 FOR FIRE GROUND
14:59:07	C6 (DIVISION 1) ASSUMES COMMAND, ORDERS 4TH AND 5TH ALARMS, DIRECTS THOSE COMPANIES TO THE REAR OF THE BUILDING
14:59:29	TL3 TO E04: CHARGE THE LINE AND ACKNOWLEDGE
14:59:32	FAO DIRECTS 5TH ALARM COMPANIES TO THE REAR OF THE BUILDING
14:59:38	TL3 TO FAO: HAVE E04 CHARGE THE LINE NOW
14:59:47	FAO: E42 AND E05 RESPOND TO THE REAR OF THE BUILDING
14:59:51	E37 (RIT) TO E37 PUMP: CHARGE THE LINE
15:00:21	D4 TO C6 COMMAND: HEAVY FIRE IN REAR. TRYING TO GET WATER BACK HERE
15:00:29	C6 COMMAND ORDERS 3RD ALARM TRUCKS TO THE FRONT WITH 35'S (ground ladders). FIRST ENGINES ON 4TH & 5TH ALARMS TO THE REAR WITH 2 1/2" LINES TO THE BASEMENT
15:01:16	FAO TO E04: CHARGE THE LINE AND ACKNOWLEDGE
15:01:22	FAO TO E33 HYDRANT: YOU HAVE AN OPEN MIC(ROPHONE). (numerous attempts to contact)
15:01:52	L17 TO E37 PUMP: CHARGE THE BIG LINE
15:02:21	E37 PUMP: ALL THE LINES ON E37 ARE CHARGED
15:02:27	FAO TO E33…….NO ANSWER
15:02:44	FAO TO E33 (pump): CHARGE YOUR BIG LINE - NO ANSWER
15:02:54	FAO TO E33 (pump): ENGINE 33 CHARGE YOUR BIG LINE
15:02:55	FAO TO E33 (pump): CHARGE YOUR BIG LINE ENGINE 33
15:03:12	FAO TO E33 (pump): CHARGE YOUR BIG LINE OK
15:03:16	E33 PUMP TO FAO: ROGER THAT COMING AT YA
15:03:18	FAO TO E33 PUMP: SWITCH TO CHANNEL 3 FOR THE FIRE GROUND
15:03:24	FAO ANNOUNCES 4TH ALARM, CHANNEL 3 IS FIRE GROUND AND CHANNEL 2 IS MAYDAY (4th and 5th were ordered at 14:59:07)
15:03:40	FAO TO COMMAND: I CAN'T RAISE E33 FROM THE BASEMENT. DO YOU HAVE THEM?

15:03:48	C6 COMMAND REPORTS THE RIT IS TRYING TO ADVANCE INTO THE BASEMENT
15:04:57	C6 COMMAND TO C7…….NO ANSWER
15:05:20	D7 ANNOUNCES ARRIVAL ON BEACON STREET (ACCOUNTABILITY)
15:06:18	C7 TO COMMAND: WE HAVE 3 BIG LINES GOING IN THE REAR TOWARDS THE FRONT
15:06:27	C6 COMMAND TO C7: WHAT ARE THE CONDITIONS BACK THERE? ARE THEY KNOCKING IT DOWN?
15:06:45	C6 COMMAND TO ACCOUNTABILITY 7: REPORT TO C6 OUT FRONT ASAP
15:07:18	C7 REQUESTS COMMAND TO HAVE A COUPLE OF AMBULANCES LOCATE TO THE REAR OF THE BUILDING
15:07:30	FAO TO E33 PORTABLE……..NO ANSWER
15:07:35	C7 TO COMMAND: ATTACK LINES MAKING PROGRESS. LINES 20 FEET INSIDE AND ADVANCING
15:08:16	C6 COMMAND ORDERS 6TH AND 7TH ALARMS, DIRECTS HALF TO MASSACHUSETTS AVENUE AND HALF TO EXETER STREET
15:08:51	RESCUE 1 URGENT……..NO ANSWER
15:08:59	RESCUE 1 TO FAO: HAVE ALL MEMBERS RESET THEIR PASS DEVICES, WE HAVE MULTIPLE PASS DEVICES GOING OFF
15:09:34	FAO MAKES ANNOUNCEMENT TO ALL UNITS ON ALL CHANNELS TO RESET ALL PASS DEVICES
15:10:14	C6 COMMAND ORDERS EMERGENCY EVACUATION OF ALL MEMBERS FROM THE BUILDING
15:10:28	FAO: EMERGENCY EVACUATION ANNOUNCEMENT ON ALL CHANNELS
15:11:28	H100 TO COMMAND: BACKDRAFT AT THE REAR OF THE BUILDING
15:11:47	C6 COMMAND: BACKDRAFT……UNREADABLE……PULL THEM OUT
15:13:00	C6 COMMAND ORDERS 8TH AND 9TH ALARM. COMPANIES TO REPORT TO HIM IN FRONT OF THE BUILDING
15:15:34	C7 TO C6: DO WE STILL HAVE MEMBERS MISSING?

15:15:43	C7 TO C1 : DO WE STILL HAVE MEMBERS MISSING IN THE BASEMENT?
15:16:38	C1: THERE ARE STILL MEMBERS UNACCOUNTED FOR IN THE BASEMENT
15:16:48	C7 TO FAO: COMPANIES ARE GOING BACK IN
15:17:03	C1 TO C7: NEGATIVE. NO COMPANIES ARE GOING IN ANYWHERE. STAY OUT AWAY FROM THE BUILDING
15:17:11	C7 T0 C1 : WE ARE AWARE OF THE COLLAPSE POTENTIAL, WE CAN SEE IN FRONT OF US, WE CAN HEAR A PASS DEVICE SHORTLY INSIDE THE BUILDING
15:17:45	C6 TO FAO: MAKE SURE ALL MEMBERS ARE OFF THE ROOF
15:18:09	C1 TO C7: NO MEMBERS TO ENTER EXCEPT JUST INSIDE THE FRONT OR BACK DOORS. OTHERWISE STAY OUT OF THE BUILDING
15:19:07	C7 TO FAO: TELL C1 THAT I AM PULLING COMPANIES BACK OUT AGAIN
15:19:13	FAO ACKOWLEDGES MESSAGE FROM C7 AND CONFIRMS COMMAND HAS THE MESSAGE
15:19:30	C7 TO C6: WE ARE GETTING THE GUY OUT NOW. GET EMS IN THE REAR
15:19:44	C7: UNREADABLE…..WE HAVE ONE OF THE TRAPPED MEMBERS AND EMS IS HERE
15:20:59	FAO TO C1 : TL 3 JUST BROUGHT A MEMBER OUT THE REAR OF THE BUILDING
15:21:28	FAO TO C1: WE HAVE NOTIFIED EMS BY PHONE TO RESPOND TO THE REAR OF THE BUILDING
15:21:37	C7 TO C6 AND C1: ARE MEMBERS STILL MISSING?
15:21:52	C1 REPORTS THAT AN ACCOUNTABILTY CHECK IS UNDERWAY.
15:22:08	FAO TO RIT CHIEF (D3)……NO ANSWER
15:22:41	LADDER 16 URGENT: HAVE AN AMBULANCE TO RESCUE 1 PLEASE. IN FRONT OF RESCUE 1 FOR THE MEMBER
15:23:56	C7 TO FAO: ASK C6 AND C1 IF ALL E33 MEMBERS ARE ACCOUNTED FOR
15:24:04	FAO NOTIFIES C7 AN ACCOUNTABILITY CHECK IS UNDERWAY.



15:25:28	LAD 16 REPORTS TO FAO THEY HAVE THE AMBULANCE
15:31:01	C2 ARRIVES AT THE 9TH ALARM
15:35:21	C6 ORDERS 1ST AND 2ND ALARM COMPANIES TO REPORT PAR FACE TO FACE WITH ACCOUNTABILITY 7
15:36:08	ACCOUNTABILITY 7 TO FAO: WE ARE AT 311 BEACON STREET
15:36:31	C6 INFORMS ACCOUNTABILITY 7 THAT DEPUTY RUGGIERE WILL ASSIST WITH ACCOUNTABILITY CHECK
15:37:18	FAO ORDERS 1ST AND 2ND ALARM COMPANIES TO REPORT FOR PAR WITH ACC 7….ENG 33-37-E22-E3-E4-E39-L15-L17-L26-TL3
15:38:07	LAD 17 INFORMS C6 THAT THE FIRE HAS EXTENDED THROUGH THE ROOF AND THEY ARE PUTTING WATER ON IT
15:40:09	C7 INFORMS C6 THEY ARE IN DEFENSIVE OPERATIONS IN THE REAR. ALL MEMBERS ARE AWAY FROM THE BUILDING
15:40:27	C6 TO C7……PROVIDES UPDATE ON FIRE CONDITIONS TO C7 AND THAT COMPANIES ARE SETTING UP HEAVY STREAM APPLIANCES FROM ADJOINING ROOFTOPS.
15:46:28	C2 TO C6: LOCATED ON EXP0SURE BUILDING ROOF. REPORTS PLAN TO UTILIZE TOWER TO OPERATE ADDITIONAL HAND LINES FROM THERE
15:50:18	C6 ORDERS ALL LINES SHUT DOWN
15:51:14	C6 ASKS C7 TO REPORT ON FIRE CONDITIONS AND CONFIRM THAT FIRE IS TRAVELING FROM THE REAR TO FRONT OF THE BUILDING
15:51:39	C700 REPORTS HEAVY FIRE VISIBLE IN FOUR WINDOWS IN THE REAR
15:51:58	C6 TO FAO: SEND TOWER LADDER 10 IN HERE AND HAVE THEM GO TO THE REAR OF THE BUILDING WITH C7
15:55:19	FAO TO L18: L18 FOR PAR, L18 REPORTS PAR
15:57:34	C7 TO C6 : REPORTS ON FIRE CONDITIONS AND PROGRESS IN THE REAR. REPORTS SETTING UP BLITZ GUNS AND COLLAPSE ZONES
16:05:28	PAR COMPLETED BY ACCOUNTABILITY 7. ALL MEMBERS ACCOUNTED FOR *EXCEPT FOR 2 MEMBERS OF E33*

16:24:01	C7 TO C6: REPORTS A POSSIBLE COLLAPSE OF 4TH FLOOR . COMMAND INSTRUCTS C7 TO MAINTAIN THE COLLAPSE ZONE IN THE REAR
16:29:53	C6 ORDERS ALL EXTERIOR LINES SHUT DOWN
16:30:00	FOR THE NEXT 2 HOURS DEFENSIVE OPERATIONS CONTINUED COMMUNICATIONS PRIMARILY LIMITED TO FIRE CONTROL OPERATIONS
18:31:30	REQUEST FOR ISD CHIEF INSPECTOR TO COME TO THE REAR
18:40:07	REQUEST FOR STRUCTURAL ENGINEER TO THE REAR
18:43:01	D09 REQUESTS TL10 AND R02 TO THE REAR OF THE BUILDING
18:46:09	C700 REQUESTS R01 TO THE REAR OF THE BUILDING
18:48:00	ESTIMATED TIME THAT LT WALSH WAS LOCATED. FIU ENTERS AND TAKES PHOTOGRAPHS PRIOR TO HIS REMOVAL BY E33 AND L15
18:51:30	C7 REQUESTS THE MEMBERS OF E33 AND L15 TO THE REAR
18:54:40	C6 REPORTS HE IS WITH THE 3 DEPARTMENT CHAPLAINS
21:25:00	PER CAD NOTATION: HEAVY FIRE REPORTED KNOCKED DOWN. REQUEST FOR A 2 ENGINE ,1 LADDER, 1 DISTRICT CHIEF FIRE DETAIL
7:43:00	NEW DATE: MARCH 27, 2015 ALL OUT TRANSMITTED ON BOX 9-1579

VIII. TIMELINE NARRATIVE

298 Beacon Street Fire Operations

The Boston Fire Department (BFD) frequently utilizes an aggressive interior attack strategy when it responds to residential structure fires due to the increased life safety risks involved in this type of structure. Rapid deployment of interior lines of hose along with simultaneous aggressive interior search, rescue and ventilation operations is the standard for the BFD. The BFD/ Incident Command System (ICS) is established and used at all such incidents and provides a system of command and control of operations.

An aggressive interior attack strategy is coupled with constant evaluation of the developing conditions by the Incident Commander (IC). Verbal reports from companies operating inside the structure, as well as exterior observations by the IC are critical to the evaluation of the strategy for the incident.

The strategy for the fire at 298 Beacon Street quickly changed from an aggressive interior attack to a concentrated search and rescue operation when a MAYDAY was received from two members of Engine 33 who were operating in the basement of the building.

The following narrative will reconstruct the events leading to the MAYDAY and the efforts to rescue Fire Lieutenant (LT) Edward Walsh and Firefighter (FF) Michael Kennedy at the fire at 298 Beacon Street. It is based on many sources including interviews of personnel at the incident (BFD and civilian), examination of physical evidence, audio recordings from the Fire Alarm Office, as well as photographs and videos available to the Board of Inquiry. Its scope will focus on the events leading to the MAYDAY and the efforts made to rescue them. It will not describe the simultaneous firefighting efforts conducted to extinguish the nine-alarm fire.

The Fire at 298 Beacon Street

On Wednesday, March 26, 2014 at 1441 hours the Boston Fire Alarm Office (FAO) received a call from a resident of 298 Beacon Street that there was smoke in the building. FAO transmitted box 1579 at 1442 hours and the following companies responded to the location:

Engine 33 (E33)
Engine 07 (E07)
Engine 22 (E22)
Engine 37 (E37) (RIT, Rapid Intervention Team)
Ladder 24 (L24)
Ladder 26 (L26)
Rescue 01 (R01)
District 4 (D04)

Upon the report of smoke showing by the Officer of E33 the following additional companies were dispatched:

Tower Ladder 3 (TL3)
Ladder 18 (L18) (RIT)
District 3 (D03) (RIT Chief)
H1 (Safety Chief)

Nine alarms were eventually struck at the following times by the IC indicated:

2nd Alarm:	14:49	D04
3rd Alarm:	14:52	D04
4th & 5th Alarm	14:59	Division 1 (C06)
6th & 7th Alarm	15:08	C06
8th & 9th Alarm	15:13	C06

Engine 33 was the first to arrive on the scene and the Officer (Victim #1, LT Walsh) reported smoke showing from the first floor of a four story brick structure and assumed command. Two civilians exiting the fire building reported that the fire was in the basement and that there might be someone in the basement apartment. The Officer and one Firefighter (Victim #2, FF Kennedy), detailed from L15, advanced a 1 3/4 inch line of hose through the front door and down the stairs to the basement.

A second Firefighter assigned to E33 (detailed from L15) stated during his post fire interview that, upon arrival, there was no fire showing and that the smoke looked like dust. The civilians exiting the building displayed no sense of urgency. He stated that a female resident told him that there was direct access to the basement apartment under the exterior stairway. He decided to check out that access. He forced two doors to gain entry to the front apartment and stated that the apartment was clear of smoke and fire. He felt heat at the rear interior door of the apartment but did not open it. Instead he exited the apartment and reported the conditions to District 4.

The District 4 Chief (D04) arrived on scene approximately one minute after E33 and assumed command. D04 acknowledged a message from an unknown unit that there were people on the fourth floor fire escape and observed one male and two female occupants who were making their way down the fire escape. D04 stated that there was no smoke showing from where the occupants were escaping. He ordered E07 to advance a 2 1/2 inch line of hose via the first floor entrance to back up E33 and then ordered E22 to advance a 2 1/2 inch line to the basement via the entrance under the exterior stairway. E07 and E22 dropped four-inch feeder lines and connected to hydrants.

Ladder 24 was the first ladder company to arrive and placed the truck at the front of the building. The chauffeur stated that the light smoke condition upon arrival changed to heavy black smoke within approximately one and one half minutes.

The Officer and one other Firefighter proceeded to the first floor entrance to conduct a primary search of the first floor. The Officer stated that the light smoke changed rapidly as he approached the front entryway to extreme heat with zero visibility. Shortly after entering the building he was forced to evacuate due to the severe fire conditions and literally dove head first down the stairs. He observed a 2 1/2 inch line that was charred (E07's line).

Engine 7 advanced a 2 1/2 inch line via the first floor front door to back up E33. The Officer and one FFOP (Firefighter on Probation) stated the heavy, dense smoke was not coming out of the doorway as they entered and they encountered severe heat at the doorway to the basement stairs. Engine 7 called for their line to be filled, but before it was they were forced to evacuate the first floor as flames, extreme heat and embers suddenly flowed from the stairwell and rolled overhead. Their 2 1/2 inch line was charred and the nozzle melted. One E07 Firefighter stated that E33's line was definitely charged. The Officer stated that the blast of heat, smoke and embers sounded like a freight train and felt like a strong gust of wind. He later noticed that there was a significant difference in the wind between the front and rear of the building, with severe wind at the rear of the building and insignificant wind at the front of the building.

At 14:48:24 D04 reported that he had a fire in a four-story brick residential building with fire in the basement and that the occupants of the fourth floor had self-evacuated from the fire escape. Seconds later a severe fire event occurred that caused fire conditions to change drastically. Heavy black smoke came billowing out of the building and members of E07 and L24 tumbled out of the building onto the front sidewalk. At 14:48:48 E33 made the first call for their line of hose to be charged. Almost simultaneously D04 ordered the second alarm at 14:48:51.

Engine 33 subsequently made the second request for their line to be charged at 14:49:12. At 14:49:22 D04 ordered all companies out of the first floor. Seconds later E33 declared a MAYDAY in the basement. **14:49:45**

Engine 22 advanced a 2 1/2 inch line to the basement via the entrance under the front stairway. The Officer stated that they charged their line and encountered heavy, black pressurized smoke and high heat but no visible fire as they attempted to advance their line into the basement. They had advanced about five feet into the basement and were operating their line when a Chief Officer ordered them out of the building. They repositioned their line to the first floor entryway with E07 where they encountered heavy black smoke with zero visibility and extreme heat but no visible fire. The Officer stated that the further they advanced the hotter it got with less affect by the 2 1/2 inch line.

When the heat became unbearable he ordered the company to back out. As they were backing out the line of hose the Officer felt pressure and then an explosion and next thing he knew he was on top of a pile of Firefighters on the front sidewalk. The Officer stated that while he was in the first floor he noticed a line of hose with water coming out of it approximately twenty feet into the building. D04 ordered all companies out of the building at this time. **14:50:17**

Ladder 26 was the second due Ladder Company and proceeded to the rear of the building on Back Street. The Officer stated that there was no smoke or fire showing from the rear of the building and that he observed a female on the fourth floor (third floor front) balcony fire escape. Ladder 26 removed her from the balcony via their aerial ladder and then raised the aerial to the roof of 298 Beacon Street. Upon further investigation the Officer observed a hole in the left side of the attached shed with fire burning inside and requested a line of hose to the rear at 14:51. He repeated this request several times without acknowledgement due to heavy radio traffic. At 14:57 he repeated his request and reported heavy fire in the rear of the building. Engine 4 and Engine 10 worked together to place a 2 1/2 inch line into operation with water supply from Beacon Street, as there are no hydrants on Back Street.

Engine 37 responded as the Rapid Intervention Team (RIT) engine company. While driving against traffic on Beacon Street they heard E33's MAYDAY transmission and noticed a light smoke condition from the building. The pump operator connected to a hydrant and the Officer and two Firefighters reported to D04. As the Officer reported to D04 the smoke changed rapidly to dark black. The District 3 Chief (D03) was on scene and assigned as RIT Sector Chief. District 03 RIT ordered E37 to advance a line to the basement via the entrance under the front stairway where they experienced extremely high heat conditions and were unable to advance more than ten feet into the building. The Officer stated that he observed that E33's line was charged despite hearing several subsequent requests for it to be charged. **14:56:06**

Engine 33 requested that their line be charged at approximately 14:48:48. E33 repeated this request several times over the next five minutes. Members of E07, E22 and E37 stated that they saw E33's line charged despite repeated requests by E33's Officer to charge the line. One Firefighter from L15, operating independently, advanced into the front entryway. He stated that the water on the floor was hot and that he was getting soaked. He thought it was an open line but found a "canoed" 1 ¾ inch line of hose with water coming out of it.

Section of a “canoed” hose found at the top of the stairs after the fire

He thought that the line was burnt through. He observed flames at the top of the basement stairway that looked like a blowtorch and stated that it looked like everything below was on fire. He then backed out and exited the building and informed the Safety Chief (H1) that there was a line burnt through in the first floor entryway.

The District 3 Chief (D03) reported to D04 and assumed supervision of the RIT Sector (E37 and L18). He was informed that two Firefighters were missing in the basement. District 3 RIT directed E37 to advance a line of hose via the basement entryway, but eventually ordered them out due to the extreme conditions. District 3 RIT proceeded to the first floor entryway to assess an alternate access point. District 3 RIT was in the entryway when an intense surge of extreme heat and heavy smoke occurred and he was knocked out of the building. It was later determined that D03 had received a concussion. District 3 RIT ordered L18 to advance a line to the first floor via the front stairway. District 3 RIT reported to C06 (Division 1 Deputy Chief, Incident Commander who assumed command at 14:59:07) that the companies were unable to get into the building to rescue the trapped members due to the extreme conditions.

The Safety Chief (H1) arrived on scene as E33 was declaring a MAYDAY and reported to D04. He observed that E37 and R01 were attempting to gain entry via the basement entryway. He proceeded to the first floor entryway where three lines of hose were in the building (E33, E07, E22). He stated that there was zero visibility and extreme heat. A member of L15 reported to H1 that E33’s line was burned through.

H1 informed C06 and ordered the companies to back out. Before they were able to exit the building he felt a strange pressure on his face, then an orange glow and was blown down the front stairs onto the sidewalk with other Firefighters.

The Officer of R01 stated that it was not a spectacular fire as R01 arrived on Beacon Street but the conditions changed drastically by the time he had donned his SCBA. He stated that there were very distinctly different types of smoke issuing from the building: heavy brown smoke from the first floor entryway and thick black smoke from the basement. District 4 ordered R01 to advance into the basement with E37 to rescue the trapped members of E33. Rescue 1 made three attempts to advance into the basement but they were unable to advance more than fifteen feet due to the extreme heat conditions. The Officer backed his crew out and reported to the IC that he was going to the rear of the building to attempt the rescue.

The initial rescue efforts concentrated on gaining access from the front of the building due to E33 advancing their line of hose via the front door and the subsequent radio reports from LT Walsh that he and FF Kennedy were located in the front of the building.

By this time it was apparent that a rescue was not going to be successful from the front of the fire building due to the extreme fire conditions. Rescue 2 (R02) responded on receipt of the MAYDAY transmission and reported to C06. C06 ordered R02 to advance a 2 1/2 inch line to the rear of the building via Exposure B with L17's assistance. There was heavy fire in the rear of the building and companies were attempting to knock down the fire and remove bars from the windows to gain access into the basement.

The Division 2 Deputy Chief (C07) responded to the scene and reported to C06. C07 voiced his concerns about the high wind conditions at the rear of the building. C06 assigned him to the rear of the building to coordinate fire attack and rescue operations. **15:04:00**

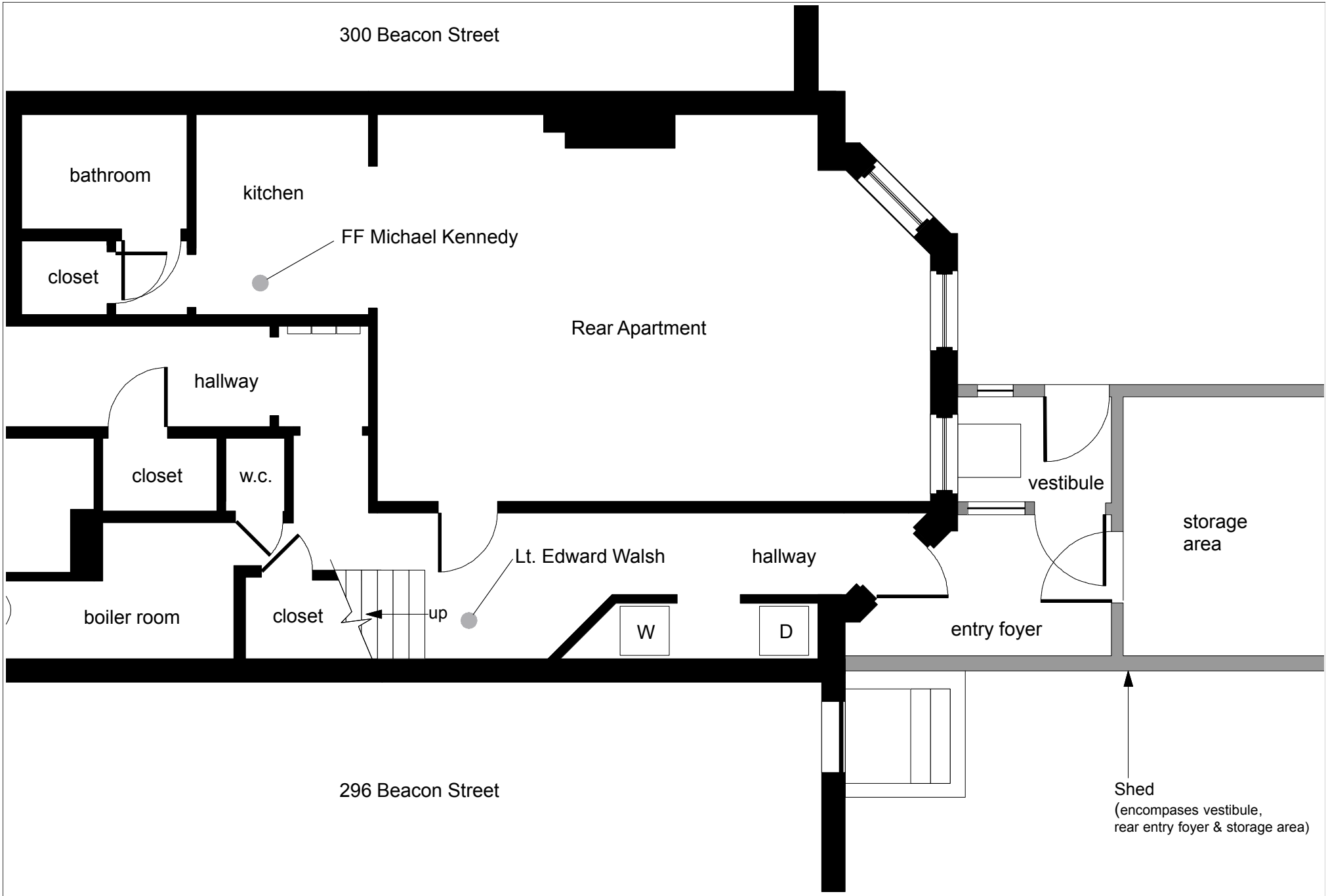
The Division 2 Deputy Chief coordinated the advance of lines of hose into the basement along with search companies to locate the missing Firefighters by assigning District 9 (D09) (Tech Rescue Chief) as RIT Supervisor and D04 as Non-RIT Operations. R01 and R02 slowly advanced into the basement along with three 2 1/2 inch lines manned by engine companies, attempting to locate the trapped members. Progress was slow due to the extreme heat and the volume of fire that had to be extinguished. Due to the slow advance some members' PASS devices began to operate. The R01 Officer asked for PASS devices to be reset in order to hear the PASS devices of the trapped members. Shortly after that message, the building shook and the IC ordered all members to evacuate the building and conduct a PAR (Personnel Accountability Report). **15:10:15**

The R01 Officer informed C07 that he heard a faint PASS device close by as he was evacuating the building and felt it was about twenty feet into the building. At that time the first floor (second floor from the rear) erupted in flames and a large volume of fire filled the rear windows.

After lines of hose knocked down the fire C07 assessed the conditions of the basement (first floor from the rear) and decided that there had been a ceiling collapse not a structural collapse. Based on the report of the R01 Officer, C07 decided to send one 2 1/2 inch line and one search team into the basement for a quick attempt to locate the member with the PASS device operating. Rescue 2 located Victim #2 (FF Kennedy) approximately twenty feet into the basement; he was removed and taken to a Boston Emergency Medical Services (BEMS) ambulance. **15:14:00**

After communicating with Command about the differing conditions in the rear versus the front of the building, C07 was given permission to send in another rescue team. This second team was allowed entry for thirty seconds but was unable to hear a PASS device or locate Victim #1 (LT Walsh). Due to the deteriorating conditions and the low probability of a rescue, C07 ordered the rescue team out of the building and ordered a PAR for all companies in the rear of the building. Defensive operations were then initiated and the appropriate collapse zone was established. **15:19:07**

Approximately three hours later, after consultation with a structural engineer specializing in building collapse, Command (C06) decided to make another attempt to locate and remove LT Walsh. The Division 2 Deputy Chief coordinated and supervised this phase of the operation. Rescue 01 and Rescue 02, due to their knowledge of the interior layout, were assigned to advance into the basement. They located LT Walsh and initiated recovery operations. As LT Walsh was being placed in a Stokes basket the building again shook. There had been a partial collapse elsewhere in the building. The Division 2 Deputy Chief urged the members involved to move as quickly as possible and they passed LT Walsh to the members of E33 and L15 waiting outside the window. He was then transferred to a BEMS ambulance stationed nearby. **18:48:00**



298 Beacon Street
Boston, MA

Basement Plan detail

scale: 0' 5' 10'

date: 8-14-15

Prepared for the Boston Fire Department by

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62

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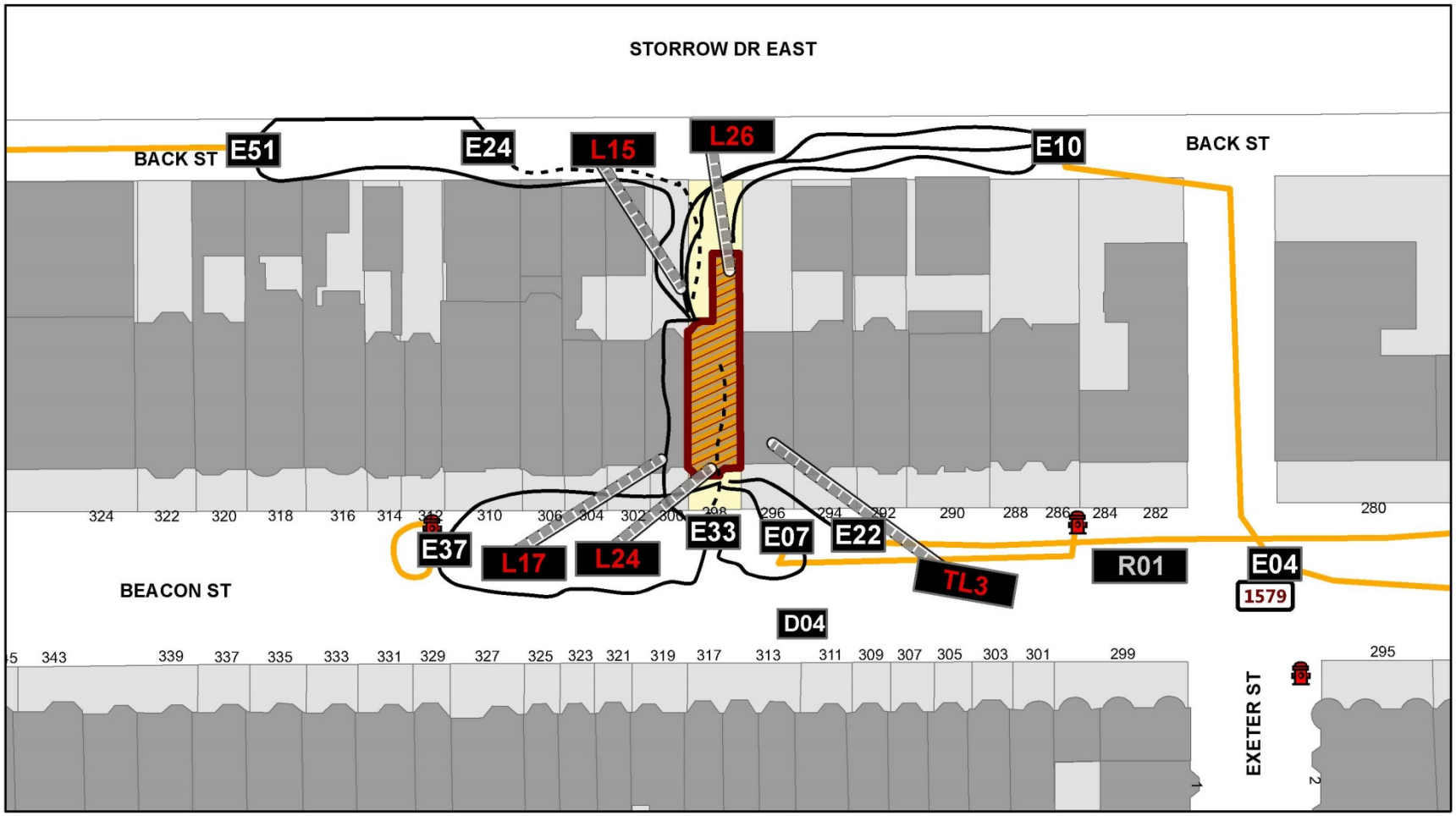
W S N E

Critical Apparatus and Attack Line Placement
Box 9-1579

March 26, 2014



Fire Location

298 Beacon St

Hose Line

2-1/2"

1-3/4"

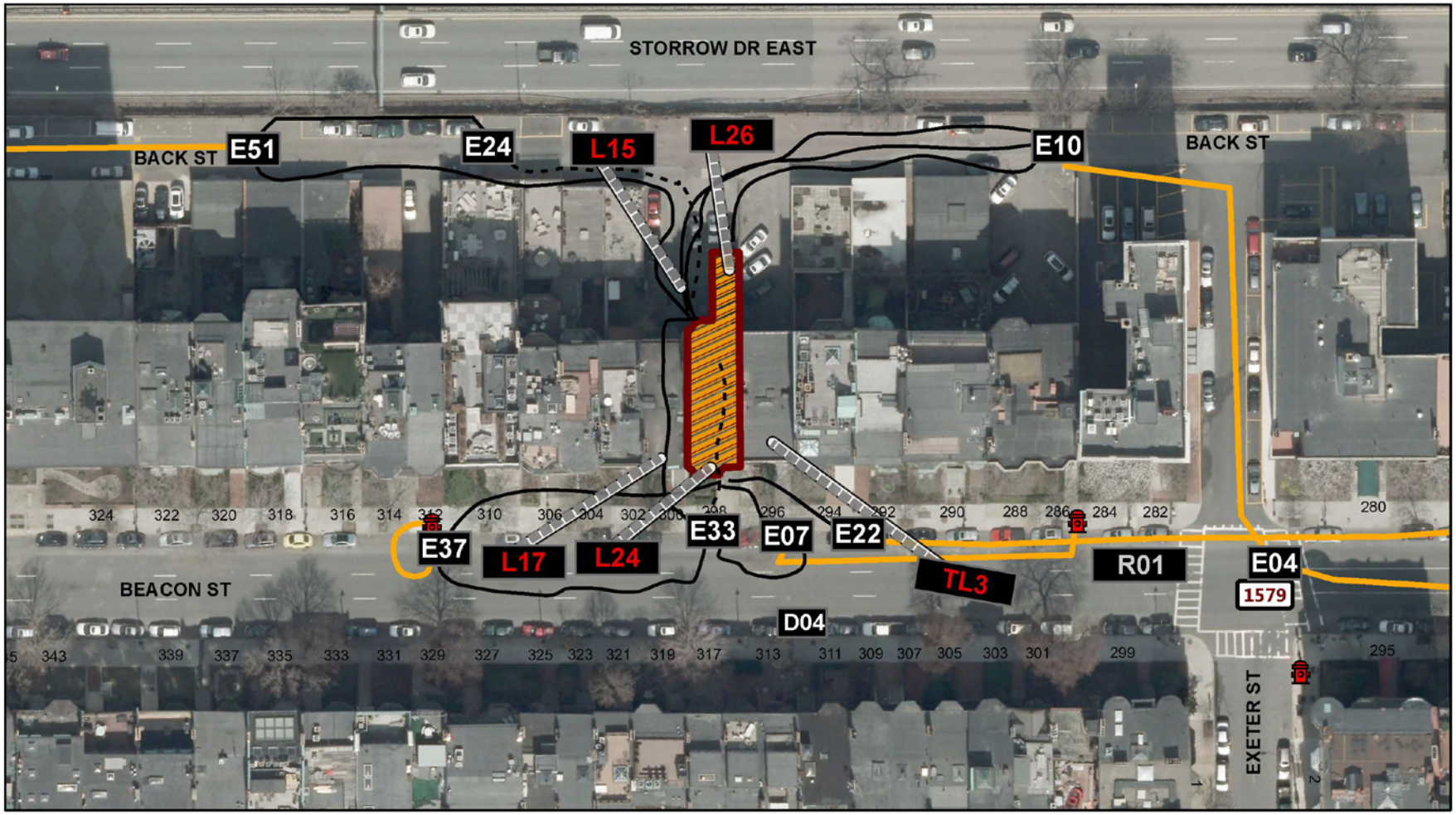
4"

0 50 100 Feet

1 inch = 62 feet

N

Critical Apparatus and Attack Line Placement
Box 9-1579
March 26, 2014



Fire Location

298 Beacon St

Hose Line

2-1/2"

1-3/4"

4"

0 50 100 Feet

1 inch = 62 feet

N

IX. FIRE DEVELOPMENT

The following description of the fire development at 298 Beacon Street is based on resident and firefighter interviews, fire modeling[1], fire scene photographs and videos, observations of fire damage, and the aggregate experience of the Board members.

Fire Growth in Rear Foyer

Once the slag from the welding operation wedged under the east wall of the basement rear foyer, it ignited the plywood wall. Fire spread upward and laterally along the wall and soon reached the wooden dresser shown in Figure IX-1. Hot combustion gases from the burning wood accumulated under the ceiling to produce a deepening hot gas layer. The hot gases probably caused the paint cans and the wood shelf shown in Figure IX-1 to also start burning. Air to support this burning entered the foyer from the expanding hole at the bottom of the east wall.

Eventually the hot ceiling layer became sufficiently hot and deep to crack the glass on the doors and window in the rear foyer. The cracked glass in the door to the basement hallway and the gaps around the fuel oil and vent pipe penetrations through the foyer south wall, which separated the foyer from the hallway, allowed smoke and hot gases to enter the basement hallway and the laundry room within a few minutes after the ignition of the foyer east wall.

Smoke Spread to Hallway and Apartments

Smoke entering the basement hallway from the rear foyer rose to the ceiling where a smoke detector was situated. The smoke detector alarm was heard by building residents including the resident of the basement rear apartment who evacuated the apartment via the hallway and stairway shown in Figure IX-2, and called 911. She reported seeing a wall of smoke in the rear hall to her left as she exited her apartment and lighter smoke overhead that was venting up the stairway. Alarmed by the smoke, she stated that she ran up the stairs toward the light still visible at the top of the stairs. Before exiting the building she alerted the residents in the first floor apartment. These residents reported seeing and smelling wispy smoke coming up the basement stairway and flowing toward the front door on Beacon Street. Since the smoke on the first floor did not appear threatening at that time, they returned to their apartment to get some possessions before evacuating. When they did evacuate a few minutes later, the smoke in the first floor hallway had become thicker and darker. There was also an indication of smoke entering the first floor apartment kitchen through floor penetrations for piping and/or wiring.

[1] One fire model used is the CFAST building fire software developed and supported by the NIST Fire Research staff. It uses a representation of the initial fire based on test data, and solves conservation and transport equations to determine the flow of smoke and heat leading to ignition of other combustible materials in the building. A more complex and sophisticated model called FDS was also used for the early stages of the fire.

At the time the first floor and basement apartment residents were leaving via the front doorway (about 14:46), firefighters from Engine Company 33 were preparing to enter the building. These residents told the firefighters how to get to the stairway leading to the basement. Fire modeling results indicate a hot gas/smoke ceiling layer (was) rapidly developing and deepening in the basement hallway and laundry room at that time. Combustible objects in the laundry room and hallway included empty laundry detergent boxes/bottles and a wood chair. Upon entering the building and making his way down the basement stairs at 14:47, FF Kennedy reported over the radio “It’s in the basement” (fire) to LT Walsh at the front entrance, and directed him to his location.

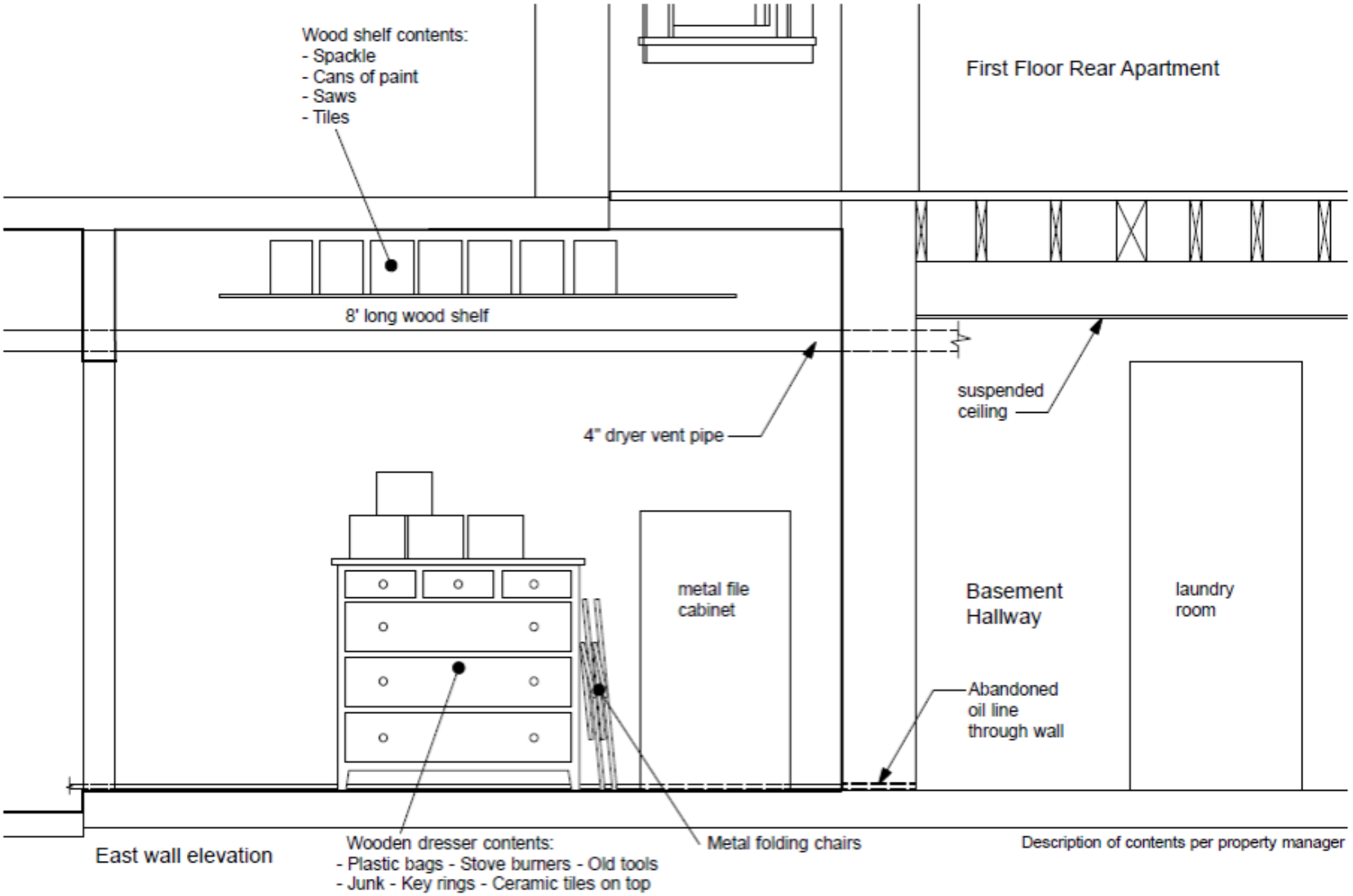
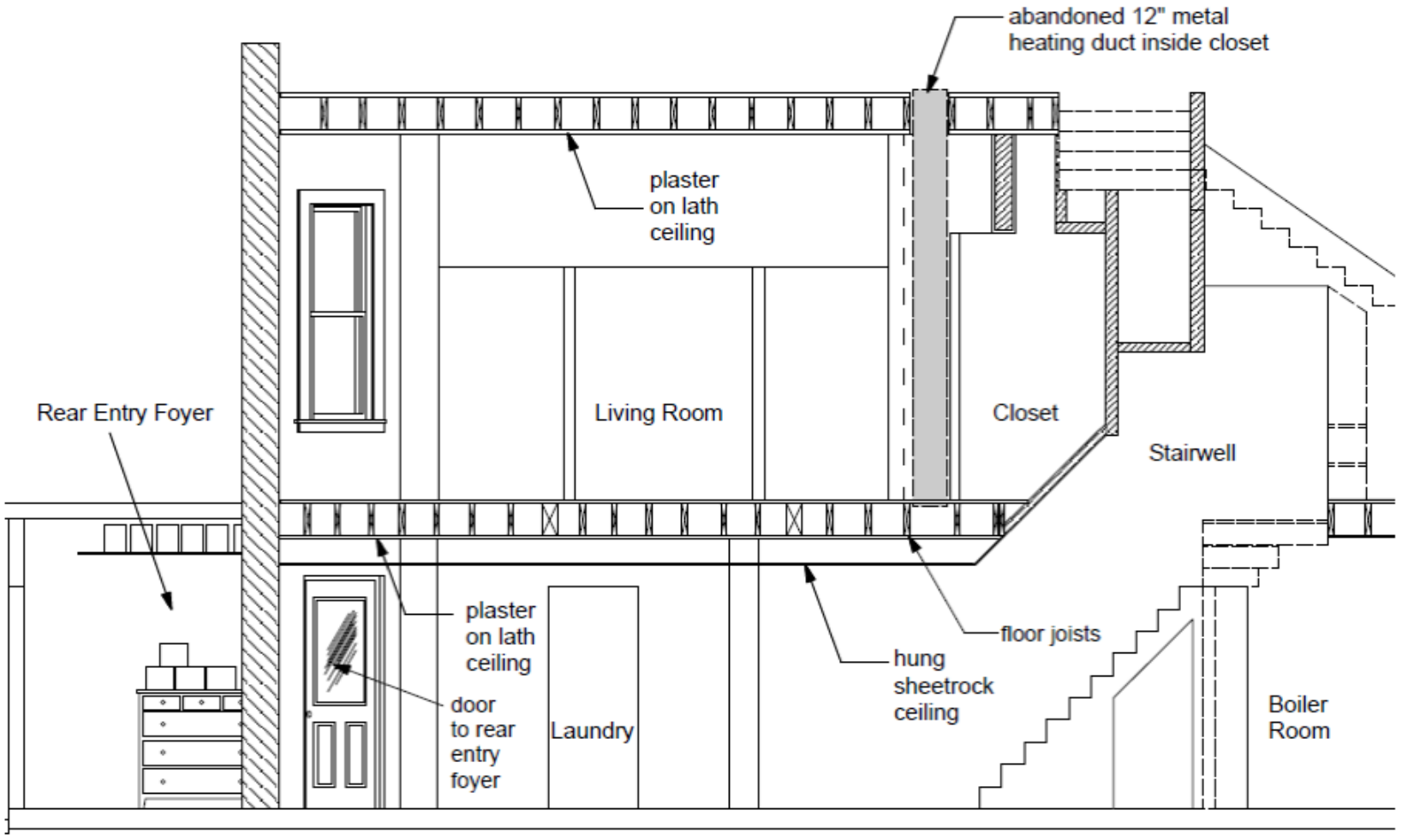


Figure IX-1. Basement rear foyer and hallway elevation view.



Section view detail through basement hallway looking east

298 Beacon Street
Boston, MA
Section Detail Looking East

scale: 0' 5' 10'
date: 5-13-15 rev 7-30-15
rev 6-26-15

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Figure IX-2. Elevation View through basement hallway looking east.

Fire Spread to Basement Rear Hallway and Stairway

The hot buoyant gas layer under the basement hallway ceiling also extended up the basement stairway to the first floor. Engine 33's 1 ¾ inch line of hose was lying on the basement stairway under this hot gas layer. Hose fire resistance tests described elsewhere in this report show that the hose starts charring and melting within 94 to 125 seconds of exposure to the radiant heat flux from the hot ceiling layer. When LT Walsh excitedly called at 14:48:48 for the hose to be charged, Engine 33's hose section on the stairway had been exposed to radiant heat for at least 94 seconds. Therefore, the pressurized water carrying capability of the hose was probably already compromised preventing water from reaching the nozzle at the time the line was charged.

LT Walsh's excited call at 14:48:48 coincided with a sudden change in fire conditions forcing firefighters on the first floor at the top of the basement stairs to quickly evacuate the building, with some retreating firefighters suffering second degree burn injuries. This sudden fire escalation motivated the Incident Commander to strike a second alarm. Based on interviews with firefighters positioned at the top of the stairs, conditions there suddenly became untenable. A sudden increase in the first floor hallway ceiling layer temperatures also caused charring of Engine 07's 2 ½ inch uncharged line of hose and melting of the nozzle's elastomeric covering in the short time it took to escape from the hallway to the front stairs twenty feet away.

The most likely explanation for the sudden fire escalation in the basement hallway and stairway is probably the failure of the hallway door window due to the glass cracking and falling out[2] or being blown out by pressurization of the rear entry foyer. This allowed higher flow rates of the hot gas and smoke from the rear entry foyer into the hallway and up the stairway. Another factor could be ignition of the stairway carpet caused by a few minutes exposure to the increasing radiant heat from the hot gasses flowing up the stairway. Hot combustion gases and copious amounts of smoke probably flowed into the first floor hallway by 14:50, propelling thick dark grey smoke out the front doorway as seen in Figure IX-3. The stairway carpet fire was eventually augmented by burning containers of combustible liquids on the shelves at the top of the stairway (see Figure IX-4), by the flow path up the stairway from the external winds entering the basement at the intermittently open shed (vestibule) doors and the hole burned in the rear foyer plywood wall. The stairway carpet was completely consumed by the fire.

[2] Fire tests and analysis indicates that glass windows will typically break and fall out of the frame when the fire heats the glass to temperatures in the range 840°F to 930°F (K. Kang, Fire Safety Journal, 2009).

Figure IX-3. Smoke venting through front doorway at approximately 14:50.

Figure IX-4. Top of the basement stairway after the fire.

At around the same time that LT Walsh and FF Kennedy were descending the basement stairway, another Engine 33 firefighter was entering the basement front apartment from the Beacon Street basement garden level entrance. He made his way through the front apartment until he encountered the apartment rear door leading to the basement hallway.

Upon touching this door, he felt significant heat and heard a crackling sound coming from the other side of the doorway. This indicates that the basement hallway hot gases and possibly flame had spread to, and were accumulating, in the portion of the rear hallway (and likely above the ceiling void space) leading to the front apartment. The firefighter did not open the door and reported this information to the Incident Commander. Figure IX-5 shows the charred door (which was not opened until after the fire) and entrance to the hallway, and Figure IX-6 shows the door location in the basement. Combustibles burning in that section of the hallway included exposed electrical cables connected to the electrical meters, a wood dresser near the meters, an ironing board and storage bins containing Christmas decorations and plastic kitchenware. Air for the combustion of these combustible materials reached the rear hallway driven by the strong winds that entered the basement from the north.

Figure IX-5. Basement front apartment doorway leading to hallway.

Flame Spread Above Basement Suspended Ceiling

As indicated in the Figure IX-6 drawing, there was an approximately one foot gap between the top of the basement hallway ceiling and the bottom of the first floor floorboards, which sat on wood joists. The basement ceiling near the foot of the stairway had a penetration to allow for possible installation of plumbing piping up to the first floor apartment. This penetration allowed the hot basement ceiling layer gases to enter the gap above the ceiling and to flow to other areas above the basement. The hot combustion gases also ignited and caused extensive burning of the wood joists and electrical wiring above the ceiling as shown in Figure IX-7.

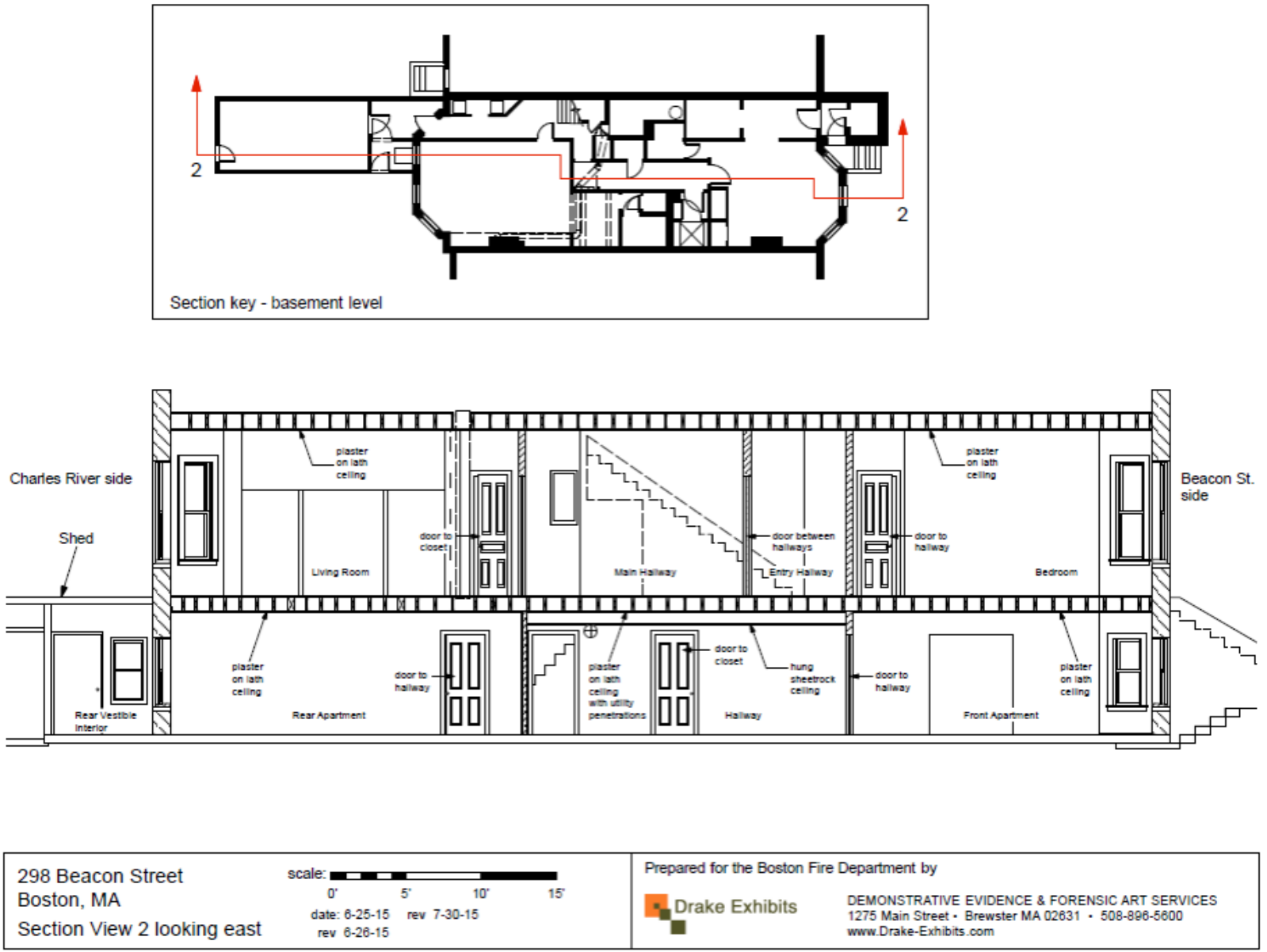


Figure IX-6. Section view 2 showing basement hallway leading to front apartment and joists above ceilings.

Figure IX-7. Burned joists and wiring above basement hallway ceiling.

The hot combustion gases above the basement ceiling apparently flowed all the way to the front basement apartment where they descended into the apartment itself. When firefighters attempted to enter the front basement apartment shortly after 14:50, the extreme heat and combustion gases prevented entry. Views of the basement front apartment after the fire showed heavy charring at upper elevations but only minor burning of the combustible furniture below as seen in Figure X8.

Figure IX-8. Basement front apartment after fire.

Fire above and below the basement ceiling weakened the metal framing supporting the suspended gypsum ceiling and destroyed the wooden lath that supported the heavy original plaster ceiling. Eventually the heavy plaster ceiling collapsed when the supporting wood lath burned away. Subsequently the plaster-on-wood-lath ceiling on the first floor failed in the same way when large sections of the heavy plaster fell to the floor causing the building to shake.

Fire Initiation and Growth in Basement Rear Apartment

Hot combustion gases from the basement rear vestibule entered the basement rear apartment when the apartment's northeast window broke from the heat of the vestibule fire. Additionally, hot gases from the basement hallway flowed into the apartment from the basement hallway door when Lieutenant Walsh and Firefighter Kennedy entered the apartment. A third pathway for the hot combustion gases was the openings in the apartment ceiling and walls associated with pipe and duct penetrations.

The hot gases entering the basement rear apartment accumulated in a deepening layer under the ceiling. Eventually radiation from the hot ceiling layer ignited the combustible furnishings in the apartment. These included window curtains and fabric blinds, paintings on the walls, a sofa, a bed with blanket and mattress, an area rug, a table and chairs. Views of the rear apartment after the fire showed that most of these furnishings were almost completely burned as indicated in Figure IX-9.

Figure IX-9. Remnants of basement rear apartment furnishing.

The basement rear apartment fire grew in size (heat release rate) as the various furnishings were ignited in the living room. At approximately 14:57 the fire cracked and blew out the basement windows. Now oxygen needed for further fire spread was available from the wind blowing through the windows.

Heat then rapidly escalated in the kitchen where FF Kennedy was found and in the hallway where LT Walsh was eventually found. When the apartment ceiling collapsed hot combustion gases accumulated under the first floor apartment floorboards and eventually seeped into that apartment.

Fire Spread to First Floor Apartment

Hot gases from the basement hallway and rear apartment fires entered the first floor apartment rear living room via floor penetrations. Some flame also entered the apartment and may have ignited a ladder-back chair in front of a window, as shown in FigureIX-10. The lower half of the northwest window is also broken at this time but a large flat-screen TV in front of the window inhibited wind flow through the broken window.

Figure IX-10. Flame showing through first floor rear window at 15:09.

The heavy fuel load in the first floor living room included a Murphy bed with a queen size mattress on the east wall, a sofa in the center of the room, tables and chairs near the east wall, a bookcase filled with books, a large ottoman chair in the northwest corner of the room, a tall chest of drawers and ladder-back chairs near the center windows. There was a wardrobe closet and file cabinet in the southeast area of the room. At the time of the photo shown in Figure IX-10 (15:09), at least some of these furnishings were smoldering due to the limited air flow into the room.

Eventually most of this heavy fuel load burned as did some of the combustibles in the interior hallway connecting the front bedroom to the rear living room. The intense burning in the first floor living room and hallway (and the first floor common hallway outside the apartment) caused the heavy ceiling plaster to fall away from the lath and loudly impact the floor at some time in the interval 15:02 to 15:09. This startled firefighters entering through the basement rear windows. Despite the burning in the first floor rear and hallway, the furnishings in the first floor front bedroom never burned.

Smoke Explosion

There was a heavy fuel load starting to burn in the first floor living room at about 15:10 and insufficient air flow through the obstructed broken windows to allow for complete combustion of those fuels. The decomposition and pyrolysis of the furnishings at that time generated large volumes of combustible vapors such that there was a fuel rich mixture of these vapors with oxygen depleted air under the living room ceiling. At about 15:11, the composition of the fuel vapor/oxygen vitiated air mixture under the ceiling may have changed (perhaps when the basement ceiling collapsed, allowing wind driven air to flow through the basement rear apartment up into the apartment above) such that a flammable mixture formed in the first floor apartment. Alternatively, there may have already been a flammable mixture that suddenly was ignited by the small flame visible in FigureIX-10. In either case, the sudden ignition of a flammable vapor-air mixture in the first floor apartment living room caused rapid flame propagation through the mixture with an accompanying sudden increase in the pressure in the room. The result was a smoke explosion[3] evident from the jetting flame projection seen in Figure IX-11. The smoke explosion startled firefighters and triggered another order for firefighters to evacuate.

[3] A smoke explosion differs from a backdraft explosion in that the latter requires a sudden change in ventilation, such as the opening of a door or window, which did not occur in this case. Reference: C. Fleishman and ZJ Chen, "Defining the difference between backdraft and smoke explosion," Procedia Engineering 62 (2013) 324 – 330.

Figure IX-11. Large projected flame and dark grey smoke from a smoke explosion at 15:11.

X. FIRE CAUSE AND DETERMINATION

NARRATIVE STATUS

FIRE INVESTIGATION UNIT

INCIDENT: 14/16454 DATE: 03/26/2014 ADDRESS: 298 Beacon Street

On 03/26/2014 at approximately 1441 hours a 911 call was received by Fire Alarm for a building fire at 298 Beacon Street. The Fire Investigation Unit (FIU) with Lieutenant [redacted] Inspector [redacted], Inspector [redacted], K-6 and Boston Police Detective [redacted], along with Inspector [redacted], K-7 were ordered by Fire Alarm to respond to the above address. Incident Command struck nine alarms. Additional members from FIU on scene were Deputy Fire Chief [redacted] (K-1), District Fire Chief [redacted] (K-2), District Fire Chief [redacted] (K-3), Captain [redacted] (K-3A), Lieutenant [redacted] (K-5), Lieutenant [redacted] (K-20), Inspector [redacted] (K-5A) and Boston Police Lieutenant Detective [redacted] . The FIU reported to District Fire Chief [redacted] of Car 4 who directed us to 298 Beacon Street, a 4-story attached tenement dwelling of ordinary construction consisting of 10 apartments.

The weather at the time of the fire was overcast skies, temperature 34 degrees F, humidity 27%, wind was from the NW sustained at 32.2 mph with gusts to 67mph. This fire involved all floors and claimed the lives of two firefighters. Interviews of witnesses and tenants were conducted by members of the FIU and Boston Police and have been submitted as supplemental reports.

Upon the FIU arrival, there was a heavy volume of smoke from the front basement and first floor doorways. Rescue operations were ongoing for two firefighters who declared a "mayday" and were still in the building. In addition, firefighters in the rear of the building were calling for help to rescue tenants from the upper floors.

298 Beacon Street is divided into 10 individual apartments. On floors one and two the apartments have been combined. Therefore, a total of 8 tenants reside at this address and their apartment location is as follows. Basement floor, front apartment, is [redacted]; rear apartment is [redacted]. First floor is a combined front and rear with [redacted] as tenant. Second floor is combined front and rear with [redacted], tenant, who was on vacation and not in town at the time of the fire. Third floor front is [redacted]. Rear apartment is [redacted], who was rescued by Ladder 26. Fourth floor front is [redacted], called 911 to report the fire. Rear is [redacted] who was at work at the time of the fire. The building is owned by the [redacted] estate and is maintained/managed by Mr. [redacted] , whose statement is mentioned later in this report.

As a result of this fire there were two firefighter deaths. Both victims were located in the basement rear. Lieutenant Edward Walsh was found at the bottom of a flight of stairs leading to the first floor. District Fire Chief [redacted] of the FIU and Boston Fire Department Photographer Inspector [redacted] entered the basement apartment after fire suppression and obtained photographic documentation of Lieutenant Walsh before he was removed from the scene. Firefighter Michael Kennedy was found inside [redacted] apartment at the entranceway to a small kitchenette and removed by Firefighter [redacted] of Engine 42 during firefighting operations. His statements to Lieutenant [redacted] have been entered as a supplement to this report. Photographic documentation as to Firefighter Kennedy's location, was done by Inspector [redacted] .

Additional resources were on scene to conduct the investigation, among them Boston Police Homicide Unit, Crime Scene Services, Mass State Police Trooper and Accelerant Canine Handler [redacted] and Suffolk County District Attorney [redacted].

After fire suppression, Lieutenant [redacted], along with the above mentioned members of the FIU, began their investigation with a 360 degree view of the exterior of 298 Beacon Street. The area of lowest burn as well as the area of burn that was furthest into the wind was at the wall of a shed facing the rear of 296 Beacon Street. This shed was attached to 298 Beacon Street. A section of exterior wall had been completely burned away, in a reverse cone pattern from the lower wood sill plate to approximately 4 feet up. At the lower sill plate was spalled concrete and the reverse cone pattern had burn extending from the opening toward the main building. The right side of the reverse cone did not have any such burn. Inside this area was heavy burn with complete destruction of 2 x 4 wood studs as well as heat and flame patterns across the ceiling and continuing toward the interior doorway. From this area there were heat and flame patterns heading toward the hallway and rear basement apartment. In this apartment and along the "B" wall was a fireplace. The burned walls in this area were consistent with total room involvement. In the kitchenette, there was an electric stove, an electric toaster, dishwasher and refrigerator. All outlets and fixtures have been photo documented by Inspector [redacted]. Again the burn pattern was consistent with total room involvement with no sign of any specific area being a point of origin.

The electrical system, including all outlets, identifiable fixtures and breaker panel boxes have been examined by Licensed Master Electrician, Lieutenant [redacted] and his report is filed supplemental to this report. Photo documentation has been submitted by Inspector [redacted] as well.

The heating system is oil fired and is in good repair with maintenance performed by [redacted] Heating Company. There is no burn outside the motor or burn box. Connections appear in order with no indication of burn. Along the rear exit hallway is a laundry room with washer and electric dryer. There was soot deposition from ceiling to approximately 2 feet off the floor. A dryer vent pipe extending horizontally to the rear of the building did not have any area of burn. The pipe was examined by Lieutenant [redacted]. He found a section of this

pipe on the floor. It was without evidence of burning on the inside. At the end of the exit hallway was an attached shed/storage. This shed had three access doors. The outermost was a metal door with glass window which entered into a small inner passageway that had an inner metal door with glass window. Once inside there was a small entranceway containing a file cabinet and stacked old ceramic tiles. To the left were stored paint cans, hardware and the oil tank. The heating oil tank is housed in the attached shed. There is no burn in that portion of this shed and the supply line as well as firematic wheel was intact. There was no natural gas supply to this area.

To the right was a third door entering the hallway which has the door to Ms. [redacted]' apartment and laundry room. In this passageway, was flame and heat vectoring back to the lower sill plate. There were no obvious cigarette butts, weathered or non-weathered, of any kind at this sill plate, either inside or outside. Nor were any butts found in the adjacent outside doorway or area in the rear of 296 Beacon Street. Further examination by Lieutenant [redacted] found an unused welding rod. Inside the wall at the sill plate was a 3/8 inch metal tubing extending along the floor toward the rear of 298 Beacon Street. This tubing had sections cut away, although the tubing appeared dry, aged and not in use, Lieutenant [redacted] removed a 12 inch section of 2 X 4 wood sill plate, believed to be the first fuel, for examination by Boston Fire Department Chemist for the presence of hydrocarbon and the unused welding rod.

Lieutenant [redacted] along with Inspector [redacted] and Boston Police Sergeant Detective [redacted], interviewed the building manager for 298 Beacon Street, Mr. [redacted] (Cell # [redacted]) at approximately 11:00 P.M. on March 26, 2014. Mr. [redacted] informed us that he had an up-to-date list of tenants of 298 Beacon Street. He has contacted by phone all the tenants except for [redacted] who was on vacation out of town. He said there was a recent complaint about the heating system making a banging noise. A plumber told him the noise was "water hammer" created by air in the system. When asked about recent building maintenance he stated there was nothing significant going on at 298 Beacon Street, but did mention a welding operation today at 296 Beacon Street. He did not offer any more information. Subsequent interviews with Mr. [redacted] have been submitted as supplemental to this report.

On 3/27/2014 at approximately 0820 hours, Lieutenant [redacted] and Inspector [redacted] interviewed Mr. [redacted], first floor (rear) tenant of 296 Beacon Street, at the corner of Beacon and Dartmouth Streets. He stated that he noticed unusual activity of a welding crew outside his window, the rear first floor apartment of 296 Beacon Street on 3/26/2014. He saw two males hurriedly throwing tools into a "utility type" truck. He said the lettering was "[redacted] Ironworks" on the tailgate and copied the license plate down. His reason for copying the plate # was that their actions, throwing expensive tools into the truck, very hurriedly was suspicious to him. The license plate number was written down on his calendar which was inside his apartment, which was now restricted to all persons. This information was relayed to Lieutenant [redacted] and Lieutenant Detective [redacted] who then escorted Mr. [redacted] into his apartment to retrieve the information.

It is the opinion of the Fire Investigation Unit that the area of origin of this fire is the rear of 298 Beacon Street, outside the shed wall facing the rear of 296 Beacon Street. The cause of this fire is a heat source too close to combustible material, with combustion accelerated by high winds. This case remains open pending further investigation. Fire value loss is estimated at $1,900,000.00 by Deputy Fire Chief [redacted]. All digital photos submitted with this report were taken by Inspector [redacted].

Respectfully submitted,

For the Fire Investigation Unit
Lieutenant [redacted]
Fire Investigation Unit/Arson Squad
[redacted]
Beacon st 298

XI. PERSONAL PROTECTIVE EQUIPMENT

Equipment

The Boston Fire Department (BFD) provides and issues personal protective clothing and equipment (PPE) to all of its members. Personal protective clothing and equipment for structural firefighting is provided in the form of bunker coat, bunker pants, bunker boots, safety gloves, fire helmet, flashlight, and a Personal Alert Safety System (PASS) device. All members are issued two full sets of bunker gear. A Self Contained Breathing Apparatus (SCBA) is provided on the fire apparatus for each on-duty Firefighter.

Bunker Gear

The BFD requires all members to wear complete PPE and SCBA when responding to and working at all structural fires and vehicle fires. This is reflected in Special Order No. 51, dated October 18, 2007 and also in Standard Operating Procedure #620 (Personal Protective Clothing). Both Fire Lieutenant Edward Walsh and Firefighter Michael Kennedy were wearing complete PPE and SCBA while operating at the structural fire on Beacon Street.

The BFD currently uses an independent service provider to perform advanced cleaning, inspections and repair of the bunker gear worn by its members. The program, consistent with NFPA 1851 (Standard on Selection, Care and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Firefighting), provides that each member's bunker gear will be collected, inspected, cleaned and, as needed, repaired at least once every 12 months.

This PPE is certified as compliant with NFPA 1971 (Standard on Protective Ensemble for Structural Firefighting) meeting the requirements of successive editions of the standard depending on the date they were placed in service.

SCBA

The BFD respiratory protection program provides every on-duty member an individual Self Contained Breathing Apparatus (SCBA). The equipment provided is a SCOTT AIR-PAK 75, Model 4.5 SCBA. Standard Operating Procedure #610 (Respiratory Protection Policy) identifies the policies governing the use of the SCBA and the situations in which approved respiratory protective equipment shall be worn. Four hundred and seventy new SCBAs were purchased in May 2013 and are compliant with NFPA 1981 (Standard on Open-Circuit Self Contained Breathing Apparatus) 2007 edition.

Every member of the Department is provided with a personal issue full face piece, which is required to be fit tested annually. The SCBAs used by LT Edward Walsh and FF Michael Kennedy were assigned to Engine 33 in August of 2013.

PASS

All members of the Department, when wearing SCBA, are provided with two Personal Alert Safety System (PASS) devices. Each member is issued a Grace Industries Super PASS II, which is an individual stand-alone PASS that they are required to affix to their bunker coat. In addition, all Department SCBA are equipped with an integrated, automatically activated, SCOTT PAK-ALERT SE PASS device. The integrated PASS is certified as compliant with NFPA 1982 (Standard on Personal Alert Safety Systems) 2007 edition.

Radio System

The BFD is responsible for the receipt and dispatch of all fire related emergency calls throughout the city. These calls are received and the apparatus dispatched by the Fire Alarm Office (FAO). The BFD operates a conventional analog radio system manufactured by Motorola. The system is licensed by the Federal Communications Commission (FCC) as a Public Safety Radio System and utilizes 15 channels. The frequencies listed are for both portable and mobile radios.

Channel	Frequency	Use
BFD 1	483.1625	Call-In, General Communications
BFD 2	483.1875	Fire Ground Communications
BFD 3	483.2125	Secondary Fire Ground Communications
BFD 4	483.2375	Evacuation Operations
BFD 5	453.6500	Station Alerting
BFD 6	483.1500	District Repeater located at E30
BFD 7	483.1750	District Repeater located at E29
BFD 8	483.2000	District Repeater located at 35 Northampton Street
BFD 9	483.2250	District Repeater located at E09
BFD 10	483.2500	District Repeater located at E16
BFD 11	486.1500	Tactical/Command Channel
BFD 12	486.1750	Tactical/Command Channel
BFD 13	486.2000	Tactical/EMS Interop
BFD 14	486.2250	Tactical
BFD 15	486.2500	Tactical

Channels BFD1 through BFD4 operate in half-duplex mode. This allows the Fire Alarm Office (FAO) to receive and transmit at the same time while the mobile and portable radios can either receive or transmit. The FAO has sole responsibility for the control of radio traffic. Channel BFD1 has been designated as the Call-In channel. The use of all other channels is restricted. The FAO will assign radio channels to incidents or units as needed.

During multiple alarm fires or other high radio traffic periods, the FAO will designate which channels are to be used for what purpose. This includes the assignment of channels for use at a particular incident. Normally BFD2 will be assigned for a fire or multiple alarms if not already in use. Subsequent fires will be assigned to BFD3 and BFD4. The units operating at the Beacon Street fire were originally assigned to BFD2 by the FAO.

All fire apparatus and command vehicles are equipped with mobile radios. The standard portable radio is the Motorola XTS5000 radio and is utilized by all firefighting and field personnel. All on duty personnel are assigned a portable radio. The transmit power of the XTS 5000 portable is 5 watts. All mobile and portable radios are equipped with a unique user identification call sign. This call sign is recorded and time stamped by the FAO console every time the radio transmits. In addition every radio voice transmission is recorded, with time stamp, on a separate digital radio voice recorder.

All portable radios are equipped with two orange buttons, which, when activated, are programmed to send an emergency signal to the FAO radio consoles. The emergency signal includes the unique user identification call sign. This signal is intended to alert the Fire Alarm Operators that there is a MAYDAY or Urgent message or that the firefighter is in distress. The Fire Alarm Operator will then call that radio to determine the nature of the emergency.

Upon transmission of a MAYDAY the FAO shall proceed with the following:

- Confirm with the Incident Commander that they are aware and have acknowledged the MAYDAY.

- Transmit the MAYDAY alert tone and simulcast “Companies maintain radio silence and standby for a MAYDAY transmission.”

- Confirm with the Incident Commander the MAYDAY firefighter’s information: Location, Radio Identification, and Problem (LIP).

- Simulcast a fire ground channel change for non RIT group operations. At this time the original fire ground channel becomes the MAYDAY channel. The member(s) calling the MAYDAY and all RIT TEAM personnel will operate on the MAYDAY channel. All other personnel will be assigned to a new fire ground channel.

Note: At approximately 14:49:45 the FAO received a MAYDAY transmission from Engine 33 and at 14:51:07 instructed all companies working at box 1579 to switch to channel 3.

Equipment Examination

An investigation of the personal protective equipment worn by the victims was conducted to determine if the required level of protection was provided. This investigation consisted of examining the protective clothing worn and the protective equipment used by the victims.

The initial inspection and testing of the equipment was conducted on April 15, 2014 at 1000 hours at the office of the Fire Investigation Unit. All the equipment examined was removed from storage in the evidence room of the BFD. Present on this date were the following:

District Chief James Lonergan	Safety Division Gr. 3	BOI Member
FF Michael Dannaher	Training Division	SCBA Technician
FF Joseph Welch	Fire Investigation Unit	Photographer
Joseph Brooks	Fire Alarm Division	Radio Shop Supervisor

FIRE LIEUTENANT EDWARD WALSH EQUIPMENT

Bunker Coat and Pants

The bunker coat worn by LT Walsh was manufactured by Viking Lifesaving Equipment with a manufacture date of 11/04 and part number PNps600331146200. This coat suffered extreme thermal exposure. Large portions of all three layers of material were burned away on the rear and sides of the coat. The remainder of the coat was burned, brittle and tattered.

The bunker pants were also subjected to extreme thermal exposure, resulting in large portions of all three layers of material being fully burned on the back of both legs. There was no label attached as this area was burned away. The remainder of the pants was burned, brittle and tattered as well. (Figures XI-1, XI-2, XI-3, XI-4)

Boots

The boots worn by LT Walsh were manufactured by Globe. This footwear was labeled as compliant with NFPA 1971 (Standard on Protective Ensembles for Structural Firefighting and Proximity Firefighting) 2007 edition and NFPA 1992 (Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies) 2005 edition. These boots suffered heat damage and burned through on the medial aspect of the left boot and on the lateral aspect of the right boot. (Figure XI-5)

Fire Resistive (FR) Station Pants

A pair of pants was manufactured by TOPPS Safety Apparel 10.03. They were labeled as being compliant with NFPA 1975 (Standard on Station/Work Uniforms for Emergency Services) 1999 edition. Most of the material from the back of both legs was completely burned away. (Figures XI-6, XI-7)

Helmet

The Cairns helmet belonging to LT Walsh was found to have suffered an extreme thermal exposure, which caused extensive damage. The brim of the helmet was completely destroyed along with the protective eye shields, leaving just the dome of the helmet remaining. (Figure XI-8)

Gloves

The gloves belonging to LT Walsh appeared to be the type issued by the Department. A tag labeled them as being compliant with NFPA 1971, 2007 edition. Some discoloration was observed, but no noticeable holes or other damage was present. (Figure XI-9)

Hood

One PGI, Inc. Nomex fire hood, tagged as belonging to LT Edward Walsh, was found to have soot on the forehead area and some staining on the back of the neck. The attached label indicated this hood to be compliant with NFPA 1971, 2007 edition. (Figure XI-10)

NOTE: At the time of the fire on March 26, 2014 the Boston Fire Department did not require its members to wear protective hoods. The decision whether to wear a protective hood was a personal choice by LT Walsh. *Effective October 2, 2014, BFD Special Order No. 47, instituted a formal Department policy requiring members to wear protective hoods.*

SCBA

The SCBA worn by LT Walsh was a SCOTT AIR-PAK 75/4.5 with integrated SCOTT PAK-ALERT SE PASS device. Department records indicate this unit was assigned inventory #851. This SCBA is certified as compliant with NFPA 1981 (Standard on Open Circuit Self Contained Breathing Apparatus) 2007 edition. The PASS is certified as compliant with NFPA 1982 (Standard on Personal Alert Safety System PASS) 2007 edition. There was no cylinder coupled to this SCBA; it was removed during the rescue/recovery effort due to the cylinder retention strap being burnt away, leaving the cylinder hanging.

This SCBA had been subjected to an extreme thermal exposure. All of the plastic components were melted and distorted. Most of the shoulder straps were burnt away. The regulator was melted with a portion of the face piece melted onto the regulator body. The purge valve was melted and distorted and found in the fully closed position. The control console was melted. The battery compartment that houses the batteries for the Heads Up Display (HUD) and PAK ALERT SE PASS alarm was completely melted and destroyed. The low pressure hose had significant damage with a hole located inches from the pressure reducer. The cylinder that was originally coupled to this SCBA was examined and found to be blackened along its entire length. The epoxy had melted away exposing the carbon fibers. The valve wheel was completely melted and the pressure gauge was destroyed. The threads on the cylinder valve appeared to be clear, an indication that during the thermal exposure it was coupled to the SCBA. All labels and markings on the cylinder were burned away. The integrated PASS could not be tested. The sensing module and battery compartment were completely destroyed. Because of the damage to this SCBA, it could not be flow tested. Department records indicate this SCBA was last flow-tested on July 2, 2013 by SCOTT and passed all functional and breathing resistance tests. (Figure XI-11)

Facepiece

The face piece was a SCOTT AV3000. The lens was completely melted. The head harness appeared to be intact with no noticeable thermal degradation. Faintly visible was the name Walsh on the head harness. Department records indicate LT Walsh was last fit tested on June 5, 2013. (Figure XI-11)

Stand-Alone PASS

The individual stand-alone PASS device was affixed to the bunker coat. This device is a Super Pass II, manufactured by Grace Industries. This pass device was burned, blackened and melted. An attempt was made to test it by pressing the emergency button on the face of the unit, but it did not function. (Figure XI-12)

Portable Radio

The radio is a Motorola XTS 5000 with BFD Inventory #8588 and assigned to the E33 Officer position, Fire Lieutenant Walsh. On the face of the radio, a portion of the bunker coat was fused to the speaker grill. There was no remote speaker microphone (RSM) attached to the radio. However, the contacts were clean indicating that the RSM was attached at one point. The Board of Inquiry (BOI) believes that the RSM became detached during the recovery effort. The insulation covering the antenna was completely burned away. The on/off volume control was found on and at full volume. The channel selector was found in the #1 position. The Emergency Alert Button (EAB) on the top of the radio, along with the Push-to-Talk (PTT) button on the side of the radio, showed signs of distortion from heat exposure. The battery also incurred thermal damage. The LCD display was covered in soot.

The discharged battery was removed. The contacts were found to be clean and dry. A new fully charged battery was installed, along with an RSM, and there was still no indication of power to the radio. The battery and housing were removed to gain access to the circuitry where it was discovered that moisture had penetrated into this area, causing the radio to short circuit. It is believed that moisture penetrated into the circuitry because of a small crack in the housing lens.

The original RSM had suffered extreme thermal damage. The connector assembly was deformed and unable to mate with the radio. The spiral cord was damaged along the full length, exposing the wiring in several places. The channel selector was fused to the body of the microphone, and it was unable to be determined on which channel it was set. The EAB and the PTT were found to be operable. (Figures XI-13, XI-14)

Flashlight

A Survivor flashlight was examined and found to have suffered extreme thermal exposure. The flashlight was burned, blackened, and melted. It was also missing the bezel. (Figure XI-15)

FIREFIGHTER MICHAEL KENNEDY EQUIPMENT

Bunker Coat and Pants

The bunker coat worn by FF Kennedy was manufactured by Viking Lifesaving Equipment with a manufacture date of November 2006 and part number PS6803. There was noticeable damage from thermal exposure to the front of the coat, on the bottom left side, near the pocket. The interior lining appeared to be in fair condition.

The bunker pants were manufactured by Viking with a manufacture date of September 2011 and part number PS1168. There was some discoloring to the outer shell above both knees, and two small areas of thermal damage to the right side pocket and the lower right leg. The interior lining appeared to be in fair condition. (Figures XI-16, XI-17)

Boots

The boots worn by FF Kennedy were manufactured by Globe, and labeled as compliant with NFPA 1971, 2007 edition and NFPA 1992, 2005 edition. They were found to be in good condition with no thermal damage. (Figure XI-18)

Helmet

A Cairns helmet, model # N5A, sustained thermal damage. The brim was missing leather on the right side of the helmet. The eye shields were melted and there was a bubble on the inside of the helmet due to the plastic shell melting. (Figure XI-19)

Gloves

A pair of BFD issued firefighting gloves, compliant to NFPA 1971, 2007 edition, was found to be in good condition. (Figure XI-20)

Hood

One American Firewear Nomex Fire Hood, tagged as belonging to Firefighter Michael Kennedy, was found to have no damage. (Figure XI-21)

NOTE: This hood was found in his possession but not worn.
At the time of the fire on March 26, 2014 the BFD did not require its members to wear protective hoods. The decision whether to wear a protective hood was a personal choice by FF Kennedy. *Effective October 2, 2014 BFD Special Order No. 47 instituted a formal Department policy requiring members to wear protective hoods.*

SCBA

The SCBA worn by Firefighter Kennedy was a Scott AIR-PAK 75/4.5 with integrated Scott PAK-ALERT SE PASS device. This SCBA was marked with inventory #852 and also E33. Coupled to this SCBA was a 30-minute air cylinder, serial #OK433872, BFD Inventory #1932c .This SCBA is certified as compliant with NFPA 1981 (Standard on Open-Circuit Self Contained Breathing Apparatus) 2007 edition. The PASS is certified as compliant with NFPA 1982 (Standard on Personal Alert Safety System) 2007 edition.

The purge valve on the regulator was found in the fully opened position. The remote gauge on the control console indicated zero pressure. The air cylinder valve was 3/4 of a turn short of being fully opened and the cylinder gauge indicated zero pressure. The batteries and electronics were tested by pressing the reset button on the control console. This indicated that both were fully functional.

In order to test the functionality of certain SCBA components, a full-air cylinder was connected to this SCBA. The replacement cylinder was opened fully and the Heads Up Display (HUD), PASS and Vibralert functioned as designed. The regulator, air saver switch, and purge valve were tested and functioned properly. The remote gauge on the control console indicated a full cylinder. The Pass was tested manually and functioned properly, going into pre-alert at 19 seconds and full alarm at 31 seconds. The cylinder valve was closed and the air pressure in the SCBA was bled to zero gauge pressure, using the purge valve. The HUD and Vibralert functioned correctly at the corresponding design pressures.

Visual examination of the SCBA showed no signs of damage. All components, including the back frame/harness, hoses and regulator, although covered in soot, appeared to be in good working order.

On April 29, 2014, this SCBA was tested for air-flow performance by a BFD SCBA Technician. The SCBA was placed on the Scott Biosystems Posichek 3, a SCBA test bench, and flow tested. This SCBA passed all functional and breathing resistance tests. The activation of the SCBA End of Service Time Indicators (EOSTI) was observed as well as the HUD visual alert signal. This SCBA was tested for air-flow performance on July 2, 2013 by SCOTT and passed all functional and breathing resistance tests. (Figure XI-22)

Facepiece

The face piece was a Scott AV3000. This was still connected to the SCBA. The lens, bezel and face seal were found to be intact. There was no noticeable damage to the head harness. There was a uniform film of soot on the outside and inside of the lens and the nose cup was partially disconnected from the left voicemitter duct. Firefighter Kennedy was last fit tested on March 5, 2014. (Figure XI-22)

Stand-Alone PASS

The individual stand-alone Super PASS II by Grace Industries was melted and deformed. The PASS was tested by pushing the emergency button. The PASS went into alarm, but the volume was much lower than normal.

The PASS was also tested by pushing the side buttons. The LEDs functioned properly and the PASS went into pre-alert at twenty seconds and alarm at thirty one seconds. Note: The BOI believes the damage sustained by the PASS device affected the volume.

One RIT Officer stated that he heard only one PASS device sounding while he was searching for LT Walsh and FF Kennedy from the rear of the building. He stated that FF Kennedy's stand-alone PASS device was barely audible; that LT Walsh's stand alone PASS device was not sounding; and that neither LT Walsh's nor FF Kennedy's SCBA integrated PASS devices were sounding. As stated previously, both of LT Walsh's PASS devices were severely damaged and did not function during the BOI's inspection. Both of FF Kennedy's PASS devices functioned during the inspection, with the stand-alone PASS device sounding at a low volume level. The BOI was unable to reconcile the Officer's statement with its inspection results. (Figure XI-23)

Portable Radio

This radio is a Motorola Model XTS 5000 with BFD Inventory #8920 and assigned to E33 hydrant position. The radio was identified as belonging to FF Kennedy.

The radio was found in the on position at 7/8 of full volume. The channel selector on the body of the radio was on channel #1. There was thermal damage to the antenna resulting in some of the insulation being melted away. The front of the radio exhibited plastic expansion due to thermal exposure. The lens also had thermal damage. There was no Remote Speaker Microphone (RSM) attached to the radio. The RSM was found still attached to the bunker coat of FF Kennedy.

The battery attached to the radio was fully discharged and, other than being dirty, was not damaged. The battery was removed and the contacts were found to be clean. A freshly charged battery was installed, but the radio would not power up. Because the case of the radio was deformed by thermal exposure, in order to connect a RSM, it had to be forced into position. The housing was removed from the chassis to discover moisture had penetrated into the circuitry short circuiting the radio.

It is believed that because the radio was sitting high in the radio pocket of the bunker coat, it was vulnerable to thermal exposure, possibly allowing water to enter from this damaged area. Note: Some radio pockets on bunker coats have Velcro on the inside of the pocket to accommodate a smaller radio; if the radio is not forced down it will sit higher, leaving it exposed. Also, this portable radio remained in the basement of the fire building, submerged in several inches of water, for several days after the fire was extinguished.

The channel selector on the RSM attached to FF Kennedy's coat was on channel #1. The Push to Talk (PTT) button was operable. The Emergency Alert Button (EAB) suffered thermal damage. The insulation of the spiral cord that connects the RSM to the radio was melted away in several places exposing the conductors. The connection at the end of this cord was damaged and no longer fit the housing.

In order to test the functionality of the RSM it was attached to a spare Motorola XTS 5000 portable radio inventory #8567. The RSM and the portable radio were placed flat on a table. The RSM was switched from channel 1 to channel 12 by rotating the selector knob 11 positions. The side button on the portable radio was pressed to test the channel selection and the RSM announced it was on Tactical 12. The EAB and the PTT were tested by pressing them but neither worked. The RSM was moved to different positions on the examination table and several times the microphone would key and stay open as if it were transmitting. Also, depending upon the position of the RSM, the radio would sometimes receive a test message from an additional portable radio that was being used. (Figures XI-24, XI-25, XI-26)

NOTE: At 15:01 of this incident the FAO made numerous announcements of "Engine 33 hydrant you have an open mic". The BOI believes that the thermal damage sustained by the spiral cord was the reason for this happening.

Flashlight

A Survivor flashlight was found to have minor thermal damage. The bezel was missing. The on/off button, when tested, still functioned properly. (Figure XI-23)

Figure XI-1. Lieutenant Walsh's Bunker Coat (front)

Figure XI-2. Lieutenant Walsh's Bunker Coat (back)

Figure XI-3. Lieutenant Walsh's Bunker Pants (front)

Figure XI-4. Lieutenant Walsh's Bunker Pants (back)

Figure XI-5. Lieutenant Walsh's Boots

Figure XI-6. Lieutenant Walsh's Station Pants (front)

Figure XI-7. Lieutenant Walsh's Station Pants (back)

Figure XI-8. Lieutenant Walsh's Helmet

Figure XI-9. Lieutenant Walsh's Gloves

Figure XI-10. Lieutenant Walsh's Protective Hood

Figure XI-11. Lieutenant Walsh's SCBA

Figure XI-12. Lieutenant Walsh's Stand-Alone PASS (on left)

Figure XI-13. Lieutenant Walsh's Portable Radio

Figure XI-14. Lieutenant Walsh's Remote Speaker Microphone (RSM)

Figure XI-15. Lieutenant Walsh's Flashlight

Figure XI-16. Firefighter Kennedy's Bunker Coat

Figure XI-17. Firefighter Kennedy's Bunker Pants (front)

Figure XI-18. Firefighter Kennedy's Boots

Figure XI-19. Firefighter Kennedy's Helmet

Figure XI-20. Firefighter Kennedy's Gloves

Figure XI-21. Firefighter Kennedy's Protective Hood

Figure XI-22. Firefighter Kennedy's SCBA

Figure XI-23. Firefighter Kennedy's Coat with Stand-Alone PASS and Flashlight

Figure XI-24. Firefighter Kennedy's Portable Radio

Figure XI-25. Firefighter Kennedy's Remote Speaker Microphone (RSM)

Figure XI-26. Firefighter Kennedy's RSM Attachment to Radio

851 ITEM #1 LT. WALSH Pre-Fire

Posi3 USB Test Results

7/2/2013 10:42:03 AM

Functional Test

Scott
Air-Pak 75 4500
Unit ID: 115S1326018728
Posi3 USB serial # U07086 - Calibration was up to date when the test was performed

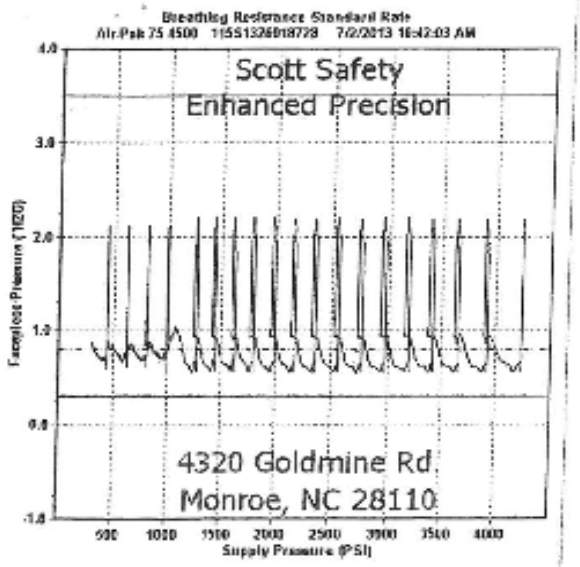
Auxiliary IDs	
-	
Regulator	115S1327005461
Reducer	115S1326018728
-	
-	
Project #	311346
-	

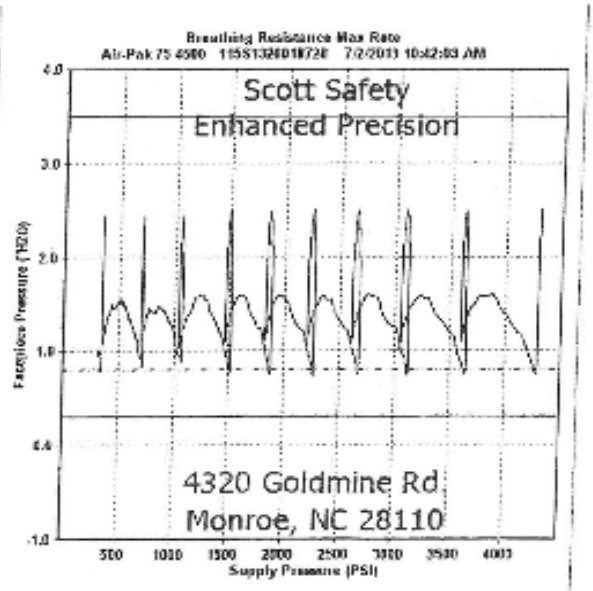
Visual Inspection	
Facepiece	Pass
Backframe/Harness	Pass
Cylinder	
Low Pressure Warning	Pass
Hoses	Pass
Manifold Volume: 0.116	

Functional Tests			
Exhalation Pressure	Pass	2.0	"H2O
Facepiece Leakage	Pass	0.1	"H2O
Positive Pressure	Pass	0.8	"H2O
Primary Lockup	Pass	103.4	PSI
Primary Creep	Pass	-0.3	PSI
Air Saver Switch Activation	Pass	-4.7	"H2O
Transfer	Pass	1171	PSI
Secondary Lockup	Pass	163.1	PSI
Secondary Creep	Pass	-0.2	PSI
High Pressure Leakage	Pass	7	PSI
Secondary Pr. at High Cylinder	Pass		
Purge	Pass	194	L/min

Alarm Activation Pressure			
HP Vibralert	Pass	1171	PSI

Gauge Accuracy					
HP Numbers		Pass			
1000 PSI		2000 PSI		3000 PSI	
Pass	1086	Pass	2047	Pass	2989





Minimum	Maximum		Breathing Results	Minimum	Maximum	
0.6 "H2O	2.2 "H2O	Pass	Facepiece Pressure	0.7 "H2O	2.5 "H2O	Pass

183651

Tested by : Test User
Scott
Tkaja

EP
Version 4.0.6.171S

PAK ID 00183651

E-33

851

257

Issued	Red	Res
8-26-13	1155132601 8728	1155132700 5451
9-2-13	FLO TEST - OK by Scott	

FitTest Results | **Boston Fire Department** | ***FitTrack 3000***

6/5/2013

Last Name	Walsh	**First Name**	Edward	**Middle Initial**	J
Personnel ID	095922	**Department**	L15	**Job Code**	
Medical Eval Date		**Custom1**	EMT# 869195	**Custom2**	
Test Date	6/5/2013	**Test Time**	1:19:30 PM	**Min FitFactor**	500
Mask Mfg.	SCOTT AV 3000	**Mask Model**	MED	**Mask Size**	Medium
Mask Type	Full Face	**Work Rate**	Heavy	**CartType**	Not Applicable
Notes					

Protocol Name SCBA-1 **Challenge Pressure** 1.50 "H2O **Respirator Rate** 93.10 L/Min.

Step Num	Step Description	Fit Factor	Leak Rate
1	Don & Face Forward	1,642	57
2	Bend at the Waist & Face Forward	575	162
3	Shake Head & Face Forward	1,668	56
4	Redon & Face Forward	1,900	49
5	Redon & Face Forward	3,349	28

Test Results PASS **Equivalent Fit Factor** 1,325 **Average Leak Rate** 70

Operator : _____

Subject : _____
Edward J. Walsh

1

Fr. Kennedy TEST POST FIRE

4/29/2014 10:06:57

PosiChek3 calibration was up to date when this test was performed.

SCOTT HEALTH & SAFETY

SCOTT PosiChek3

Visual / Functional Test Results

L03128

Scott
Air-Pak 75 4500
552

BostonFireDept
115 Southampton
Boston, Ma

Apparatus Tested

Location :	ENGINE 33
Other ID :	PAK ALERT 00185238

Auxiliary IDs

Facepiece / Head Har	
Regulator	115S1327003636
Reducer	115S1327003796
Low Pressure Alarm	
Cylinder	
Airline Attachment	
Harness	

Visual Inspection

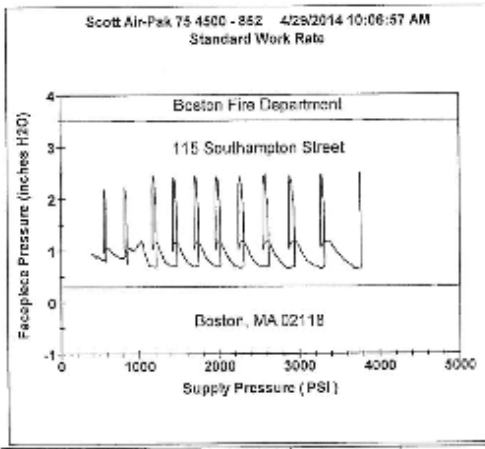
Facepiece / Head Harness	N/A
Backframe/Harness	Pass
Cylinder	Pass
Alarms	N/A
Hoses	Pass

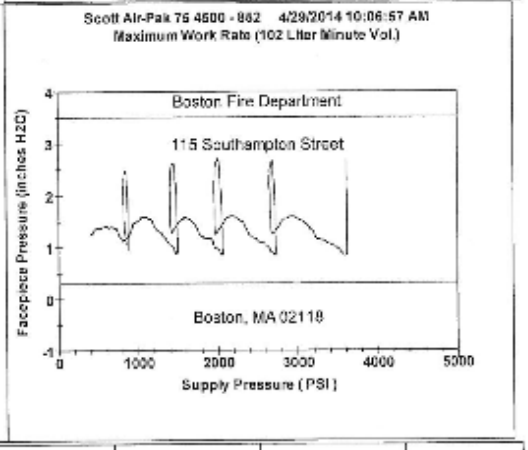
Functional Tests

Facepiece Leak Test	Pass	0.2 in. H2O
Exhalation Pressure :	Pass	2.3 in. H2O
Remote Pressure Gauge	Pass	

1000 PSI		2000 PSI		3000 PSI	
Pass	1219	Pass	2071	Pass	3132

Alarm(s) Activation :	Pass	1188 PSI
Air Saver Switch	Pass	-4 in. H2O
Static Facepiece Pressure	Pass	0.8 in. H2O
Primary Reducer Lockup	Pass	105 PSI
Primary Creep	Pass	8 PSI
Low Cylinder Transfer Pr :	Pass	1186 PSI
Secondary Reducer Lockup	Pass	185 PSI
Secondary Reducer Creep	Pass	0 PSI
Purge Flow Test	Pass	185 L/min
High Pressure Leakage	Pass	15 PSI
Secondary Pr. at High Cyl.	Pass	156 PSI





Minimum		Maximum			Breathing Results	Minimum		Maximum		
0.6	in. H2O	2.5	in. H2O	Pass	Facepiece Pressure	0.8	in. H2O	2.7	in. H2O	Pass

4/29/2014 10:26:52 AM Michael S. Dannaher : Test performed as part of Boston Frie Department Board of Inquiry.

Tested by : Michael S. Dannaher
Service Center : Boston Fire Department

Signature

Page 1 of 1

Version 3.28

FitTest Results | **Boston Fire Department** | *FitTrack 3000*

3/5/2014

Last Name	Kennedy	First Name	Michael	Middle Initial	R
Personnel ID	104927	Department	L15	Job Code	
Medical Eval Date		Custom1	EMT878553	Custom2	
Test Date	3/5/2014	Test Time	1:50:28 PM	Min FitFactor	500
Mask Mfg.	SCOTT AV 3000	Mask Model	MED	Mask Size	Medium
Mask Type	Full Face	Work Rate	Heavy	CartType	Not Applicable
Notes					

Protocol Name: SCBA-1 | Challenge Pressure: 1.50 "H2O | Respirator Rate: 93.10 L/Min.

Step Num	Step Description	Fit Factor	Leak Rate
1	Don & Face Forward	500	186
2	Bend at the Waist & Face Forward	522	178
3	Shake Head & Face Forward	870	107
4	Redon & Face Forward	611	152
5	Redon & Face Forward	661	141

Test Results PASS | **Equivalent Fit Factor** 608 | **Average Leak Rate** 153

Operator : _____

Subject : _____
Michael R. Kennedy

1

852

E-33

PAK ID 00185236

Issued	Red	Reg
8-26-13	1155132700 3196	1155132700 3636
7-2-13	FLO TEST-OK by Scott	

852 FR. Kennedy Pre Fire

SCOTT SAFETY

Posi3 USB Test Results

Functional Test

7/2/2013 6:44:48 AM

Scott
Air-Pak 75 4500
Unit ID: 115S1327003196
Posi3 USB serial # U07066 - Calibration was up to date when the test was performed

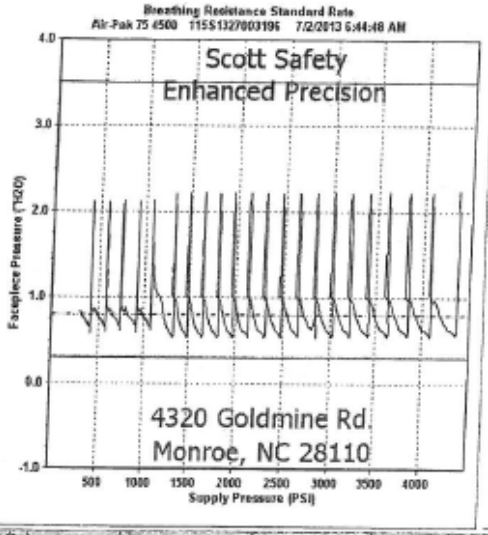
Auxiliary IDs	
-	
Regulator	115S1327003636
Reducer	115S1327003196
-	
-	
Project #	311346
-	

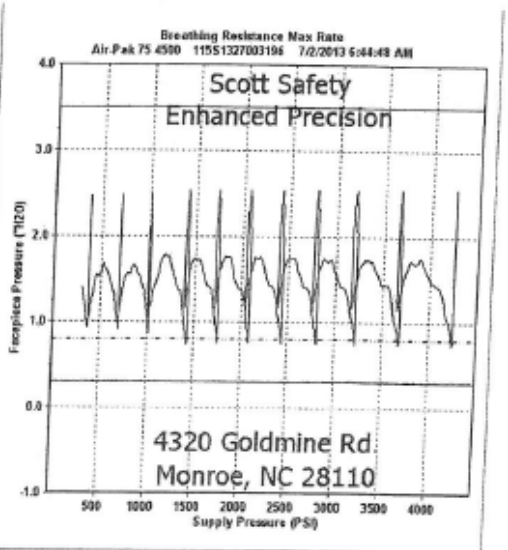
Visual Inspection	
Facepiece	Pass
Backframe/Harness	Pass
Cylinder	
Low Pressure Warning	Pass
Hoses	Pass
Manifold Volume: 0.131	

Functional Tests			
Exhalation Pressure	Pass	2.0	"H2O
Facepiece Leakage	Pass	0.1	"H2O
Positive Pressure	Pass	0.8	"H2O
Primary Lockup	Pass	102.2	PSI
Primary Creep	Pass	-3.8	PSI
Air Saver Switch Activation	Pass	-4.1	"H2O
Transfer	Pass	1196	PSI
Secondary Lockup	Pass	167.7	PSI
Secondary Creep	Pass	-4.2	PSI
High Pressure Leakage	Pass	23	PSI
Secondary Pr. at High Cylinder	Pass		
Purge	Pass	184	L/min

Alarm Activation Pressure			
HP Vibralert	Pass	1196	PSI

Gauge Accuracy					
HP Numbers			Pass		
1000 PSI		2000 PSI		3000 PSI	
Pass	933	Pass	2006	Pass	3119





Breathing Results	Minimum		Maximum		
Facepiece Pressure	0.7	"H2O	2.6	"H2O	Pass

185236

Tested by : Test User
Scott
asjkaja

EP
Version 4.0.6.171S

XII. TRAINING RECORDS

Boston Fire Department Fire Ground-Based Training

In 2008 the Boston Fire Department (BFD) instituted a program for tracking individual firefighter training records using a new electronic data base. The following information includes all BFD fire ground-based training received by LT Walsh and FF Kennedy. Any training not related to firefighting skills, tactics and equipment, e.g., EMS and HAZMAT training, has been omitted.

Back to Basics training consists of fire companies performing basic operational tasks during live fire exercises. These tasks include advancing lines of hose, raising ground ladders, performing search and rescue, ventilation and forcible entry. The operation of fire pumpers and the operation and placement of aerial ladders is practiced during this live fire training.

Maze training is an individual search and rescue exercise. Its primary purpose is to build a firefighter's confidence in their personal protective equipment (PPE). The training is designed to teach the firefighter various survival tactics should they become separated from their crew and trapped by fire and/or building collapse.

Rapid Intervention Team (RIT) training is designed to instruct and drill firefighters on MAYDAY protocols, self-survival skills, and team-based operating procedures that are utilized on the fire ground to rescue a missing, trapped, or disoriented firefighter(s).

The following is the fire ground-based training attended by Fire Lieutenant Edward J. Walsh from January 1, 2008 to March 26, 2014:

11-03-2008
Back to Basics – Live Fire Training

11-24-2008
Back to Basics – Live Fire Training

06-15-2009
Fit Test/Maze/Search & Rescue

10-09-2009
Back to Basics – Live Fire Training

11-19-2009
Flashover Recognition Training

05-13-2010
Fit Test/Maze/Search & Rescue

09-21-2010
Back to Basics – Fires in Taxpayers

04-07-2011
Flashover Recognition Training

08-17-2011
Fit Test/Maze/Search & Rescue

10-07-2011
Fit Test/Maze/RIT Refresher

10-20-2011
Thermal Imaging Essentials

03-24-2012
Fallen Firefighters Foundation
Everyone Goes Home Video

04-11-2012
BFD MAYDAY Training Video

09-04-2013
BFD Radio Communications Video

Fire Lieutenant Edward Walsh was appointed to the Boston Fire Department on December 08, 2004. He attended fourteen weeks of recruit training at the Boston Fire Department Training Academy but was not certified as Firefighter I/II at that time. At the time of his appointment to the Boston Fire Department Firefighter I/II certification was not required to graduate from the Boston Fire Department Training Academy. LT Walsh was certified as a HAZMAT Technician on May 19, 2006.

The following is the fire ground-based training attended by Firefighter Michael R. Kennedy from January 1, 2008 to March 26, 2014:

02-05-2008
Live Fire Training

02-07-2008
Live Fire Training

03-03-2008
Firefighter I/II Certification

08-23-2008
Back to Basics - Live Fire Training

04-02-2009
Fit Test/Maze/Search & Rescue
09-01-2009
Back to Basics - Live Fire Training

10-26-2009
Flashover Recognition Training

03-01-2011
Flashover Recognition Training

06-02-2011
Fit Test/Maze/RIT Refresher

09-01-2011
Fit Test/Maze/Search & Rescue

04-11-2012
BFD MAYDAY Training Video
Fallen Firefighters Foundation
Everyone Goes Home Video

Firefighter Michael Kennedy was appointed to the Boston Fire Department on November 05, 2007. He attended sixteen weeks of recruit training at the Boston Fire Department Training Academy and was Firefighter I/II certified by the Massachusetts Fire Training Council on March 3, 2008. FF Kennedy was certified as a HAZMAT Technician on September 10, 2012.

Firefighter I certification covers firefighter safety and health, personal protective equipment, portable fire extinguishers, ropes and knots, basic rescue and extrication, forcible entry, ground ladders, ventilation, water supply, fire hose, fire streams, fire control, fire detection, alarms, suppression systems, communications, and hazardous materials awareness and operations.

Firefighter II certification covers all of the aforementioned plus more advanced rescue and extrication, advanced water supply, fire hose service testing, advanced fire streams (foam), advanced fire control, protecting scene evidence, and advanced communications.

XIII. HOSE TESTS

A. Hose Radiant Heat Exposure Tests

B. Fire Hose Flame Exposure Test

C. Fire Hose and Nozzle Test

D. Hose Maintenance and Testing

The national consensus standard describing minimum design and construction requirements for fire hose, including the testing needed to verify these requirements, is NFPA 1961, Standard on Fire Hose, 2013 Edition. This standard specifies that the hose structural support material, also called the hose reinforcement or jacket, be constructed of natural and/or synthetic fiber. It further specifies that the hose interior lining be made of a rubber or thermoplastic material. The only thermal resistance test specified in NFPA 1961 is the Heat-Resistance Test in ANSI/UL 19, *Lined Fire Hose and Hose Assemblies*, and the Heat Resistance Test in FM Class Number 2111, *Factory Mutual Approval Standard for Fire Hose*. These tests require the hose to be able to pass a hydrostatic strength test after it has been heated for about 60 seconds by a steel block at a temperature of about 260 °C (500 °F). The test description is included in the Appendix to this report.

Since neither NFPA 1961 nor the current BFD hose procurement specification requires attack hose to be subjected to any type of flame exposure, there is a question as to how long BFD hose can withstand either indirect or direct exposure to the heat flux from a flame. The testing described in this section provides answers to this question, as well as to any question about the flow rate discharge capabilities of pertinent BFD hose sections and nozzles.

A. HOSE RADIANT HEAT EXPOSURE TESTS

Radiant heat flux exposure tests were conducted on exemplar Boston Fire Department hose samples in order to determine how long a section of dry hose can withstand the radiant heat flux from a flame or hot combustion products under a ceiling. The situation is depicted schematically in Figure XIII-1. The hose is shown on the floor of a hallway, room, or stairway, and the hot gases and soot have accumulated under the ceiling such that the bottom of the hot gas layer is a distance denoted by h above the hose.

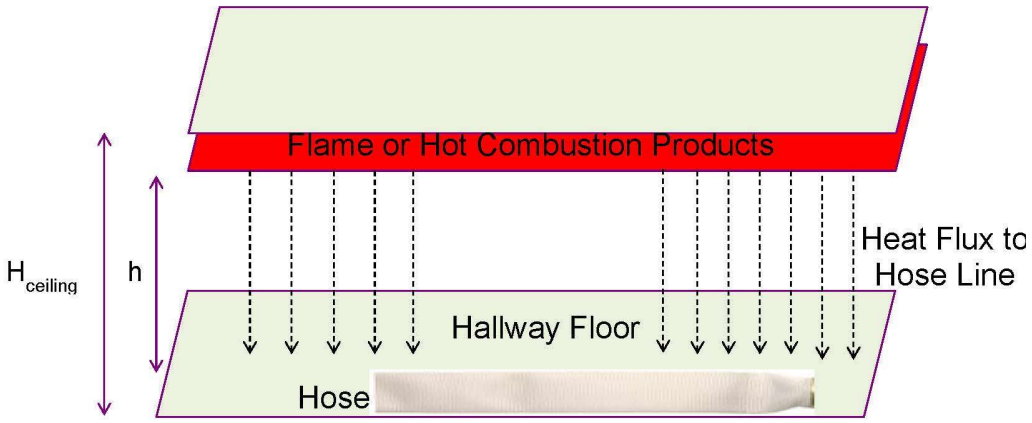


Figure XIII-1. Hose exposure to radiant heat flux from flame or combustion products under ceiling.

The magnitude of the radiant heat flux impinging on the hose depends on the temperature, thickness, and thermal properties of the flame or hot gas/soot layer as well as the distance h above the hose. In the case of a two-foot deep layer of combustion gas and soot from a typical residential furniture flame (temperature of 1700 ^{o}F to 1900 ^{o}F), the radiant flux at the floor would be about 9 kW/m^2 for a nine foot high ceiling (h= 7 ft), and about 20 kW/m^2 for a seven foot high ceiling (h= 5 ft). In the case of a three foot deep flame under the nine foot high ceiling (h= 6 ft), the radiant flux at the floor would be about 15 kW/m^2.

The radiant heat flux exposure tests were conducted in the cone calorimeter apparatus shown in Figure XIII-2. The radiant heat source is an electrical resistance heater installed within an inverted truncated cone so that a uniform heat flux impinges on the 4-inch by 4-inch test sample holder shown under the heater. The test sample and holder are mounted on a load cell to measure weight loss as the test sample starts to burn. Pyrolysis and combustion products from the burning sample are collected in a fume hood and duct equipped with instrumentation to measure combustion gas temperatures and composition.

This is a standard flammability test apparatus used in many fire test laboratories. The apparatus used for the BFD hose exposure tests is situated in the Worcester Polytechnic Institute Fire Laboratory.

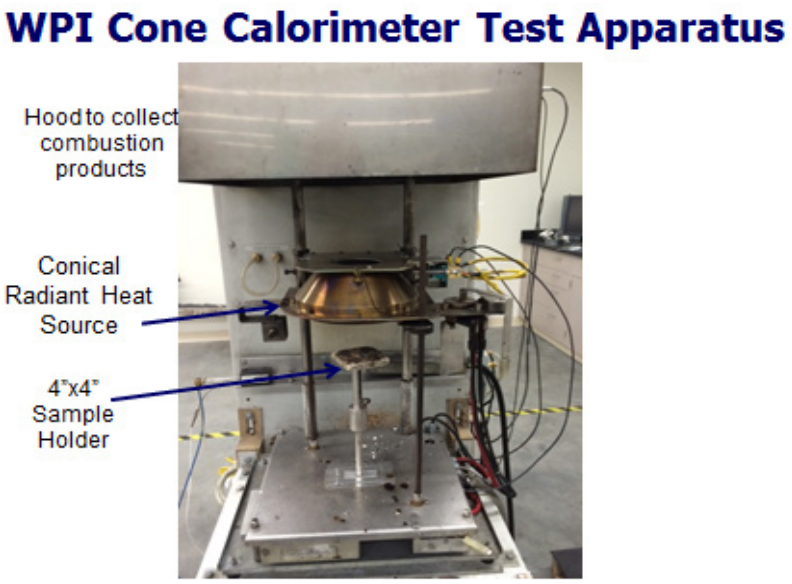


Figure XIII-2. WPI Cone Calorimeter Test Apparatus

Tests in the Worcester Polytechnic Institute (WPI) cone calorimeter were conducted using hose samples representative of the 1 3/4 inch attack hose used by Engine 33. Per the December 2013 BFD Attack Hose Specifications, the inner and outer hose jackets are made of filament polyester yarn. The waterway is a synthetic rubber. Figure XIII-3 shows one of the 4-inch sections of hose cut for use in the WPI cone calorimeter.

Figure XIII-3. Section of fire hose used in cone calorimeter tests.

Radiant heat fluxes of 10 kW/m^2 and 15 kW/m^2 were used for the hose heat flux exposure tests. Two hose samples were used for each of the two radiant heat fluxes. Observations were made of the exposure time to the initiation of smoking, charring, and melting.

Results are shown in Table XIII-1. Melting of the jackets occurred after about two minutes of exposure to the 15 kW/m^2 heat flux, and after about four minutes of exposure to the 10 kW/m^2 heat flux. Smoking and charring of the hose, indicating the initial degradation of hose strength and high pressure water carrying capability, occurred 20 to 30 seconds prior to the actual melting of the hose samples.

Table XIII-1
Results of Radiant Heat Flux Exposure Tests

Hose Sample #	Heat Flux (kW/m^2)	Time to Smoking (s)	Time to Charring (s)	Time to Melting (s)
1	15	84	94	125
2	15	91	98	118
1	10	200	222	251
2	10	175	197	230

Figure XIII-4 is a photograph of the charred and melted hose samples after the heat flux exposure tests.

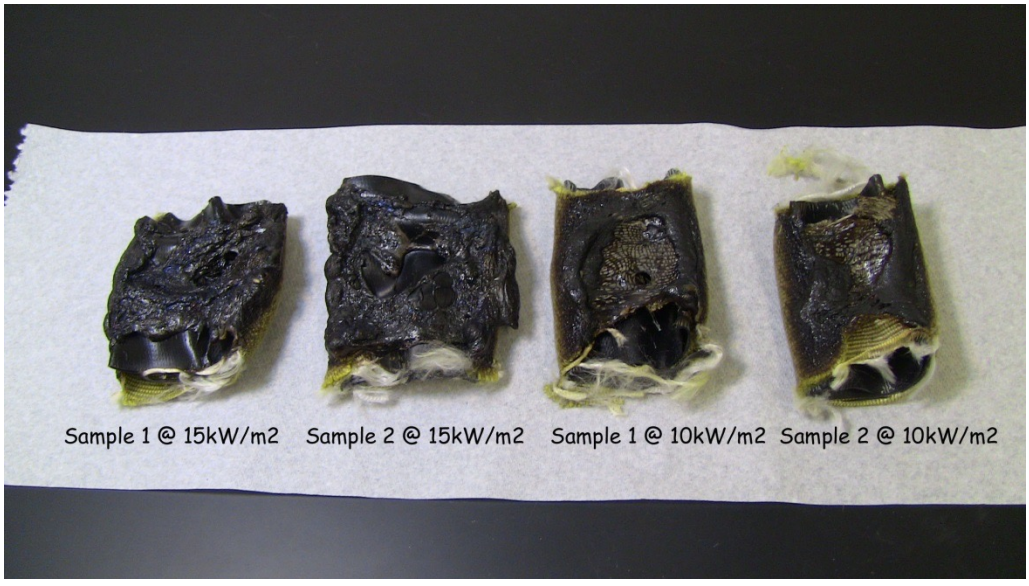


Figure XIII-4 Hose samples after radiant heat flux exposure tests.

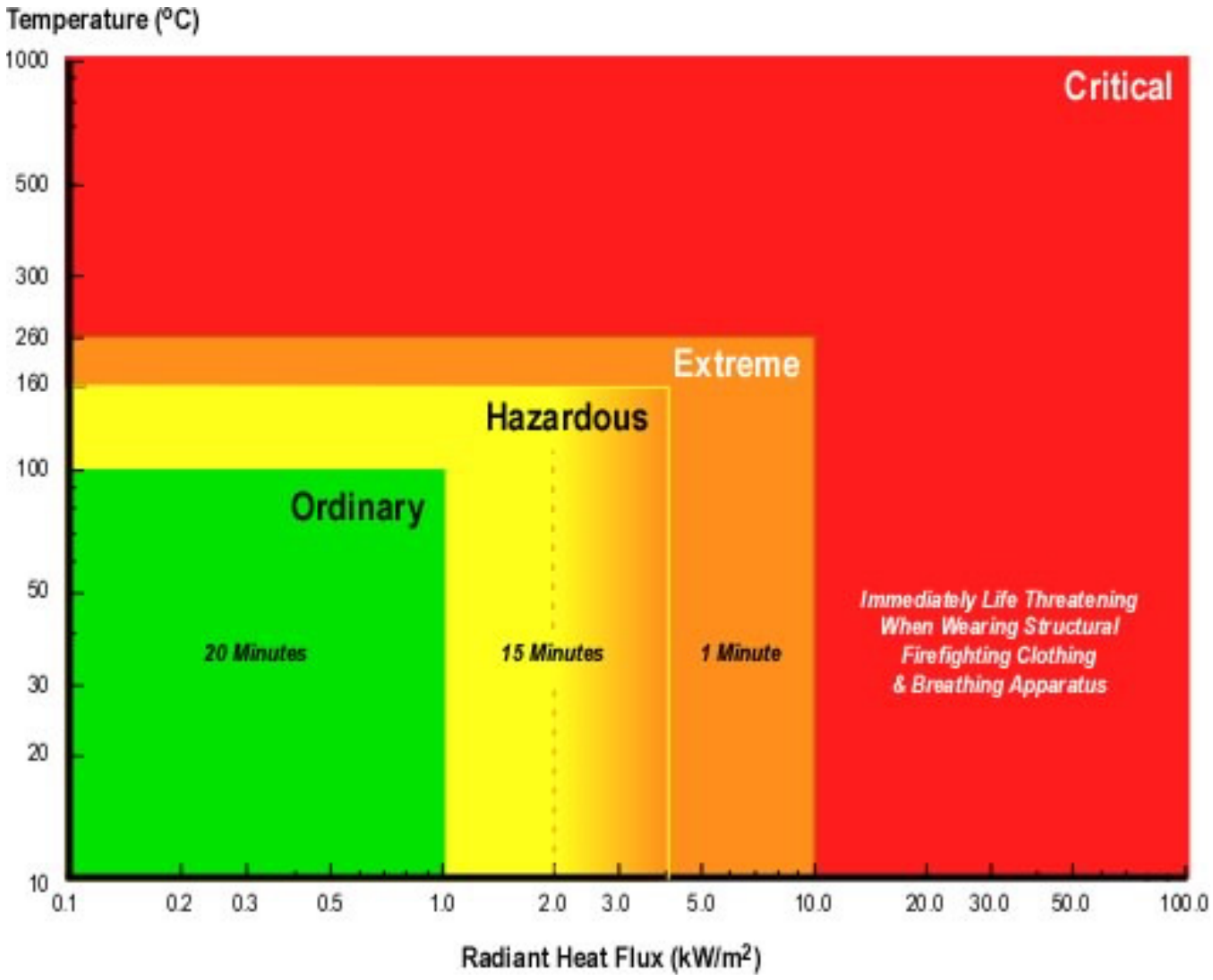


Figure XIII-5. Thermal Exposure Limits in the Firefighting Environment

Note: Adapted from *Measurements of the firefighting environment. Central Fire Brigades Advisory Council Research Report 61/1994* by J.A. Foster & G.V. Roberts, 1995. London: Department for Communities and Local Government and *Thermal Environment for Electronic Equipment Used by First Responders* by M.K. Donnelly, W.D. Davis, J.R. Lawson, & M.J. Selepak, 2006, Gaithersburg, MD: National Institute of Standards and Technology.

Note: Degrees Fahrenheit = 9/5 degrees Celsius + 32

B. Fire Hose Flame Exposure Test

After discussing the results of the radiant flux testing on samples of 1 ¾ inch Angus hose performed at Worcester Polytechnic Institute (WPI), and the fact that there is no known direct flame exposure test data available for the Board to consider, the Board conducted a flame exposure test. The Board acknowledges these flame exposure tests were not completed using the controlled conditions used during the radiant flux testing by WPI. The flame exposure tests were meant to supplement the radiant flux results by providing the members of the Board practical information on the ability of the hose to resist direct flame exposure over time without loss of integrity, as well as provide visible evidence of the way in which the hose would deteriorate during continuous exposure to flames. The tests were conducted at the Boston Fire Department Training Academy on August 21, 2014. Present for the tests were Board of Inquiry Chairman, Deputy Chief M. Doherty, Deputy Chief B. Shea and District Chief J. Lonergan of the Safety Division. Members of the academy staff were also in attendance to assist in the test fire setup.

Test Procedure:

Three tests were performed in all. Two were performed with the lines of hose filled with water. The first test was performed with water flowing through the nozzle and the second test was performed with static water in the hose. The purpose of these two tests was to determine how the material of construction would react to direct flame contact and to determine how long the hose would maintain its functional integrity under those conditions. Failure of the water-filled tests occurred when the hose breached and lost its integrity. A third test was performed to determine the burning characteristics of a flat uncharged hose. Since it was not filled with water, hose failure was not as obvious. This test required observation to determine a point where it was believed the hose was destroyed beyond its ability to hold water.

The three test samples were fifty-foot sections of 1 ¾ inch Angus hose line. Each section was previously in-service at the Training Academy and showed signs of normal wear and tear, fully intact and without leaks. The test fires were set in a fifty-gallon drum perforated on the sidewalls to allow air flow into the barrel to support combustion. Each of the three test fires was set using a butane torch to ignite straw used as kindling to initiate free flaming combustion of the wood pallet scraps. The barrel was set in a three-sided metal enclosure approximately four feet tall which acted as a wind break.

Each test was commenced when the fire was judged to be of similar intensity and flame height. The hose was stretched across the three-sided enclosure and allowed to bow slightly to allow contact with the top of the flames. A stopwatch was used to time the duration to failure as described previously. *(There was a slight wind effect that did cause flickering movement of the flame that may have allowed variations in locations of flame impingement. The staff attempted to manipulate the line of hose during these times to minimize this effect).*

Test 1: Water Flowing in Line of Hose

- This test evolution utilized 1 ¾ inch Angus hose with water flowing at approximately 90 psi hydrant pressure through the fire pump. The hose was stretched across the test enclosure allowing a slight bow to allow flame contact.
- The outer jacket melted/charred away between 45 to 75 seconds exposing an 8 inch to 12 inch section of the inner jacket.
- The inner jacket did not blister/melt like the outer jacket.
- At 1 minute 41 seconds there was a localized rupture of the rubber waterway through the inner jacket causing total failure. Immediately prior to failure there appeared to be a bulging of the rubber waterway that resulted in the rupture.

Test 2: Static Water in Line of Hose

- Test evolution two utilized a section of 1 ¾ inch Angus hose filled with water from the fire pump. Once filled, the gate valve was closed so that only static water pressure existed within the hose. The nozzle remained closed.
- Similar to test evolution 1, the outer jacket melted/charred away between 60 and 75 seconds exposing an 8 inch to 12 inch section of the inner jacket.
- Inner jacket did not blister/melt like the outer jacket.
- At 1 minute 45 seconds there was a localized rupture of the rubber waterway and inner jacket causing total failure. Immediately prior to failure there appeared to be a bulging of the rubber waterway that resulted in the rupture.

In both tests 1 and 2, the inner jacket had surprisingly little charring or notable deterioration at the time of localized failure. The outer jacket showed very limited thermal resistance before exposing the inner jacket. The outer jacket primarily acts to reinforce the inner jacket and rubber waterway while providing short duration thermal protection. Once the reinforcement and limited thermal protection was lost, it is believed the rubber waterway bulged and herniated through the inner jacket. The inner jacket is believed to have resisted charring/melting like the outer liner most likely due to the cooling effect of the water on the inner wall.

Test 3: Flat Uncharged Line of Hose

- The outer jacket of the 1 ¾ inch hose failed within thirty seconds.
- An approximately 12 inch to 18 inch section of the hose jacket fully ignited circumferentially within 1 minute. The hose was not capable of holding water in less than 1 minute after it was placed over the test fire. The exact time that the hose would have failed was difficult to determine since there was no water to rupture the hose to signal failure.
- By 1 minute 15 seconds there was visible blistering of the interior rubber membrane as the inner/outer jackets continued separating and stretching. It was very evident the hose was destroyed.
- The inner and outer jackets were heavily damaged and pulling apart within ninety seconds. The hose was allowed to burn freely until it tore into two sections.

C. Fire Hose and Nozzle Test

On June 7, 2014 a flow test was conducted at Boston Fire Department Headquarters on the recovered fifty-foot section of Engine 33's 1 ¾ inch hose and nozzle to determine if both items were functional and capable of producing their rated flow rate. Present at this test were Board of Inquiry Chairman, Deputy Chief M. Doherty, Deputy Chief B. Shea and District Chief M. Feely of the Safety Division. Members of the Fire Investigation Unit were also present to maintain continuity of the chain of custody of these items and to photograph the testing for the record.

The test was conducted using E33's standard issue Elkhart Chief low-pressure nozzle (model # 4000-24) which is rated to flow 185 gallons per minute (GPM) at 75 pounds per square inch (PSI) nozzle pressure while affixed to a 1 ¾ inch attack line of hose. On inspection, the visual condition of the nozzle was unremarkable and consistent with the normal wear expected on in-service equipment. There was no visible damage to the nozzle body, urethane bumper or vane teeth. The handle operated the ball valve fully without any resistance. The fifty-foot section of E33's hose was manufactured by Mercedes. The visible condition of the hose jacket was dirty with normal wear abrasions on the outer covering. Neither the hose nor the nozzle had any remarkable damage, nor did either leak or indicate any operational deficiencies throughout the test.

The hose/nozzle test was performed using Engine 24's 2009 E-One Cyclone pump, (VIN 4EN3AAA8191005431). This pump was utilized because it is equipped with electronic pressure and flow gauges on its discharge outlets which allowed for comparative flow and pressure measurements.* Engine 24 supplied a fifty foot section of 1 ¾ inch attack hose attached to a recently issued Elkhart Chief low pressure nozzle (Model # 4000-24). This nozzle was placed in service one week earlier and in new condition. Both the hose and nozzle were the same make and model as E33's hose and nozzle.

** The officer of Engine 24 stated that he was not certain of the accuracy of the flow gauge on the pump since he did not know when it was last calibrated. This was not considered a concern since this was a comparative analysis using the same gauge pressures and equipment. A pressure of 100 PSI was utilized factoring the 75 PSI required nozzle pressure for the Elkhart Chief nozzle to flow its rated capacity. In addition to the nozzle pressure, 1 ¾ inch hose has an estimated friction loss (FL) of approximately 30 PSI in 100 feet of 1 ¾ inch hose. Because the test hose was only a fifty foot section, we utilized a FL of 15 PSI. It was determined that a constant pump pressure of 100 PSI would achieve the required 75 PSI nozzle pressure and allow an additional 10 PSI friction loss for hose fittings*.

TEST 1: Engine 24's Hose and Nozzle Combination

Test 1 consisted of stretching a fifty foot section of E24's 1 ¾ inch hose with Engine 24's Elkhart Chief nozzle from outlet #1 on Engine 24's pump.

Evolution #1: The hose was charged and the discharge pressure was raised to 100 PSI. Using the straight stream setting on the Elkhart nozzle, a flow rate of approximately 160 GPM was achieved and maintained throughout the evolution.

Evolution # 2: To determine whether the nozzle would reach its rated 185 GPM flow rate, the pump pressure was incrementally increased to 150 PSI. At 150 PSI a flow rate of approximately 190 GPM was achieved. Above 150 PSI the stream pattern began to break up and there was no appreciable gain in the flow rate.

Evolution # 3: The nozzle tip was removed to create a solid stream flowing through the shutoff section of the nozzle. A flow rate of 200 GPM was achieved at 100 PSI. The solid stream had adequate reach, volume and pattern.

TEST 2: Engine 33's Hose and Nozzle Combination

Test 2 consisted of stretching the fifty-foot section of E33's 1 ¾ inch hose with Engine 33's Elkhart Chief nozzle from outlet #1 on Engine 24's pump.

Evolution #1: The hose was charged and the discharge pressure was raised to 100 PSI. Using the straight stream setting on the Elkhart nozzle, a flow rate of approximately 200 GPM was achieved and maintained throughout the evolution.

Evolution # 2: Since the first evolution of E33's hose and nozzle combination indicated that it exceeded the rated nozzle flow capacity, out of concern for preserving the hose as evidence it was determined evolution #2 was unnecessary. (An informal pressure test of the hose was also not performed due to the same concerns.)

Evolution # 3: The nozzle tip was removed to create a solid stream. A flow rate of 205 GPM was achieved at 100 PSI. The solid stream had adequate reach and volume. The pattern was broken up to a spray to a small degree but it did produce effective reach.

Findings:

The test of Engine 33's hose and nozzle combination produced a flow rate that exceeded the manufacturer's specifications as well as E24's newer comparison hose and nozzle combination. Based on these tests, it is the Board's opinion that neither a malfunction nor deficiency in the flow rate of E33's Elkhart Chief low pressure nozzle occurred. It is the Board's finding that E33's assigned 1 ¾ inch nozzle would not have negatively impacted E33's ability to provide an adequate stream at the rated flow rate.

Engine 33’s fifty-foot Mercedes 1 3/4 inch hose with Elkhart Chief nozzle

Flowing 190 GPM at 100 PSI

Straight stream flowing 190 GPM at 100 PSI

D. Hose Maintenance and Testing

Until the early 2000s there was a "Hose Shop" located at Fire Headquarters staffed by one civilian employee who was responsible for the maintenance and inventory of fire hose. The position was removed from the budget upon that person's retirement in 2005. Subsequently, an equipment procurement officer within the Training Division was responsible for ordering all equipment purchased by the Department including all fire hose. The Board was unable to identify a formal procedure or system for procurement, maintenance, testing, replacement, or inventory control of fire hose used by the Department in the years prior to March 26, 2014. The Board was also unable to determine if the Department followed the recommendations of NFPA 1962 Standard on Care, Use, Inspection, Service Testing and Replacement of Fire Hose Couplings, Nozzles and Fire Hose Appliances or if hose procurement specifications were NFPA compliant.

Approximately two years ago the BFD established a Logistics Department, staffed with three inventory specialists. They have established formal procurement and inventory control processes for all equipment and supplies. Currently, the Logistics staff is coordinating with the BFD Administration to align the Department with NFPA standards for procurement, maintenance and testing of all attack and supply hose.

The Logistics staff provided the Board with the most recent hose specifications used to replace much of the Department's attack hose. The specification sheet indicates that all hose must be NFPA compliant along with additional specific BFD requirements that the vendor must meet. (See Hose Specifications in XVIII. Appendix.)

Pump and Hose Testing:

In the 2014 budget the Director of Maintenance requested, and was granted, funds for a third party inspection and test of all fire pumps on BFD fire engines as well as pressure testing of all hose on the apparatus. The inspection and testing began, as scheduled, in June 2014, after the Beacon Street fire had occurred.

The vendor performed the tests according to NFPA standards and recorded comments for each fire engine tested. The Board reviewed the documentation of the fire pump and hose testing and noted many similar comments and numerous failures. Engine 33 was tested on June 11, 2014. The following comments were recorded: *"Performed Annual pump test-failed due to inoperative primer, truck will pump from hydrant. Performed Annual Hose testing. Performed hose testing on swapped out hose (Original hose swapped out due to failure)."*

The Board discussed the E33 test results with the Director of Maintenance. He stated that the NFPA Standard's criteria for passing the pump and hose tests are very stringent. Although a failure was noted, it did not necessarily mean that E33's hose catastrophically failed during the test. Failures could range from improperly marked hose or missing gaskets to pinhole leaks or total failure under pressure.

There were no further comments in the report to indicate why E33's hose had failed. This lack of specific causes for a failure was a deficiency that was noted throughout the test report. It is known that immediately after the Beacon Street fire, much of E33's attack hose was placed in service to replace the hose that was lost or damaged during the fire. This was most likely the same hose that failed the June hose test.

Note: The BFD Maintenance Division acknowledged the lack of specific, detailed information in the following outside vendor's report and has taken steps to improve the quality of future reports from this vendor.

Unit Number	Serial	License	RO Number	Date In	Mech Vendor	RO Reason	External Notes
E-10	4EN6AAA8481004060	FIRE271	RO38527	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/19/2014 - Failed due to throttle at pump panel INOP & priming pump works intermittently. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose.
E-14	1K9AF4286BN058026	FIRE7955	RO38019	6/11/2014	BULLDOG FIRE APPARATUS	PM Services	Annual pump & hose testing completed. Failed due to inoperative primer / truck will pump from hydrant. Hose replaced and passed. Performed hose testing on hose that was swapped out for failing (because of holes in hose in the original test.
E-16	4ENRAAA86X1000197	FIRE3794	RO38555	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/19/2014 on Moon Island; Passed; master suction gauge INOP. Performed Annual Hose Testing; 675' 4", 200' 3", 1300' 2 1/2", 400' 1 3/4"
E-17	1K9AF4283CN058289	FIRE207	RO38561	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/20/2014 at Moon Island. Passed. Performed Annual Hose Testing: 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4"
E-18	4P1CT02A92A002554	FIRE380	RO38549	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/19/2014 on Moon Island; failed, suction gauge INOP, suction intake port for test gauge INOP, discharge pressure fluctuating more than 5% (55 PSI to 90 PSI) both master & test gauges. Performed Annual Hose Testing 675' of 4:, 200' of 3", 1300' of 2 1/2", 400' 1 3/4"
E-20	4ENRAAA82V1007452	FIRE4144	RO38580	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/19/2014 on Moon Island. Failed, priming pump INOP. Performed Annual Hose Testing; 675' 4" - 200' 3" - 1300 2 1/2" - 400' 1 3/4"
E-21	4EN3AAA8391005432	FIRE9142	RO38497	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/16/2014 - Failed due to throttle at pump panel INOP & priming pump works intermittently. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. PO 636650 - Rec. #0000296223
E-22	1K9AF4281CN058288	FIRE216	RO38556	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/27/2014 on Moon Island. This is a retest - Passed. Front suction INOP Performed Annual Hose Testing: 675' 4" - 200' 3" - 1300' 2 1/2" - 400' - 1 3/4"

Unit Number	Serial	License	RO Number	Date In	Mech Vendor	RO Reason	External Notes
E-24	4EN3AAA8191005431	FIRE6359	RO38552	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/19/2014 - Passed: #1 discharge gauge is off by 20 psi (lower than master), no master intake screen on discharge, MTV valve needs ball bearings replaced. Performed annual hose testing. Performed Annual Hose Testing: 675' 4", 200' 3", 1300' 2 1/2", 400' 1 3/4" PO 636650
E-28	4EN6AAA8X81004063	FIRE286	RO38584	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump test 6/24/2014 on Moon Island; passed. #2 discharge extremely hard to open / close, no pump panel info plate. Performed Annual Hose Testing; 675' 4" - 200' 3" - 1300 2 1/2" and 400' of 1 3/4"
E-29	4EN6AAA8271002306	FIRE4676	RO38585	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/24/2014 on Moon Island; Passed, coolant temp reached 248 degrees (no alarm sounded) cab heater was turned hight but would not help to reduce temperature. Engine cooler was opened at pump panel, this helped to reduce engine temp. into a safe working range. Performed Annual Host Testing; 675' 4" - 200' 3" - 1300' - 2 1/2" - 400' 1 3/4"
E-30	4ENRAAA88X1000198	FIRE3852	RO38581	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	6/27/2014 Performed Annual Pump Test 6/25/2014 on Moon Island; failed - priming pump failed half way through lift test. Performed Annual Hose Testing 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4". 6/26/2014 - Performed re-test Annual Pump Test on Moon Island; failed second time. Tach at pump panel inop., notified Luis to my recommendation was too hook this truck up to a hydrant and perform a pressure test with water and look for leaks.
E-32	4P1CT02A02A002538	FIRE4159	RO38111	6/11/2014	BULLDOG FIRE APPARATUS	PM Services	ASI performed - failed due to inoperative primer, truck will pump from hydrant. Performed annual hose testing Performed hose testing on hose that was swapped out for failing (holes in hose on original test.
E-33	**1K9AF428XCN058287**	**FIRE387**	**RO38021**	**6/11/2014**	**BULLDOG FIRE APPARATUS**	**PM Services**	**Performed Annual pump test - failed due to inoperative primer, truck will pump from hydrant.** **Performed Annual Hose testing** **Performed hose testing on swapped out hose (Original hose swapped out due to failure)**
E-37	1K9AF4284BN058025	FIRE8948	RO38587	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/25/2014 on Moon Island; passed, tank level gauge inop. Performed Annual Hose Testing: 675' 4" - 200' 3" - 1300 2 1/2" - 400' 1 3/4"

Unit Number	Serial	License	RO Number	Date In	Mech Vendor	RO Reason	External Notes
E-39	4EN6AAA8681004061	Fire338	RO38583	6/25/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pim Test 6/25/2014 on MI - this is a retrest - Passed - left rear discharge gauge INOP. Performed Annual Hose Testing 675' 4" - 200' - 3" - 1300' 2 1/2" - 400' - 1 3/4"
E-42	1K9AF4288BN058027	FIRE8949	RO38554	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/20/2014 on Moon Island; Passed: master drain INOP. Performed Annual Hose Testing: 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4"
E-49	4ENRAAA8611003429	FIRE4405	RO38575	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pum Test 6/23/2014 on Mood Island; passed. Throttle at pump panel is loose and is hard to adjust, will not hold RPM set, dash tach inop. Performed Annual Hose Testing 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4"
E-50	4ENRAAA87X1009412	FIRE4381	RO38633	6/28/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/27/2014 on Moon Island; failed, priming pump after start of the test. Performed Annual Hose Testing; 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4"
E-51	4ENRAAA8211003430	FIRE4407	RO38496	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/16/2014 - Failed due to throttle at pump panel INOP & priming pump works intermittently. Retest Annual Pump test - Passed - water level gauge not working, suction guage not working. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. PO 636650 - Rec. #0000296222
E-55	4ENRAAA82T1006511	FIRE224	RO38634	6/30/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/26/2014 on Moon Island - retest - passed. Performed Annual Hose Testing 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4"
E-56	4ENRAAA88T1006495	FIRE396	RO38574	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/23/2014 on Moon Island; passed. Cab tach INOP, pump panel throttle does not work properly. Performed Annual Hose Testing; 675' 4" - 200' 3" - 1300' 2 1/2" - 400' 1 3/4"
E-7	1K9AF4288DN058404	Fire233	RO38625	6/30/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/26/2014-passed. Performed Annual Hose Test-675' of 4", 200' of 3", 1300' if 21/2" ,400' of1 3/4
E-9	4P1CT02A02A002555	FIRE279	RO38513	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/16/2014 - Failed due to throttle at pump panel INOP & priming pump works intermittently. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. PO 636650 - Rec. #0000296

Unit Number	Serial	License	RO Number	Date In	Mech Vendor	RO Reason	External Notes
New E-20	4P1CT02AX3A003536	FIRE441	RO41902	9/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 9/27/2014 oon Moon Island;.Passed, priming pump after start of the test.* Performed annual hose testing: 675' of 4", 200' of 3", 1300' of 2 1/2", 400' of 1 3/4" (Tested @ Bulldog)
New E-50	4P1CT02A63A003534	FIRE437	RO41901	9/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 9/27/204 on Moon Island; passed, priming pump after start of the test. Performed Annual Hose Testing : 675' of 4", 200' of 3", 1300' of 2 182", 400' of 1 3/4" (This was tested @ Bulldog)
Old E-48	4ENRAAA83R1003352	FIRE248	RO38528	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/16/2014 - failed. Starter on truck failed after set up for pump test. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. PO 636650
Old SP-2	4ENRAAA88P1002470	FIRE280	RO39188	6/30/2014	BULLDOG FIRE APPARATUS	PM Services	No Pump Test performed Hose Tese performed - 600' 4" - 200' 3" - 1100 2 1/2" - 300' 1 3/4"
SP-2	4ENRAAA8XT1006496	FIRE395	RO38576	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/23/2014 on Moon Island; PASSED, throttle at pump panel is loose and is hard to adjust, will not hold RPM set, dash tach INOP Peformed Annual Hose Testing: 675' of 4", 200' of 3", 130' of 2 1/2", 400' of 1 3/4".
SP-24 ACADEMY 1	4ENRAAA84X1000196	FIRE3793	RO38112	6/11/2014	BULLDOG FIRE APPARATUS	PM Services	Performed API test / failed due to inoperative primer, truck will pump from hydrant. Performed annual hose testing 2200 ft.
SP-3	4ENRAAA81T1006497	FIRE394	RO38511	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	06/16/2014 - Performed annual pump test 06/16/2014 - Failed due to throttle at pump panel INOP & priming pump works intermittently. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. 06/27/2014 Performed Annual Pump Test 6/17/2014 on MI - RETEST after failing / PASSED. Tach at dash does not match tach at pump panel, 300 RPM discrepancy, master intake gauge will not go into vacuum, intake test port for test gauge hook up is cracked. Performed Annual Hose Testing: 75' of 4", 200' of 2 1/2", 100' of 3 1/4". PO 636650 - Rec. #0000296282
SP-5	4ENRAAA82N1000937	FIRE115	RO39187	6/30/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/16/2014 on Moon Island; failed, suction gauge INOP, suction intake port for test gauge INOP, discharge pressure fluctuating more than 5% (55 PSI to 90 PSI) both master & test gauges. Performed Annual Hose Testing: 600' 4" - 200' 3" - 110' 2 1/2" - 300' 1 3/4". Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the above original test. Training gave these lengths to us: 100' 4" and 50" 2 1/2"

Unit Number	Serial	License	RO Number	Date In	Mech Vendor	RO Reason	External Notes
SP-6	4ENRAAA8XP1002471	FIRE228	RO38500	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	NO PUMP TEST performed during API 6/16/2014 on Moon Island Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. PO 636650 - Rec. #0000296242
SP-7	4ENRAAA84S1004872	FIRE208	RO38498	6/26/2014	BULLDOG FIRE APPARATUS	PM Services	Performed annual pump test 06/16/2014 - Failed due to throttle at pump panel INOP & priming pump works intermittently. Performed annual hose testing. Performed hose testing on hose that was swapped out for failing (because of holes in the hose) on the original test. Training provided hose. PO 636650 - Rec. #0000296226
SP-8	4ENRAAA8XX1000199	FIRE3856	RO38586	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	API & Hose Testing
SP-9	4ENRAAA82S1004871	FIRE209	RO38134	6/13/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/16/2014 on Moon Island. Failed due to throttle at pump panel INOP and priming pump works intermittently. Performed Annual Hose Testing: 600' of 4" - 200' of 3" 1100' of 2 1/2" - 300' of 1 3/4". Performed Hose testing on hose that was swapped out for failing (because of holes in hose) on the above original test. Training provided these lengths
SP-9	4ENRAAA82S1004871	FIRE209	RO38573	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/16/2014 on Moon Island; failed due to throttle at pump panel INOP and priming pump works intermittently. Performed Annual Hose Testing; 600' if 4", 200' of 3", 1100' of 2 1/2", 300' of 1 3/4". Performed Host testing on hose that was swapped out for failing (because of holes in hose) on the above original test. Training gave these lengths to you
SP-9	4ENRAAA82S1004871	FIRE209	RO38573	6/27/2014	BULLDOG FIRE APPARATUS	PM Services	Performed Annual Pump Test 6/20 @ MI, retested and passed; external MIV will not spin @ horns / bearing, over heating issue during pump test, oil pressure gauge INOP. Performed Annual Hose Test 75 4" - 200' - 1/2" - 100' 1 3/4"

XIV. BOI RECOMMENDATIONS

A. Fire Ground Operations

B. Accountability and Communications

C. Rapid Intervention Team Operations

D. Cutting and Welding Operations

E. Board of Inquiry

A. Fire Ground Operations

Fire ground operations are inherently dangerous and dynamic. It is important that all members are well trained and well equipped to accomplish the objectives of the Incident Commander (IC). The Boston Fire Department ensures that all firefighters receive proper training by the Training Division. District Chiefs and Company Officers regularly conduct company drills on Standard Operating Procedures and task oriented procedures.

The Training Division must constantly review, evaluate and improve the Department's own Standard Operating Procedures. It should continually review new firefighting related research, proactively evaluate the BFD's procedures and equipment and constantly educate the firefighting force with important information or improved procedures that are developed.

The Department must continually strive to improve its efficiency both operationally and administratively. When issues requiring change become apparent, the Department should advocate for change and improvement as necessary and implement new written policies in a timely fashion.

<u>The Board of Inquiry makes the following recommendations</u>:

1. The National Incident Management System (NIMS) has a provision which allows the ranking superior officer to forego assumption of Command. This is done for a number of reasons, one of which is to allow a subordinate officer the opportunity to continue in the role of Incident Commander in order to foster experience and confidence. The superior officer then takes on the role of advisor. When this situation occurs, the ranking superior officer maintains overall responsibility for the incident. In order to avoid confusion on the fire ground, the superior officer must resist the urge to give orders and radio transmissions that would be misinterpreted by those on scene as coming from Command. The Superior officer should announce over the radio that command will remain in the hands of the subordinate position.

2. Continue to emphasize the importance that all members review Standard Operating Procedures (SOPs) on a regular basis and ensure that all Engine Companies follow the guidelines of SOP #205 Engine Company Operations.

3. Identify areas of the City where row-type buildings are prevalent, e.g., Back Bay, South End. The Department should institute a written policy, for these identified areas and other specific occupancies, that assigns the third Engine Company on the first alarm to the Charlie side (rear) of the building, unless otherwise directed by the IC. The assigned Engine Company would announce their arrival, their specific location and give a report on conditions at the rear of the building.

4. Develop a written policy detailing when Engine Companies should charge lines of hose being advanced into a fire building. Additionally, the Department should constantly evaluate the latest fire service research on fire ground tactics and incorporate proven tactical advancements into Department training.

5. Provide input and support for the promulgation of improved thermal resistance testing by the NFPA in conjunction with the testing agencies and hose manufacturers. When approved by the NFPA, the Department should replace existing attack hose with hose meeting the latest standards.

6. Develop an SOP on the use of Thermal Imaging Cameras (TICs) and provide regular refresher training on their operation and use.

7. Develop an inventory control program to include written repair and replacement policies for all critical firefighting equipment, including TICs.

8. Develop a procedure for staging of Boston Emergency Medical Services (BEMS) ambulances and other non-Department assets to ensure they are properly and readily accessible during an incident.

9. Develop a training program on wind driven fires, control of flow paths and coordination of ventilation. This program should train all field personnel how to identify the conditions and locations that could give rise to the extreme fire behavior and growth rate created when these conditions are present. It should establish procedures to combat wind driven fires and similar phenomena based on the latest fire service research on tactics, strategies and specialized equipment.

10. In addition to the daily temperature and wind conditions announcement made by FAO at 0900 and 1900, the FAO should announce whenever elevated wind conditions exist to ensure that ICs and responding companies are aware of the conditions that could affect strategic and tactical decisions.

11. Request that the Boston Water and Sewer Commission review the need for the installation of hydrants on Back Street, in particular, and any other locations in the City where there are insufficient hydrants.

12. Assign a fourth Engine Company on box alarms to areas identified as lacking adequate hydrants, e.g., Back Street. Have the Engine Company stage at the nearest hydrant in preparation to provide a water supply to the rear of the building.

13. Recommend that the Department specify that all newly ordered fire engines have integral flow meters (GPM) and evaluate the possibility of retrofitting existing Engine Companies.

B. Accountability and Communications

Accountability and Communications are an important part of every incident operation. An accurate accountability system assists the IC in maintaining a safe, organized fire ground. It can be difficult to maintain an accurate accountability system during a rapidly escalating incident. The Incident Commander (IC) or Accountability Chief must track the assignment and location of all companies at the incident and be prepared to conduct a PAR (Personnel Accountability Report) at any moment. Company Officers must keep their log-in roster up to date, transmit their arrival at the incident on the Mobile Computer Terminal (MCT) and report to the IC for assignment.

Clear, concise and accurate communications contribute to an efficient and safe operation. Proper radio procedure and discipline is paramount to transmitting and receiving accurate fire ground information. All members must carry their assigned radio and operate on the appropriate radio channel for the incident.

The Board of Inquiry found no areas in the related Standard Operating Procedures (SOPs) where a failure to adhere to, or a deficiency in the content of the SOP, contributed to the deaths of LT Walsh or FF Kennedy. The following recommendations are intended to reinforce current BFD procedures and improve firefighter safety and operational efficiency through training, research and available improved technology.

<u>The Board of Inquiry makes the following recommendations</u>:

1. Establish a Technology Committee to function similar to the current Safety and Apparatus Committees. The mission of the Committee would be to assess the effectiveness of the technology and systems currently used in the Department; identify areas where improvement is needed; and research existing and evolving technology to determine whether investing in new technology would improve firefighter safety and operational efficiency.

2. Train all Chief Officers and Company Officers in the processes and procedures for managing Level 1 and Level 2 accountability. Proficiency in Level 1 accountability at one-alarm incidents will assist in the transition to Level 2 accountability in the event the incident escalates.

3. Ensure that all members are logged onto the MCT for both the day and night tours to insure the accuracy of mobile riding lists. Officers must update the system with personnel changes as they occur during the tour of duty.

4. Research, develop and implement a more accurate and robust system of accountability to ensure that all on scene personnel are tracked and accounted for in an efficient manner. Dedicated Accountability Chiefs or Officers should be trained and automatically dispatched to ensure rapid response to multiple alarm incidents. Consider, for a short term solution, a manual riding list system where each Firefighter places an individual name tag on the apparatus when they arrive for duty.

5. Reinforce the policy that all members arriving at an incident, whether on-duty or responding while off duty, must report to the IC for assignment and accountability.

6. Develop and implement a more efficient and standardized procedure for conducting a Personnel Accountability Report (PAR). The Accountability Officer should conduct the PAR by contacting a Sector/Branch/Division for its PAR report. The Fire Alarm Office (FAO) should assist the Accountability Officer as needed and be prepared to conduct a PAR when requested by the IC. When conducting a PAR priority should be based on the order in which companies arrived at or were dispatched to the incident, unless the situation dictates otherwise.

7. Assign a Staging Officer at each multiple alarm incident to work in conjunction with the Accountability Officer.

8. Routinely conduct Personnel Accountability Reports (PAR) at all training exercises and incidents to develop proficiency and accuracy.

9. Consider the application of names on PPE to more easily identify a member when conditions make this difficult.

10. Reemphasize SOP #280 Radio Procedures to stress the importance of radio discipline and proper communication protocols within the Incident Command System to avoid overloading the IC and FAO with excessive radio transmissions.

11. Issue a directive, supported by a Target Safety program, stressing the proper method of transmitting routine, urgent, and MAYDAY communications on the fire ground and the proper pathways these communications should follow. Chief Officers and Company Commanders must be vigilant in enforcing this policy.

12. Incorporate a radio communication component into all live fire training exercises with an emphasis on the proper method for calling a MAYDAY, performing PAR, changing fire ground channels when a MAYDAY has been announced, and the importance of transmitting clear, concise and accurate messages.

13. Electronically identify radios by a method other than function since members may change functions during an incident. It should consider using a universal numbering system such E33 officer, E33-Alpha, Engine 33-Bravo, E33-Charlie and E33-Driver as the assigned positions.

C. Rapid Intervention Team Operations

Rapid Intervention Team (RIT) operations are a critical component of an emergency operation. Well trained and disciplined personnel are required to perform their duties under dangerous and highly stressful conditions. Command and control are of utmost importance to ensure that the RIT operation is conducted efficiently and as safely as possible in a situation fraught with danger. A RIT operation is labor intensive and will require multiple companies to complete the rescue.

Direct communication with the trapped member(s) must be established and maintained by the IC or the RIT Chief (when on scene) as soon as the MAYDAY is transmitted. The trapped Firefighter(s) must communicate their Location in the building, Identify themselves by company, describe the Problem they are facing (LIP) and activate their PASS device. The fire ground radio channel will become the dedicated MAYDAY channel and all non-RIT personnel must operate on the newly announced fire ground channel. This dedicated RIT radio channel allows direct communication between the RIT Chief, the trapped member(s), the RIT companies attempting the rescue as well as the Fire Alarm Office.

Continuous direct communication with the trapped Firefighter is necessary to keep the Firefighter informed of progress and to gather any information regarding changing conditions or location. The RIT Chief must understand the problem, anticipate what additional resources are needed and request them before they are needed. A strong command presence is necessary to marshal the efforts of those attempting the rescue.

<u>The Board of Inquiry makes the following recommendations:</u>

1. A full RIT assignment consisting of a RIT Chief, one engine company and one ladder company should be dispatched upon striking a box alarm. This will ensure that a full RIT is on scene as early in the operation as possible.

2. Consider training specialized RIT companies and District Chiefs who receive intensive ongoing training in RIT operations. RIT operations are intense and require command, control, discipline and skill to conduct properly. Chief Officers are a critical part of the RIT and must take control of the operation.

3. Conduct annual RIT refresher training for all fire companies and Chief Officers to ensure that all BFD members are proficient in RIT operations. Company Officers must ensure that their members know and understand SOP # 206 Rapid Intervention Team.

4. RIT companies should not be routinely tasked with fire ground duties nor used for fire operations except under extreme situations. A MAYDAY can occur at any time during an incident and a dedicated RIT must be available to take action.

D. Cutting and Welding Operations

Cutting and welding operations are inherently dangerous due to the ability of the hot sparks and slag to ignite combustible materials. The Boston Fire Prevention Code and the Commonwealth of Massachusetts Regulations address the preventive measures that must be taken to work safely and prevent the ignition of combustibles in the work area.

There was no BFD permit issued for the cutting/welding work conducted at 296 Beacon Street nor was there any confirmation of the level of competence of the person(s) performing the welding.

The Board of Inquiry makes the following recommendations:

1. The Department should evaluate the current application and approval process for all hot work permits issued to contractors. A City of Boston Ordinance should be established that requires a certification for any person wishing to perform hot work within the City of Boston that provides stringent penalties for violators.

2. In order to facilitate consistency and uniformity in the approval process of such permits the Department should develop a written policy regarding the requirements for hot work permit approval and provide a training program for all BFD uniformed members involved in approving such permits and working at hot work paid details.

E. Board of Inquiry

The opening paragraph of the International Association of Fire Chiefs' Guide for Investigation of a Line-of-Duty Death states "The investigation of a line-of-duty death of a member is one of the most difficult and important activities that must be conducted by a fire department. This difficulty is compounded by the fact the investigation must usually be conducted under extremely stressful circumstances and often under pressure for the rapid release of information. It is important for every fire department to have a plan and to be prepared to conduct such an investigation."

A line-of-duty death investigation must be comprehensive in scope and factual in nature. It requires individuals with in-depth knowledge of fire department organization and procedures, investigation and interview procedures, safety procedures, information management and report compilation. It is important that the investigation team be convened immediately and that its members conduct the investigation in a timely fashion.

The International Association of Fire Chiefs and the International Association of Firefighters (as well as several previous Boston Fire Department Boards of Inquiry) recommend that the fire department maintain a permanent Board of Inquiry and establish a plan that identifies the investigation team. This team should be activated immediately when an incident occurs and the team members should be assigned full time to the investigation.

<u>The Board of Inquiry makes the following recommendations</u>:

1. Establish and maintain a permanent Board of Inquiry that identifies specific individuals, and alternates, who can be immediately activated when an incident occurs.

2. Train the Board members, and alternates, in the skills, techniques and procedures necessary to conduct a thorough investigation and compile a comprehensive report.

3. Assign all Board members full time to the investigation in order to complete the investigation in a timely manner with impactful recommendations.

XV. PHOTOGRAPHS

Figure XV-1 Front entrance of 298 Beacon Street.

Figure XV-2 Front basement apartment front entrance.

Figure XV-3 First floor front hallway viewed from the front foyer.

Figure XV-4 Top of the basement stairway where E33's hose line breached.

Figure XV-5 Top of the stairway looking toward the basement.

Figure XV-6 Engine 33's hose being collected by an FIU Investigator.

Figure XV-7 Storage cabinet at the top of the basement stairway.

Figure XV-8 View from the bottom of the stairway showing the exposed framework for the suspended gypsum ceiling and the charred floor joists exposed after the plaster ceiling failed.

Figure XV-9 The foot of the basement stairs where LT Walsh was located. The door to the rear basement apartment is to the immediate right out of view.

Figure XV-10 View from the bottom of the basement stairway facing the shed doorway. The rear apartment doorway is on the immediate left and the laundry space is on the right.

Figure XV-11 The basement hallway viewed from the shed looking toward the basement stairway.

Figure XV-12 The suspended ceiling framework at the bottom of the stairway exposing heavily charred floor joists and the shaft opening.

Figure XV-13 The open shaft at the foot of the basement stairway, previously hidden by the suspended ceiling. The shaft was a conduit for fire and gas extension to the second floor.

Figure XV-14 The shaft viewed from the second floor looking toward the basement.

Figure XV-15 The kitchen of the rear basement apartment where FF Kennedy was located.

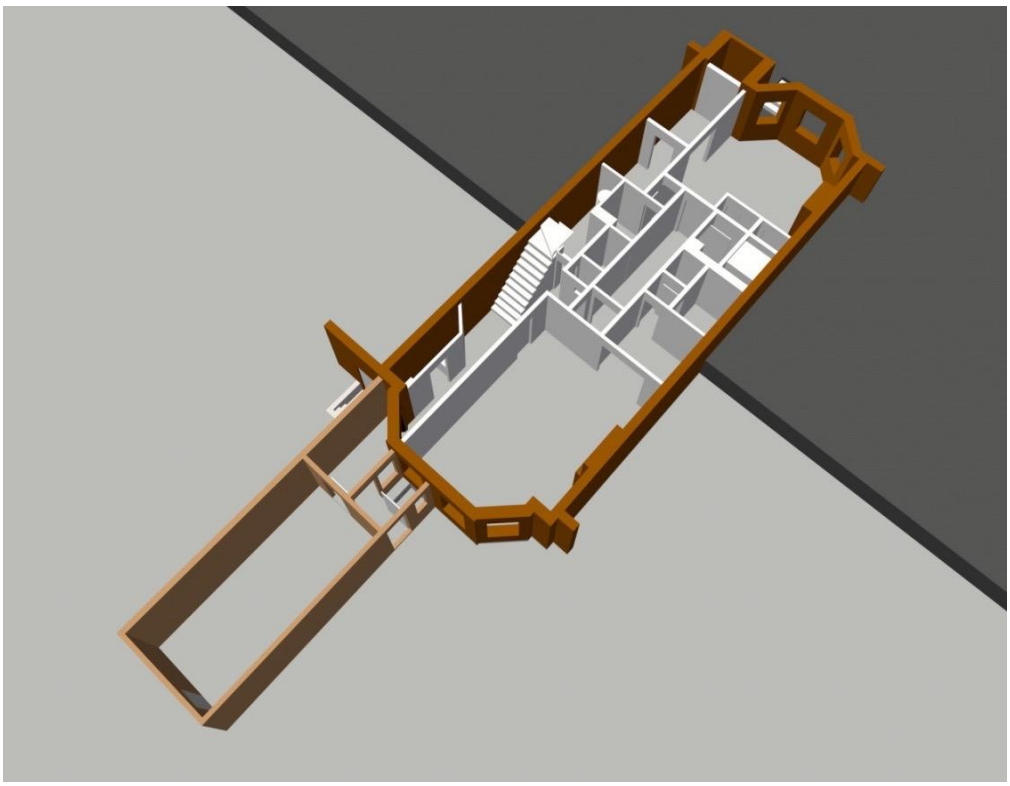


Figure XV-16 Computer generated rendering of the basement level showing both the front and rear apartments and the connection to the shed. (Jeff Drake, Drake Exhibits)

Figure XV-17 The open joist bays extending over the demising wall between the basement hallway and the rear apartment.

Figure XV-18 The basement hallway viewed from the rear entrance foyer of the shed.

Figure XV-19 Area of origin on the exterior of the shed.

Figure XV-20 Interior view of the shed entrance foyer, where fire breached the shed siding.

Figure XV-21 Heavily charred unprotected rafters in the shed entrance foyer.

Figure XV-22 The shed exterior entrance and rear basement apartment windows.

Figure XV-23 The shed entrance and vestibule.

Figure XV-24 The interior apartment window within the shed vestibule

Figure XV-25 Segment of E33's line of hose and nozzle recovered within the apartment.

Figure XV-26 E33's line of hose where it separated entering the apartment from the hallway. There were no remnants of the hose from the top of the stairs to the apartment.

Figure XV-27 E07's charred 2 ½ inch line of hose with the outer jacket burned away.

Figure XV-28 E07's nozzle with the elastomeric covering melted and distorted.

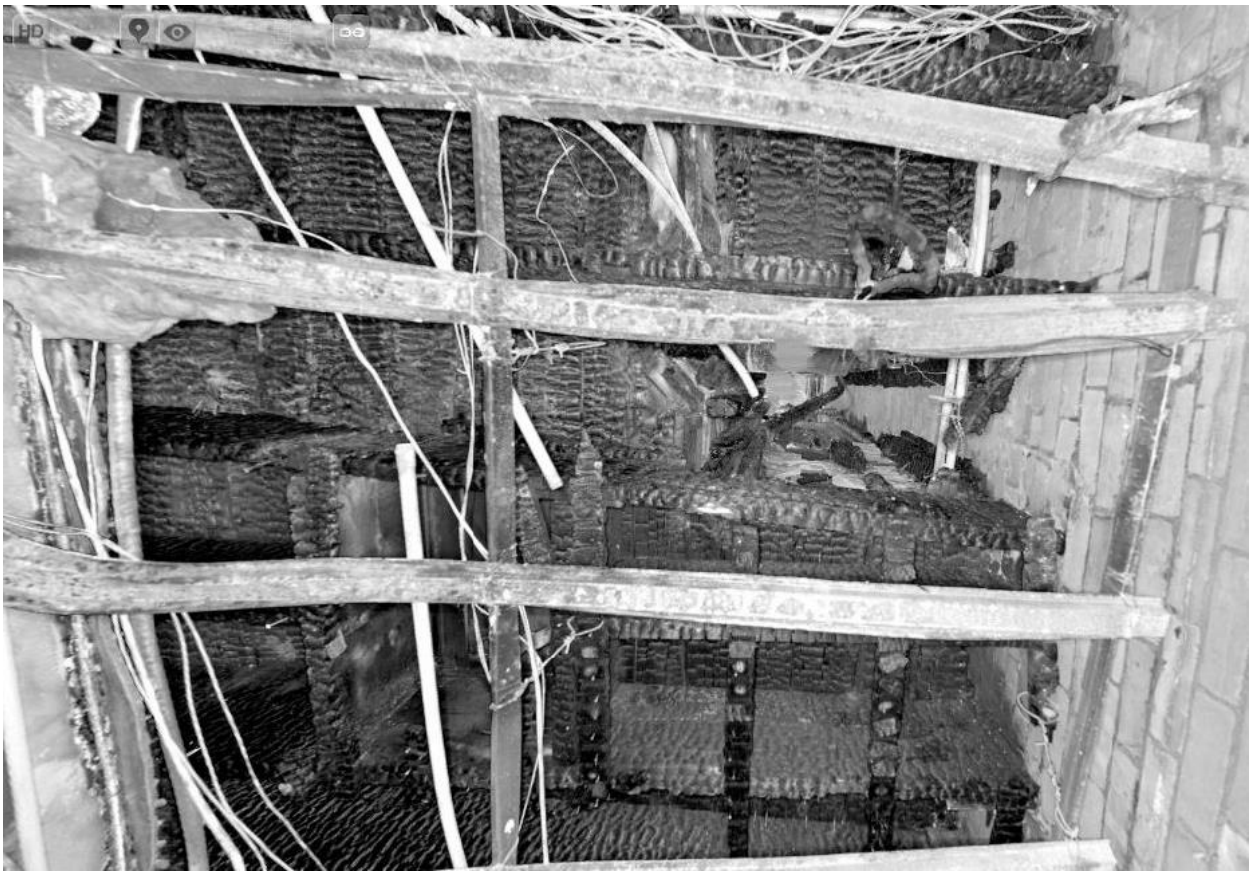


Figure XV-29 Two shafts above the ceiling viewed from the foot of the basement stairs.

Figure XV-30 E33's 1 ¾ inch line of hose charged on the front stairs.

14:48:24

Figure XV-31 District 4 reports a fire in a 4 story residential brick building. Fourth floor occupants self-evacuating over fire escape.

14:48:48

Figure XV-32 E33 calls for their line to be charged. D04 orders second alarm.

14:52:30

Figure XV-33 Less than three minutes after E33's MAYDAY.

XVI. BIOGRAPHY

FIRE LIEUTENANT EDWARD J. WALSH, JR.

Fire Lieutenant Edward J. Walsh, Jr.
Date of Birth: March 31, 1971

Appointed to the Boston Fire Department on December 8, 2004
Assigned to Ladder Company 15 on December 8, 2004
Transferred to Engine Company 33 on March 1, 2012
Promoted to Fire Lieutenant and transferred to Personnel on April 3, 2012
Transferred to Engine Company 30 on July 1, 2013
Transferred to Ladder Company 17 on January 1, 2014
Transferred to Engine Company 33 on February 1, 2014

FIREFIGHTER MICHAEL R. KENNEDY

Firefighter Michael R. Kennedy
Date of Birth: October 11, 1980

Appointed to the Boston Fire Department on November 5, 2007
Assigned to Ladder Company 2 on November 5, 2007
Transferred to Ladder Company 15 on October 1, 2012

XVII. GLOSSARY

Alpha **Bravo** **Charlie** **Delta**	Terminology used to delineate a side of a building within the Incident Command System. Alpha is the front; Bravo is the left, Charlie is the rear and Delta is the right.
Aerial	Term used to describe a ladder truck. The hydraulically powered ladder permanently affixed to a ladder truck.
Apparatus	A general fire service term for a motor vehicle fire truck; includes engines, aerial ladders, rescue vehicles, tower ladders, and others.
Balloon Framing	A system of framing a wooden building in which all vertical structural elements of the exterior bearing walls and partitions consist of single pieces extending from the soleplate to the roof plate; the floor joists are supported by sills and/or fastened by nails to the studs.
BEMS	Boston Emergency Medical Services
BFD	Boston Fire Department
BFD/ICS	Boston Fire Department/Incident Command System
Board	Board of Inquiry
BOI	Board of Inquiry, appointed by the Fire Commissioner, responsible for investigating the Line-of-Duty fatal fire of March 26, 2014 at 298 Beacon Street.
BPD	Boston Police Department
C06	Radio call sign for the Deputy Fire Chief in charge of Division 1
C07	Radio call sign for the Deputy Fire Chief in charge of Division 2
D04	District Fire Chief in charge of District 4 (Back Bay, South End)
Deputy Chief	A Fire Chief in charge of a Division
District Chief	A Fire Chief in charge of a District

Engine Company	Fire apparatus that carries up to 750 gallons of water, 2000 feet of hose, 1000 GPM to 1250 GPM (gallons per minute) pump, equipment and personnel.
FAO	Fire Alarm Office
Fire Apparatus	See Apparatus
Fire Commissioner	Administrative Head of the Fire Department
Firefighter	All uniformed personnel of the Fire Fighting Force below the rank of Lieutenant.
FIU	Fire Investigation Unit of the Fire Prevention Division of the Boston Fire Department.
IC	Incident Commander. The person who assumes overall command and control of all personnel and equipment at an emergency. This person will change as the incident escalates and higher ranking personnel arrive and assume command.
Integrated PASS	A Personal Alert Safety System device that is permanently integrated into the Self Contained Breathing Apparatus.
Ladder Company	Fire apparatus that carries either a 100 foot or a 110 foot aerial ladder, extension ladders, power and hand tools, forcible entry and extrication tools, EMS equipment and personnel.
LODD	Line-of-Duty Death
NFIRS	National Fire Incident Reporting System
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
Officer	General term used to describe a Firefighter who has been promoted to Lieutenant or Captain
PASS	Personal Alert Safety System. Emergency equipment worn by firefighters that combines a motion sensor with an emergency alarm. If the device detects no motion for more than 30 seconds, it emits a 95 decibel alarm.

RIT	Rapid Intervention Team
Safety Chief	District Fire Chief assigned to the Safety Operational Unit
SCBA	Self Contained Breathing Apparatus
Simulcast	Simultaneous transmission of the same radio message on two or more radio channels
Stand-Alone PASS	An individual portable Personal Alert Safety System device that is attached to a Firefighter's bunker coat

XVIII. APPENDIX

A. Weather Conditions

B. Death Certificates

C. NFIRS Report Incident #14-016454

D. Box 1579 Running Card

E. Synopsis of Building Permit History

F. Cutting, Burning and Welding Safeguards

G. Cutting Burning and Welding Application

H. UL 19 Heat Resistance Test

I. Hose Specifications

Tabular Weather History for 26 Mar 2014 - 26 Mar 2014

Source MIT Green Building Weather Station (detailed information below) via

http://www.wunderground.com/

Time	Temperature °F	Dew Point °F	Humidity %	Wind	Speed MPH	Gust MPH	Pressure IN	Precipitation IN
14:00	31.8	8.5	37	South	24	65	29.58	0
14:10	32.1	8.7	37	South	44	65	29.58	0
14:20	32.1	5.6	32	SSE	22	58	29.58	0
14:30	32.1	3.4	29	SSW	51	63	29.58	0
14:40	32.1	1.9	27	South	46	66	29.58	0
14:50	32.1	1.9	27	SSW	52	69	29.59	0
15:00	32.4	2.9	28	SSW	41	63	29.6	0
15:10	32.4	2.1	27	North	22	65	29.6	0
15:20	32.2	2.8	28	SW	33	60	29.61	0
15:30	32.2	2	27	SSW	35	63	29.6	0
15:40	32.4	1.3	26	SSW	32	60	29.62	0
15:50	32.2	1.2	26	NNE	6	65	29.62	0
16:00	32.4	1.3	26	South	35	65	29.62	0
16:10	32.7	0.8	25	South	53	55	29.63	0
16:20	32.8	1.7	26	South	20	60	29.63	0
16:30	32.9	1.8	26	North	30	58	29.64	0
16:40	33.1	1.1	25	North	23	53	29.64	0
16:50	32.9	0.9	25	SSW	33	58	29.65	0
17:00	32.9	0.9	25	SSE	16	60	29.66	0
17:10	33.2	2	26	SE	4	51	29.66	0
17:20	32.4	1.3	26	South	40	65	29.67	0
17:30	32.4	1.3	26	SSW	41	56	29.67	0
17:40	32.2	2	27	SSW	33	69	29.69	0
17:50	32.4	1.3	26	SSW	40	53	29.69	0
18:00	31.9	1.7	27	South	35	50	29.71	0
18:10	31.5	2.1	28	North	46	49	29.72	0
18:20	31.3	1.2	27	SSW	36	60	29.73	0
18:30	30.9	0.8	27	SSW	22	52	29.74	0
18:40	30.3	0.3	27	SSW	27	63	29.75	0
18:50	30.1	0.9	28	SW	12	61	29.76	0
19:00	29.8	0	27	SW	12	64	29.75	0
19:10	29.5	0.4	28	SSW	46	64	29.77	0
19:20	29.4	0	27	South	46	67	29.78	0

19:30	29.4	0.3	28	North	36	64	29.8	0
19:40	29.3	0.2	28	SSW	29	65	29.81	0
19:50	29	0.7	29	SSW	10	53	29.82	0
20:00	29	0.7	29	North	28	61	29.83	0
20:10	28.8	1.3	30	South	39	47	29.84	0
20:20	28.8	1.3	30	SW	33	50	29.85	0
20:30	28.5	0.3	29	North	46	47	29.86	0
20:40	28.1	0.7	30	South	45	59	29.86	0
20:50	27.9	1.2	31	North	49	56	29.88	0

REGISTRY DIVISION OF THE CITY OF BOSTON

COUNTY OF SUFFOLK, COMMONWEALTH OF MASSACHUSETTS, UNITED STATES OF AMERICA

Certificate Number

№ 320839

I, the undersigned, hereby certify that I hold the office of ______________ City Registrar of the City of Boston and I certify the following facts appear on the records of Births, Marriages and Deaths kept in said City as required by law.

The Commonwealth of Massachusetts
MEDICAL EXAMINER'S CERTIFICATE OF DEATH
REGISTRY OF VITAL RECORDS AND STATISTICS

OCME CASE NUMBER: 2014-4346
REGISTERED NUMBER: 001793
STATE USE ONLY

DECEDENT

Field	Entry
1. Decedent – Name (First, Middle, Last)	EDWARD J. WALSH, JR.
2. Sex	M
3. Date of Death	MARCH 26, 2014
4a. Place of Death (City/Town)	BOSTON
4b. County of Death	SUFFOLK
4c. Hospital or Other Institution	BOSTON MEDICAL CENTER
6. Social Security Number	[redacted]
7. If US War Veteran	—
8. Decedent of Hispanic Origin	No
9. Race	WHITE
10. Decedent's Education	4
11a. Age – Last Birthday	43
12. Date of Birth	MAR. 21, 1971
13. Birthplace	BOSTON, MASSACHUSETTS
14. Married, Never Married, Widowed or Divorced	MARRIED
15. Last Spouse	[redacted]
16a. Usual Occupation	LIEUTENANT
16b. Type of Business/Industry	BOSTON FIRE DEPT.
17. Residence	[redacted]
Father – Name	[redacted]
State of Birth	MASS
Mother – Name	[redacted]
State of Birth	MASS

INFORMANT

Field	Entry
Informant's Name / Mailing Address	[redacted]
Relationship	WIFE

DISPOSITION

Field	Entry
Method of Disposition	Burial
Funeral Service Licensee or Other Designee	RICHARD J. STANTON
License #	#6143
Place of Disposition	ST. PATRICK'S CEMETERY
Location	WATERTOWN, MASSACHUSETTS
Date of Disposition	APRIL 2, 2014
Name and Address of Facility	STANTON FUNERAL SERV., 786 MT. AUBURN ST., WATERTOWN, MASS.

CERTIFIER

Field	Entry
Part I – Cause of Death – a. Immediate Cause	SMOKE INHALATION AND THERMAL INJURIES
Approx. Interval	MINUTES
b. Due to	
c. Due to	
d. Due to	
Part II – Other Significant Conditions	
Autopsy	Yes
Manner of Death	Accident
Date of Injury	MARCH 26, 2014
Time of Injury	UNKNOWN
Injury at Work	Yes
Describe How Injury Occurred	FIREFIGHTER IN APARTMENT BUILDING FIRE
Place of Injury	APARTMENT BUILDING
Location/Address of Injury	298 BEACON ST, BOSTON, MA.
Known Time of Death	UNKNOWN
Date Pronounced	MARCH 26, 2014
Time Pronounced	7:36PM
Date Signed	JUNE 05, 2014
Medical Examiner – Name and Address	HENRY M. NIELDS, MD, PHD, 720 ALBANY STREET, BOSTON, MA 02118
Date Burial Permit Issued	MAR.31,2014 #2058
Received in City/Town of	BOSTON
Date of Record	APRIL 1, 2014

WITNESS my hand and the SEAL of the CITY REGISTRAR

on this ______ Day of JUL 0 7 2015 A.D. __________

Patricia A McMahon City Registrar

By Chapter 314 of the Acts of 1892, "All certificates or attestations of the Assistant City Registrars shall have the same force and effect as that of City Registrar."

I further hereby certify that by annexation, the records of the following cities and towns are in the custody of the City Registrar of Boston.

	Annexed
East Boston	1637
South Boston	1804
Roxbury	1868
Dorchester	1870
Charlestown	1874
Brighton	1874
West Roxbury	1874
Hyde Park	1912

REGISTRY DIVISION OF THE CITY OF BOSTON

COUNTY OF SUFFOLK, COMMONWEALTH OF MASSACHUSETTS, UNITED STATES OF AMERICA

Certificate Number

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FOR USE BY MEDICAL EXAMINERS ONLY

The Commonwealth of Massachusetts
MEDICAL EXAMINER'S CERTIFICATE OF DEATH
REGISTRY OF VITAL RECORDS AND STATISTICS

2014-4344 OCME CASE NUMBER | 001840 REGISTERED NUMBER | STATE USE ONLY

DECEDENT

1. DECEDENT - NAME: MICHAEL - RYAN R.C. KENNEDY
2. SEX: M
3. DATE OF DEATH: MARCH 26, 2014
4a. PLACE OF DEATH: BOSTON
4b. COUNTY OF DEATH: SUFFOLK
4c. HOSPITAL OR OTHER INSTITUTION: MASSACHUSETTS GENERAL HOSPITAL
6. SOCIAL SECURITY NUMBER: [redacted]
7. IF U.S. WAR VETERAN: IRAQ
8a. WAS DECEDENT OF HISPANIC ORIGIN?: No
8b. RACE: WHITE
9. EDUCATION: 12 | 4
10a. AGE: 33
10. DATE OF BIRTH: OCT. 11, 1980
11. BIRTHPLACE: BOSTON, MASSACHUSETTS
12. MARRIED, NEVER MARRIED, WIDOWED OR DIVORCED: NEVER MARRIED
13. LAST SPOUSE: -------
14a. USUAL OCCUPATION: FIREFIGHTER
14b. TYPE OF BUSINESS/INDUSTRY: CITY OF BOSTON
15. RESIDENCE: [redacted]
16. FATHER: [redacted]
17. STATE OF BIRTH: MASS
18. MOTHER: [redacted]
19. STATE OF BIRTH: CANADA

INFORMANT

20. INFORMANT'S NAME / MAILING ADDRESS: [redacted]
21. RELATIONSHIP: MOTHER

DISPOSITION

23. METHOD OF DISPOSITION: Burial ☐ Cremation ☐ Entombment ☐ Removal from State ☐ Donation ☐ Other
24. FUNERAL SERVICE LICENSEE: EDWARD J. DOHERTY, JR.
LICENSE #: #50132
25a. PLACE OF DISPOSITION: FOREST HILLS CEMETERY
25b. LOCATION: BOSTON, MASSACHUSETTS
27. DATE OF DISPOSITION: APRIL 3, 2014
NAME AND ADDRESS OF FACILITY: P.E. MURRAY-F.J.HIGGINS, 2000 CENTRE ST.,BOSTON, MA.02132

CERTIFIER

28. PART I - CAUSE OF DEATH

a. Immediate Cause: SMOKE INHALATION AND THERMAL INJURIES — APPROX. INTERVAL: MINUTES
b. Due to
c. Due to
d. Due to

PART II - OTHER SIGNIFICANT CONDITIONS CONTRIBUTING TO DEATH: BLUNT TRAUMA TO ABDOMEN

31. AUTOPSY: ☐ Yes ☐ No — Yes

34. MANNER OF DEATH: ☐ Natural [x] Accident ☐ Homicide ☐ Suicide ☐ Could not be determined ☐ Pending Investigation
DATE OF INJURY: MARCH 26, 2014
TIME OF INJURY: UNKNOWN
INJURY AT WORK: ☐ Yes ☐ No — Yes
DESCRIBE HOW INJURY OCCURRED: FIREFIGHTER IN APARTMENT BUILDING FIRE
PLACE OF INJURY: APARTMENT BUILDING
LOCATION/ADDRESS OF INJURY: 298 BEACON ST,BOSTON,MA.

36. MEDICAL EXAMINER CERTIFICATION
APPROX. TIME OF DEATH: UNKNOWN
DATE PRONOUNCED: MARCH 26, 2014
LICENSE #: 76085
TIME PRONOUNCED: 4:07PM
NAME AND ADDRESS: HENRY M. NIELDS, MD, PHD 720 ALBANY STREET, BOSTON, MA 02118
DATE SIGNED: JUNE 05, 2014

PERMANENT BLACK INK ONLY

PRONOUNCEMENT FORM ON FILE ☐

WAS THIS DEATH PRONOUNCED?: ☐ Yes ☐ No NO
TITLE: ☐ RN ☐ PA ☐ NP

41. DATE BURIAL PERMIT ISSUED: APR.2,2014 #2093
42. RECORDED IN CITY/TOWN OF: BOSTON
43. DATE OF RECORD: APRIL 3, 2014
BURIAL AGENT SIGNATURE: DORIS REYNOLDS

WITNESS my hand and the SEAL of the CITY REGISTRAR

JUL 0 7 2015

on this ______ Day of __________________ A.D.__________

Patricia A McMahon

______________________________ *City Registrar*

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West Roxbury	1874
Hyde Park	1912

A

FDID *	State *	Incident Date (MM DD YYYY) *	Station	Incident Number *	Exposure *
25035	MA	03 26 2014		14-0016454	000

☐ Delete
☒ Change
☐ No Activity

NFIRS -1 Basic

B Location*

☐ Check this box to indicate that the address for this incident is provided on the Wildland Fire Module in Section B "Alternative Location Specification". Use only for Wildland fires.

Census Tract ____ - ____

☒ Street address
☐ Intersection
☐ In front of
☐ Rear of
☐ Adjacent to
☐ Directions

Number/Milepost	Prefix	Street or Highway	Street Type	Suffix
000298		BEACON	ST	

Apt./Suite/Room	City	State	Zip Code
	Boston	MA	02116 -

Cross street or directions, as applicable

C Incident Type *

111 — Building fire
Incident Type

D Aid Given or Received*

1 ☐ Mutual aid received
2 ☐ Automatic aid recv.
3 ☐ Mutual aid given
4 ☐ Automatic aid given
5 ☐ Other aid given
N ☒ None

Their FDID | Their State
Their Incident Number

E1 Date & Times — Midnight is 0000

Check boxes if dates are the same as Alarm Date.

	Month	Day	Year	Hr Min Sec
Alarm * (ALARM always required)	03	26	2014	14:43:06
☐ Arrival * (ARRIVAL required, unless canceled or did not arrive)	03	26	2014	14:45:02
☐ Controlled (CONTROLLED Optional, Except for wildland fires)				
☐ Last Unit Cleared (LAST UNIT CLEARED, required except for wildland fires)	03	27	2014	18:43:20

E2 Shift & Alarms

Local Option

Shift or Platoon	Alarms	District
		04

E3 Special Studies

Local Option

Special Study ID#	Special Study Value

F Actions Taken *

11 — Extinguishment by fire service personnel
Primary Action Taken (1)

22 — Rescue, remove from harm
Additional Action Taken (2)

51 — Ventilate
Additional Action Taken (3)

G1 Resources *

☐ Check this box and skip this section if an Apparatus or Personnel form is used.

	Apparatus	Personnel
Suppression	0086	
EMS		
Other		

☐ Check box if resource counts include aid received resources.

G2 Estimated Dollar Losses & Values

LOSSES: Required for all fires if known. Optional for non fires.

				None
Property $	001	800	000	☐
Contents $		100	000	☐

PRE-INCIDENT VALUE: Optional

Property $		000	000	☐
Contents $		000	000	☐

Completed Modules

☒ Fire-2
☒ Structure-3
☐ Civil Fire Cas.-4
☒ Fire Serv. Cas.-5
☐ EMS-6
☐ HazMat-7
☐ Wildland Fire-8
☒ Apparatus-9
☐ Personnel-10
☐ Arson-11

H1 * Casualties ☐ None

	Deaths	Injuries
Fire Service	002	
Civilian		

H2 Detector

Required for Confined Fires.

1 ☒ Detector alerted occupants
2 ☐ Detector did not alert them
U ☐ Unknown

H3 Hazardous Materials Release

N ☐ None
1 ☐ Natural Gas: slow leak, no evacuation or HazMat actions
2 ☐ Propane gas: <21 lb. tank (as in home BBQ grill)
3 ☐ Gasoline: vehicle fuel tank or portable container
4 ☐ Kerosene: fuel burning equipment or portable storage
5 ☐ Diesel fuel/fuel oil: vehicle fuel tank or portable
6 ☐ Household solvents: home/office spill, cleanup only
7 ☐ Motor oil: from engine or portable container
8 ☐ Paint: from paint cans totaling < 55 gallons
0 ☐ Other: Special HazMat actions required or spill > 55gal., Please complete the HazMat form

I Mixed Use Property

NN ☐ Not Mixed
10 ☐ Assembly use
20 ☐ Education use
33 ☐ Medical use
40 ☐ Residential use
51 ☐ Row of stores
53 ☐ Enclosed mall
58 ☐ Bus. & Residential
59 ☐ Office use
60 ☐ Industrial use
63 ☐ Military use
65 ☐ Farm use
00 ☐ Other mixed use

J Property Use* Structures

131 ☐ Church, place of worship
161 ☐ Restaurant or cafeteria
162 ☐ Bar/Tavern or nightclub
213 ☐ Elementary school or kindergarten
215 ☐ High school or junior high
241 ☐ College, adult education
311 ☐ Care facility for the aged
331 ☐ Hospital
341 ☐ Clinic, clinic type infirmary
342 ☐ Doctor/dentist office
361 ☐ Prison or jail, not juvenile
419 ☐ 1-or 2-family dwelling
429 ☒ Multi-family dwelling
439 ☐ Rooming/boarding house
449 ☐ Commercial hotel or motel
459 ☐ Residential, board and care
464 ☐ Dormitory/barracks
519 ☐ Food and beverage sales
539 ☐ Household goods, sales, repairs
579 ☐ Motor vehicle/boat sales/repair
571 ☐ Gas or service station
599 ☐ Business office
615 ☐ Electric generating plant
629 ☐ Laboratory/science lab
700 ☐ Manufacturing plant
819 ☐ Livestock/poultry storage (barn)
882 ☐ Non-residential parking garage
891 ☐ Warehouse

Outside

124 ☐ Playground or park
655 ☐ Crops or orchard
669 ☐ Forest (timberland)
807 ☐ Outdoor storage area
919 ☐ Dump or sanitary landfill
931 ☐ Open land or field
936 ☐ Vacant lot
938 ☐ Graded/care for plot of land
946 ☐ Lake, river, stream
951 ☐ Railroad right of way
960 ☐ Other street
961 ☐ Highway/divided highway
962 ☐ Residential street/driveway
981 ☐ Construction site
984 ☐ Industrial plant yard

Look up and enter a Property Use code only if you have NOT checked a Property Use box:

Property Use 429
Multifamily dwelling

NFIRS-1 Revision 03/11/99

K1 Person/Entity Involved
Local Option

Business name (if applicable) | Area Code | Phone Number

☐ Check this box if same address as residence location. Then skip the three duplicate address lines.

Mr./Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City

State | Zip Code

☐ More people involved? Check this box and attach Supplemental Forms (NFIRS-15) as necessary

K2 Owner ☐ Same as person involved: Then check this box and skip the rest of this section.
Local Option

Business name (if applicable) | Area Code | Phone Number

☐ Check this box if same address as residence location. Then skip the three duplicate address lines.

Mr./Ms., Mrs. | First Name | MI | Last Name | Suffix

Number | Prefix | Street or Highway | Street Type | Suffix

Post Office Box | Apt./Suite/Room | City: Boston

State: MA | Zip Code

L Remarks
Local Option

Responded to Box 1579 struck for 298 Beacon Street. Engine 33 was first unit on scene, reported smoke showing from floor 1 of a 4 story brick building and immediately advanced a 1 3/4 inch line through main entrance on floor 1 of Alpha side of the building. District 4 arrived approximately 1 minute later and assumed command. At that time 3 occupants were evacuating the building from the third floor via the fire escape on the Alpha face of the building. Car 4 ordered Engine 7 to run a 2 1/2 inch line in the main entrance to back up Engine 33's line. The hydrant man working on Engine 33 [redacted] assigned to Ladder 15 but detailed to Engine 33 for the day) informed Chief [redacted] (Car 4) that the fire was in the basement. Car 4 then ordered Engine 22 to advance a line directly to the basement through the door beneath and adjacent to the steps leading from the sidewalk to the front entrance of the building. Before Engine 22 had a line in place, a fire event (possibly a flash over, or a backdraft) occurred in the building, vastly increasing the volume of smoke. Several members came tumbling out of the front entrance, where thick smoke was issuing. Car 4 ordered a second alarm, then ordered all members off of floor 1. Seconds later, Engine 33 issued a mayday. About 1 minute after that Ladder 26 reported fire showing from the rear on floor 1 and requested a line. Engine 22 pump relayed a message from the police that there was a building occupant on a rear porch. Car 4 struck a third alarm and ordered the second alarm companies to respond to the rear. While this was ensuing, Chief [redacted] (Car 3 RIT), and Chief [redacted] (Safety, H1) were coordinating efforts to effect a rescue of Engine 33 by having RIT companies and Rescue 1 enter the building using the Alpha side basement entrance. These efforts were unsuccessful. Car 4 remained in command in front of the building until the arrival of Deputy Chief [redacted] C6) who assumed command. Car 4 then went to the rear of the building to direct operations there. Car 4 directed operations in the rear (Charlie side) until the arrival of Deputy [redacted] (C7) who assumed command of Charlie Division.

Entered on February 19, 2015 by Commissioner [redacted], who was the Incident Commander on March 26, 2014, as the Deputy Chief of Division 1.

L Authorization

Upon [redacted] Assuming Command | [redacted] Signature | DIS Position or Rank | D04 Assignment | 04 Month | 19 Day | 2014 Year

[redacted] | [redacted] | DIS | D04 | 04 | 19 | 2014

ordered a fourth and fifth alarm immediately. Multiple RIT teams were deployed from the Alpha and Charlie sectors. Simultaneously, multiple interior attack lines were being [redacted] | 077990 | [redacted] | DIS | D04 | 04 | 19 | 2014

advanced from both the Alpha and Charlie sectors both to the basement areas as well as upper floors.

Additional alarms s were struck up to and including nine alarms. At some point in the operations before defensive operation were ordered, a RIT team from the Charlie sector located Firefighter Michael Kennedy, in the basement. Firefighter Kennedy was unresponsive, CPR was initiated immediately, and FF Kennedy was extricated to an awaiting

25035	MA	3	26	2014		14-0016454	000	Complete Narrative
FDID *	State *	MM	DD	YYYY Incident Date *	Station	Incident Number *	Exposure *	

Narrative:

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Entered on February 19, 2015 by Commissioner [redacted] , who was the incident commander on March 26, 2014, as the Deputy Chief of Division 1.

Upon assuming command I ordered a fourth and fifth alarm immediately. Multiple RIT teams were deployed from the Alpha and Charlie sectors. Simultaneously, multiple interior attack lines were being advanced from both the Alpha and Charlie sectors both for the basement areas as well as upper floors.

Additional alarms s were struck up to and including nine alarms. At some point in the operations before defensive operation were ordered, a RIT team from the Charlie sector located Firefighter Michael Kennedy, in the basement. Firefighter Kennedy was unresponsive, CPR was initiated immediately, and FF Kennedy was extricated to an awaiting ambulance, and transported to MGH.

After the recovery of Firefighter Kennedy, with rapidly deteriorating fire conditions. I ordered everyone out of the building , and ordered defensive operations. A PAR was conducted and it was confirmed that Lt. Edward Walsh was still unaccounted for. After hours of defensive operations, consisting of multiple ladder pipe and deck gun operations, the fire was knocked down enough to evaluate the structural integrity of the building, to determine if a recovery effort could be made. After consultation with and a structural engineer from the state building department it was determined the structure was safe enough to proceed with a recovery operation.

Exterior operations were suspended, and a recovery team was formed and deployed, and within minutes Lt. Walsh was located and recovered and removed to Boston Medical Center. Exterior operations were resumed and after multiple hours of operations the fire was contained and extinguished.

FDID *	State *	MM Incident Date *	DD Incident Date *	YYYY Incident Date *	Station	Incident Number *	Exposure *	Complete Narrative
25035	MA	3	26	2014		14-0016454	000	

A

FDID: 25035 *
State: MA *
Incident Date: MM 03 DD 26 YYYY 2014 *
Number:
Incident Number: 14-0016454 *
Exposure: 000 *
☐ Delete ☒ Change ☐ No Activity

NFIRS -2 Fire

B Property Details

B1 0010 ☐ Not Residential
Estimated Number of residential living units in building of origin whether or not all units became involved

B2 001 ☐ Buildings not involved
Number of buildings involved

B3 ☐ None
Acres burned (outside fires) ☐ Less than one acre

C On-Site Materials or Products ☐ None

Complete if there was any significant amounts of commercial, industrial, energy or agricultural products or materials on the Property, whether or not they became involved

Enter up to three codes. Check one or more boxes for each code entered.

On-site material (1):
1 ☐ Bulk storage or warehousing
2 ☐ Processing or manufacturing
3 ☐ Packaged goods for sale
4 ☐ Repair or service

On-site material (2):
1 ☐ Bulk storage or warehousing
2 ☐ Processing or manufacturing
3 ☐ Packaged goods for sale
4 ☐ Repair or service

On-site material (3):
1 ☐ Bulk storage or warehousing
2 ☐ Processing or manufacturing
3 ☐ Packaged goods for sale
4 ☐ Repair or service

D Ignition

D1 40 Storage area, Other
Area of fire origin *

D2 83 Flying brand, ember, spark
Heat source *

D3 12 Exterior wall covering or finish
Item first ignited *
1 ☐ Check here if item ignited was confined to object of origin

D4 63 Sawn wood, including all finished lumber
Type of material first ignited
Suppressed only if item first ignited code is 00 or >79

E1 Cause of Ignition

☐ Check box if this is an exposure report. Skip to section G

1 ☐ Intentional
2 ☒ Unintentional
3 ☐ Failure of equipment or heat source
4 ☐ Act of nature
5 ☐ Cause under investigation
U ☐ Cause undetermined after investigation

E2 Factors Contributing To Ignition ☐ None

13 Cutting, welding too close to combustible
Factor Contributing To Ignition (1)
Factor Contributing To Ignition (2)

E3 Human Factors Contributing To Ignition

Check all applicable boxes

1 ☐ Asleep
2 ☐ Possibly impaired by alcohol or drugs
3 ☐ Unattended person
4 ☐ Possibly mental disabled
5 ☐ Physically Disabled
6 ☐ Multiple persons involved
X ☐ None
7 ☐ Age was a factor

Estimated age of person involved
1 ☐ Male 2 ☐ Female

F1 Equipment Involved In Ignition

☐ None If Equipment was not involved, Skip to Section G

Equipment Involved
Brand
Model
Serial #
Year

F2 Equipment Power

Equipment Power Source

F3 Equipment Portability

1 ☐ Portable
2 ☐ Stationary

Portable equipment normally can be moved by one person, is designed to be use in multiple locations, and requires no tools to install.

G Fire Suppression Factors

Enter up to three codes. ☐ None

Fire suppression factor (1)
Fire suppression factor (2)
Fire suppression factor (3)

H1 Mobile Property Involved

☐ None

1 ☐ Not involved in ignition, but burned
2 ☐ Involved in ignition, but did not burn
3 ☐ Involved in ignition and burned

H2 Mobile Property Type & Make

Mobile property type
Mobile property make
Mobile property model
Year
License Plate Number
State
VIN Number

Local Use

☐ Pre-Fire Plan Available
Some of the information presented in this report may be based upon reports from other Agencies

☐ Arson report attached
☐ Police report attached
☐ Coroner report attached
☐ Other reports attached

NFIRS-2 Revision 01/19/99

NFIRS-3 Structure Fire

I1 Structure Type *
If fire was in enclosed building or a portable/mobile structure complete the rest of this item

1 [X] Enclosed Building
2 [ ] Portable/mobile structure
3 [ ] Open structure
4 [ ] Air supported structure
5 [ ] Tent
6 [ ] Open platform (e.g. pier)
7 [ ] Underground structure (mine, sewer)
8 [ ] Connective structure (e.g. tunnel)
0 [ ] Other type of structure

I2 Building Status *
1 [ ] Under construction
2 [X] Occupied & operating
3 [ ] Idle, not routinely used
4 [ ] Under major renovation
5 [ ] Vacant and secured
6 [ ] Vacant and unsecured
7 [ ] Being demolished
0 [ ] Other
U [ ] Undetermined

I3 Building Height
Count the ROOF as part of the highest story

004 Total number of stories at or above grade

001 Total number of stories below grade

I4 Main Floor Size*

[ ] , [001] , [625] Total square feet

OR

[ ] , [065] BY [ ] , [025] Lenght in feet / Width in feet

J1 Fire Origin *
[X] Below Grade

001 Story of fire origin

J2 Fire Spread *
1 [ ] Confined to object of origin
2 [ ] Confined to room of origin
3 [ ] Confined to floor of origin
4 [X] Confined to building of origin
5 [ ] Beyond building of origin

J3 Number of Stories Damaged By Flame
Count the ROOF as part of the highest story

[ ] Number of stories w/ minor damage (1 to 24% flame damage)

[ ] Number of stories w/ significant damage (25 to 49% flame damage)

[ ] Number of stories w/ heavy damage (50 to 74% flame damage)

005 Number of stories w/ extreme damage (75 to 100% flame damage)

K Material Contributing Most To Flame Spread
[ ] check if no flame spread OR none or minimal first ignited OR unable to determine — Skip To Section L

K1 [ ] [ ] Item contributing most to flame spread

K2 [ ] [ ] Type of material contributing most to flame spread — Required only if item contributing code is 00 or 70

L1 Presence of Detectors *
(In area of the fire)

N [ ] None Present — Skip to section M
1 [X] Present
U [ ] Undetermined

L2 Detector Type
1 [ ] Smoke
2 [ ] Heat
3 [ ] Combination smoke - heat
4 [ ] Sprinkler, water flow detection
5 [ ] More than 1 type present
0 [ ] Other _____
U [ ] Undetermined

L3 Detector Power Supply
1 [ ] Battery only
2 [ ] Hardwire only
3 [ ] Plug in
4 [ ] Hardwire with battery
5 [ ] Plug in with battery
6 [ ] Mechanical
7 [ ] Multple detectors & power supplies
0 [ ] Other _____
U [X] Undetermined

L4 Detector Operation
1 [ ] Fire too small to activate
2 [X] Operated (Complete Section Lc)
3 [ ] Failed to Operate (Complete Section Ld)
U [ ] Undetermined

L5 Detector Effectiveness
Required if detector operated

1 [X] Alerted Occupants, occupants responded
2 [ ] Occupants failed to respond
3 [ ] There were no occupants
4 [ ] Failed to alert occupants
U [ ] Undetermined

L6 Detector Failure Reason
Required if detector failed to operate

1 [ ] Power failure, shutoff or disconnect
2 [ ] Improper installation or placement
3 [ ] Defective
4 [ ] Lack of maintenance, includes cleaning
5 [ ] Battery missing or disconnected
6 [ ] Battery discharged or dead
0 [ ] Other _____
U [ ] Undetermined

M1 Presence of Automatic Extinguishment System *
N [X] None Present
1 [ ] Present — Complete rest of Section M

M2 Type of Automatic Extinguishment System *
Required if fire was within designed range of AES

1 [ ] Wet pipe sprinkler
2 [ ] Dry pipe sprinkler
3 [ ] Other sprinkler system
4 [ ] Dry chemical system
5 [ ] Foam system
6 [ ] Halogen type system
7 [ ] Carbon dioxide (CO_2) system
0 [ ] Other special hazard system
U [ ] Undetermined

M3 Automatic Extinguishment System Operation
Required if fire was within designed range

1 [ ] Operated & effective (Go to M4)
2 [ ] Operated & not effective (M4)
3 [ ] Fire too small to activate
4 [ ] Failed to operate (Go to M5)
0 [ ] Other
U [ ] Undetermined

M4 Number of Sprinkler Heads Operating
Required if system operated

[ ] Number of sprinkler heads operating

M5 Automatic Extinguishment System Failure Reason
Required if system failed

1 [ ] System shut off
2 [ ] Not enough agent discharged
3 [ ] Agent discharged but did not reach fire
4 [ ] Wrong type of system
5 [ ] Fire not in area protected
6 [ ] System components damaged
7 [ ] Lack of maintenance
8 [ ] Manual Intervention
0 [ ] Other _____
U [ ] Undetermined

NFIRS-3 Revision 01/19/99

NFIRS - 5
Fire Service
Casualty

A

FDID *	State *	Incident Date * (MM / DD / YYYY)	Station	Incident Number *	Exposure *	Delete	Change
25035	MA	3 / 26 / 2014		14-00164[redacted]0000		☐	☒

B Injured Person

Identification Number

1 ☒ Male * 1 ☒ Career
2 ☐ Female 2 ☐ Volunteer

First Name	MI	Last Name	Suffix
Edward J		Walsh	

C Casualty Number *

Casualty Number: 1

D Age or Date of Birth *

Age in years: 43 OR Date Of Birth (Month / Day / Year): [redacted]

E Date & Time of Injury Midnight is 0000

Date of Injury (Month / Day / Year): 3 / 26 / 2014
Time of Injury (Hour / Minutes): 14:46:00

F Responses

Number of prior responses during past 24 hours: 0

G1 Usual Assignment

1 ☐ Suppression
2 ☐ EMS
3 ☐ Prevention
4 ☐ Training
5 ☐ Maintenance
6 ☐ Communications
7 ☐ Administration
8 ☐ Fire investigation
0 ☐ Other

G2 Physical Condition Just Prior To Injury

1 ☐ Rested
2 ☐ Fatigued
4 ☐ Ill or Injured
0 ☐ Other
U ☐ Undetermined

G3 Severity

1 ☐ Report only, including exposure
2 ☐ First aid only
3 ☐ Treated by physician (no lost time)
4 ☐ Moderate (lost time)
5 ☐ Severe (lost time)
6 ☐ Life threatening (lost time)
7 ☒ Death

G4 Taken To

1 ☒ Hospital
4 ☐ Doctor's office
5 ☐ Morgue/funeral home
6 ☐ Residence
7 ☐ Station or quarters
0 ☐ Other
N ☐ Not transported

G5 Activity at Time of Injury

31 Handling charged hose lines
Activity at time of injury

H1 Primary Apparent Symptom

01 Smoke inhalation
Primary apparent symptom

I1 Cause of Firefighter Injury

4 Exposure to hazard
Cause of injury

I3 Object Involved in Injury

☐ None

53 Fumes, gases, or smoke
Object involved in injury

H2 Primary Area of Body Injured

93 Multiple body parts - whole body
Primary injured body part or area

I2 Factor Contributing to Injury

30 Lost, caught, trapped, or confined by
Contributing factor

J1 Where Injury Occurred

1 ☐ Enroute to FD Location
2 ☐ At FD location
3 ☐ Enroute to incident scene
4 ☐ Enroute to medical facility
5 ☒ At scene in structure
6 ☐ At scene outside
7 ☐ At medical facility
8 ☐ Returning from incident
9 ☐ Returning from med facility
0 ☐ Other

J2 Story Where Injury Occurred

Check this box and enter the story if the injury occurred inside or on a structure

1 ☒ 1 Story of injury ☒ Below grade
2 ☐ Injury occurred outside

J3 Specific Location Complete as Applicable

65 ☐ In aircraft
64 ☐ In boat or ship or barge
63 ☐ In rail vehicle
61 ☐ In motor vehicle
54 ☐ In sewer
53 ☐ In tunnel
49 ☒ In structure
45 ☐ In attic
36 ☐ In water
35 ☐ In well
34 ☐ In ravine
33 ☐ In quarry or mine
32 ☐ In ditch or trench
31 ☐ In open pit
28 ☐ On steep grade
27 ☐ On fire escape/outside stairs
26 ☐ On vertical surface or ledge
25 ☐ On ground ladder
24 ☐ On aerial ladder or in basket
23 ☐ On roof
22 ☐ Outside at grade
00 ☐ Other

J4 Vehicle Type Complete ONLY if Specific Location code 61-65

1 ☐ Suppression vehicle
2 ☐ EMS vehicle
3 ☐ Other FD vehicle
4 ☐ Non-FD vehicle

Remarks

Fire Lieutenant Walsh died in the line of duty. As of

If protective equipment failed and was a factor in this injury, please complete the other side of this form.

NFIRS-5 Revision 8/15/99

NFIRS - 5
Fire Service
Casualty

A

FDID *	State *	MM Incident Month *	DD Incident Day *	YYYY Incident Year *	Station	Incident Number *	Exposure *	Delete	Change
25035	MA	3	26	2014		14-00164[redacted]0000	0	☐	☒

B Injured Person

Identification Number

1 ☒ Male * 1 ☒ Career
2 ☐ Female 2 ☐ Volunteer

First Name	MI	Last Name	Suffix
Michael R		Kennedy	

C Casualty * Number: 2

D Age or Date of Birth *

Age in years: 33 OR Date Of Birth (Month Day Year): [redacted]

E Date & Time of Injury (Midnight is 0000)

Date of Injury (Month Day Year): 3 26 2014
Time of Injury (Hour Minutes): 14:46:00

F Responses

Number of prior responses during past 24 hours: 0

G1 Usual Assignment

1 ☐ Suppression
2 ☐ EMS
3 ☐ Prevention
4 ☐ Training
5 ☐ Maintenance
6 ☐ Communications
7 ☐ Administration
8 ☐ Fire investigation
0 ☐ Other

G2 Physical Condition Just Prior To Injury

1 ☐ Rested 0 ☐ Other
2 ☐ Fatigued U ☐ Undetermined
4 ☐ Ill or Injured

G3 Severity

1 ☐ Report only, including exposure
2 ☐ First aid only
3 ☐ Treated by physician (no lost time)
4 ☐ Moderate (lost time)
5 ☐ Severe (lost time)
6 ☐ Life threatening (lost time)
7 ☒ Death

G4 Taken To

1 ☒ Hospital
4 ☐ Doctor's office
5 ☐ Morgue/funeral home
6 ☐ Residence
7 ☐ Station or quarters
0 ☐ Other
N ☐ Not transported

G5 Activity at Time of Injury

31 Handling charged hose lines
Activity at time of injury

H1 Primary Apparent Symptom

01 Smoke inhalation
Primary apparent symptom

H2 Primary Area of Body Injured

93 Multiple body parts - whole body
Primary injured body part or area

I1 Cause of Firefighter Injury

4 Exposure to hazard
Cause of Injury

I2 Factor Contributing to Injury

30 Lost, caught, trapped, or confined
Contributing Factor

I3 Object Involved in Injury

☐ None

53 Fumes, gases, or smoke
Object involved in injury

J1 Where Injury Occurred

1 ☐ Enroute to FD location
2 ☐ At FD location
3 ☐ Enroute to incident scene
4 ☐ Enroute to medical facility
5 ☒ At scene in structure
6 ☐ At scene outside
7 ☐ At medical facility
8 ☐ Returning from incident
9 ☐ Returning from med facility
0 ☐ Other

J2 Story Where Injury Occurred

1 ☒ Check this box and enter the story if the injury occurred inside or on a structure
1 Story of injury
☒ Below grade
2 ☐ Injury occurred outside

J3 Specific Location (Complete as Applicable)

65 ☐ In aircraft
64 ☐ In boat or ship or barge
63 ☐ In rail vehicle
61 ☐ In motor vehicle
54 ☐ In sewer
53 ☐ In tunnel
49 ☒ In structure
45 ☐ In attic
36 ☐ In water
35 ☐ In wall
34 ☐ In ravine
33 ☐ In quarry or mine
32 ☐ In ditch or trench
31 ☐ In open pit
28 ☐ On steep grade
27 ☐ On fire escape/outside stairs
26 ☐ On vertical surface or ledge
25 ☐ On ground ladder
24 ☐ On aerial ladder or in basket
23 ☐ On roof
22 ☐ Outside at grade
00 ☐ Other

J4 Vehicle Type (Complete ONLY if Specific Location code is 61)

1 ☐ Suppression vehicle
2 ☐ EMS vehicle
3 ☐ Other FD vehicle
4 ☐ Non-FD vehicle

Remarks
Firefighter was advancing line in basement when he an

If protective equipment failed and was a factor in this injury, please complete the other side of this form.

NFIRS-5 Revision 8/15/99

1579
BEACON & EXETER STS

GRID 24-11 CIR 50 TEST CO:

Notes:

	RESPOND TO FIRE				COVERING ASSIGNMENTS	
	ENGINE	LADDER	SPECIAL	CHIEF	ENGINE	LADDER
1st	33 7 22	15 TL17	R1 *	D4		
WF	3	24	MCP TL3 H2	Dv1 H1	39-7 17-22 18-17 29-33	18-TL17 21-TL3
2nd	3 4 37 39	24 26	MCP TL3 H2 W12	Dv1 H1	5-10 10- 7 17-22 18-17 21-39 29-33 42-37 50- 4	14-26 18-TL17 21-TL3
3rd	10 17	18			5- 7 24-22 49-24 55-42	21-TL17
4th	24 14				51-29 55-14 56- 5	
5th	29 42	14			28-37 Bk I-28 Ca 2-33 Qu 2-18	4-26 7- 4 Bk 2-14 Qu 2- 7
6th	5 55				30-24 32- 7 49-14 Ne 1-30 Nw 6-51 So 2-32	
7th	32 28	4			9- 7 30-37 48-24 Ch 2-9 De 1-48 Wn 1-56	23-26 Ca 1-15
8th	30 8				16-42 Ev 1- 8 Mi 1-16 Wt 1-37	
9th	21 49				41-14 56-39 Ma 3-10 Rev 1- 5 Wal 2-41	

Synopsis of Building Permit History

1. 6/27/18 – Hazard Report: Assessment of property – occupancy dwelling.

2. 6/14/20 (permit granted) – Permit No. 1351 (LF) – Remove rear partitions (4th floor). Making 4 rooms & trunk rooms per plans. Occupancy – private dwelling

3. 1/29/30 (permit granted) – Permit No. 238 (SF) – 2 partitions removed (non-bearing). General repairs to interior, laying floors. Removing wardrobe, closets and shelves – not to interfere with egress.

4. 7/7/36 - Letter from Building Commissioner to Water Division, Public Works Department refers to another letter (not in building jacket) with reference to 293 Beacon St.

5. 1/27/42 – Letter, the signee refers to an enclosed signed statement regarding the library. Signee said a re-inspection occurred and inspector agreed that legal stipulations regarding fire precautions had been taken care of and required that the enclosed be mailed immediately to City Hall Annex, Room 901.

6. 1/27/42 – Letter, the signee will not use the library on 2nd floor for sleeping rooms at any time.

7. 2/12/42 (permit granted) – Permit No. 104 (LF) – Change from one family to lodging. Occupancy dwelling.

8. 10/7/46 (permit granted) – Permit No. 2764 (LF) – Erect connecting balconies as per plan submitted to connect with 300 Beacon St. 4th floor front new balcony. 3rd floor rear connect to existing balcony. 2nd floor rear new balcony. Occupancy "dwelling" (last used for) but crossed out and written "lodging house" (building to be used for).

9. 2/14/47 (permit application refused) – Permit Application No. 428 (LF) – Erect one story over existing one story ell – wood construction – flat roof – as per plans filed.

10. 3/19/47 – Letter, written by Building Commissioner, application, dated 2/14/47, is refused as it is in violation of Chapter 479, Acts of 1938, as amended. Section 203 (a), Buildings hereafter erected in the fire zone shall be of Type I, II, III or IV construction.

11. 11/5/73 – Speed letter – City zoning administrator requesting from addressees four copies of a certified plot plan and zoning computation form. Pertains to permit application no. 1810 for 124 Marlboro St. (possible misfile).

12. 7/16/74 – Two Violations – Chapter 479, Acts of 1938, V1394 - Section 110 (a): Failure to secure a permit to change occupancy of this building from lodging house (Doc. # 2764 10/21/46) to 8 apartments. This building now has 8 apartments. Additionally, UB899 - Section 116 (d): Egress. Unsafe and dangerous. Rear stairwell leading to basement exit blocked off by an apartment which leaves the 2nd and 3rd floor apartments without proper egress. Violation closed 1/28/75 - V1394. Violation closed 12/16/74 – UB899.

13. 8/6/74 – Letter from Assessing Commissioner to Building Commissioner advising that the property according to assessing records has been a building with 8 apartments since 1955 (2 in the basement, one each on first and second floors, two on the third floor and two on the fourth floor). Additionally, all utilities are provided by the owner and there is parking for four cars in the rear.

14. 10/21/74 – Speed letter – City reviewer requesting a complete set of plans showing all architectural, structural, electrical and mechanical work stamped by a Massachusetts Registered Architect or Engineer and by the Boston Fire Department are required. If there is no response after 30 days of the above date, your documents will be deemed abandoned. Pertains to permit application no. 1568.

15. 11/26/74 (permit granted) – Permit No. 1568 (LF) – Change occupancy from lodging house to 8 apartments in conformity with building code, including correction or rear egress per a complaint filed against the owner by Building Department prior to our purchase. Install legal kitchens and baths. Install fireproof partitions in first and second floor main hallways. As per plans. Legal complaints V1394 & UB899.

16. 11/5/75 (permit granted) – Permit No. 358 (LF) – To legalize two (2) existing balconies: one (1) on 2nd and one (1) on 3rd floors. Occupancy 8 apartments.

17. 10/23/85 (permit granted) – Permit No. 1831 (SF) – Replace approx. 12 lin. ft. of soffit on cornice work and a few moldings.

18. 12/27/85 (permit granted) – Permit No. 2722 (SF) – Install window grates in front and rear. Total: five windows.

19. 1/11/88 (permit granted) – Permit No. 5020 (SF) – Replace gutters/downspouts & flashing at front w/new copper. Also copper face on windows. Replace slate at front at windows.

20. 8/25/88 (permit granted) – Permit No. 1287 (SF) – Repair and replace shingles on one side existing shed on rear.

21. 12/20/89 (permit granted) – Permit No. 3327 (SF) – 1. Repair crack in rear brick façade. 2. Repair bulge in left rear brick façade.

22. 11/18/91 – Violation – Massachusetts State Building Code, Stat. 1972, Chap. 802, Section 113.1 Failure to secure a building permit. Wood shingles have been installed on rear addition. On 3/23/92, inspector submitted report that states "17 (circled) has perm, work done-close case".

23. 6/1/93 (permit granted) – Permit No. 5581 (SF) – Point brickwork.

24. 11/28/94 (permit granted) – Permit No. 2942 (SF) – Install copper gutters and decking, below front mansard. Replace missing slate and install new copper pipe, front building.

25. 11/11/95 (permit granted) – Permit No. 1254 (LF) – Install rear iron fence 6' high also guard rail fence to match fence to stop encroachment of vehicles on property. Occupancy 8 apartments.

26. 1/2/96 (permit granted) – Permit No. 4238 (SF) – Renovate existing kitchen bath. Add ½ bath and install Murphy bed. Work to be done on first floor.

27. 10/25/96 (permit granted) – Permit No. 1256 (LF) – Construct elevator shaft from basement level to 2nd floor. Minimum relocation of existing walls. Construct pit below basement floor to grade beams for support of dead and live load of floor areas changed by elevator as per plan. Re-hang doors.

28. 12/6/96 (amended permit granted) – Permit No. A211 (permit amendment) – Amend permit #1256/96 – Change concrete grade beams to steel by engineer.

29. 1/14/97 (amended permit granted) – Permit No. A256 (permit amendment) – Change size of floor header.

30. 3/8/05 (permit granted) – Permit No. 6298 (SF) – Rear elevation: Investigate the bulge at the top floor. Repair as necessary. Repair roof and gutter.

31. 4/28/05 (permit granted) – Permit No. 3270 (LF) – Exterior brick work cost reflected on sf#6298.

32. 8/22/06 – Fire Escape Affidavit 105.

33. 7/23/13 – Fire Escape Affidavit 275.

Electrical Permits (common areas)

1. 4/2/74 (permit granted) – Permit No. 16419 – Change 100 amp to 200 amp. 10 meters. 2 20 amp receptacles. 6 15 amp receptacles. 1 10 km range. 30 100 watt fixtures. 10 20 amp air conditioners receptacles. 2 kw heater. 1 oil burner. 10 circulators. (basement)

2. 10/15/74 (permit granted) – Permit No. 15724 – 2 plugs per apt. 4 s.p. switches. 9 6 kw ranges per unit. 8 sub panels, 1 house, 2 public.

3. 6/20/94 (permit granted) – Permit No. 1233 – 15 amp. circuit- smoke alarm service – 5 zones – low voltage 5 smoke detectors, 1heat detector, 3 sounding devices, local and 24 vdc.

4. 8/25/97 (permit granted) – Permit No. 3382 – remodel kitchen, bath, laundry and new elevator.

CUTTING & WELDING

Safeguards and Conditions Prescribed:

Comply with the provisions of the Boston Fire Prevention Code Articles 8 and 19. Fire Watch to be maintained for a minimum of Thirty (30) minutes after completion of burning daily. BFPC 8.04 and CMR 527 Sections 1 and 39.

The person accepting this permit shall conform to the Statutes of the Commonwealth, Commonwealth of Massachusetts Fire Prevention Regulations, the Boston Fire Prevention Code, the Ordinances of the City of Boston and the conditions of this permit. This permit may be revoked at any time by the Head of the Fire Department; a violation of any of its conditions shall work an immediate revocation of the permit. The person to whom this permit is issued shall indemnify and save harmless the City of Boston from any damage it may sustain, or be required to pay by reason of the exercise of this permit or by reason of any violation of any condition of this permit

The preceding language was excerpted from a standard BFD Hot Work permit issued at the time of the fire. The safeguards described in the wording refer to:

- The Boston Fire Prevention Code Article 8: Welding and Cutting
- The Boston Fire Prevention Code Article 19: Gases
- Commonwealth of Mass Regulations 527 Section 1: Administration
- Commonwealth of Mass Regulations 527 Section 39: Welding and Cutting Processes

Both 527 CMR and the Boston Fire Prevention Code require a person seeking to perform a welding and cutting operation to obtain a permit. Each code details the safeguards the permit holder must comply with to minimize the risk of causing a fire. 527 CMR is the minimum standard of compliance expected but the CMR allows the local authorities the ability to exceed those minimum standards in situations where they determine additional safeguards are warranted due to the hazards and risk associated with a specific application. Often the BFD District Chief would require a BFD Paid Fire detail as an additional safeguard in conjunction with the minimum safeguards required for all permit holders to comply with as a condition of the permit.

Note: In January 2015, the State of Massachusetts adopted a revised code titled: 527 CMR 1.00, The Massachusetts Comprehensive Fire Safety Code. The CMR is a composite of NFPA 1 with Massachusetts specific amendments. Section 41 details the requirements for Welding, Cutting and Other Hotwork and has expanded the scope of work to include a number of processes that were not covered under the previous code.

Boston Fire Department
Fire Prevention Division
1010 Massachusetts Avenue – 4th Floor
Boston, MA 02118
Tel: 617-343-2175 Fax: 617-343-3604

Form version 3/13 in use on the date of the fire. Form was revised again on 5/15 to coincide with adoption of the latest edition of the State Fire Code

Instructions for the Cutting/Burning and Welding Applications

All fields on applications must be **CORRECTLY AND COMPLETELY FILLED OUT;**

- Incomplete or incorrect application(s) will be returned by mail only.
- Areas that are either incorrect or incomplete will be hi-lighted and if necessary a written explanation will accompany a returned application(s).
- To ensure accuracy when resubmitting the corrected application(s) resubmit the hi-lighted application with your corrections on it.
- Correctly completed applications take 3 – 5 business days for processing and approval review.
- Phone calls on the status of the application should only be made if the application has been in Fire Prevention for more than 1 week.
- When the application is approved the customer will be called for pick –up if it is unpaid or pick-up was requested at time of submittal. Due to volume of permits issued, a permit requested for pick-up is only held in Fire Prevention for 1 business day, after which it is automatically mailed out.
- If pick-up was not requested upon approval it will be automatically mailed out.

Permission Letter

All applications for Cutting/Burning/ Welding must be accompanied with a permission letter from the property owner, manager, or agent at the time of submittal, there are **NO EXCEPTIONS.** Permission Letters must be submitted:

- on letterhead,
- must be dated,
- specify the exact work location (street address and number),
- list the name of every contractor performing cutting/burning/ and welding work on the property,
- list all floors where work is being performed, a floor and area must be individually listed, **"ALL FLOORS" IS NOT ACCEPTABLE AND THERE ARE NO EXCEPTIONS**
- if the work is being performed in certain area(s) like the basement or the roof, the letter must specify these locations and the reason why the work is being performed
- complete scope and description of work being performed must be included in all letters
- signed by property owner/agent/manager

Emergency Work

If the job is an emergency **THE APPLICATION AND THE LETTER MUST STATE THIS.** An emergency relates to items such as:

- no heat in the winter,
- no water or hot water,
- no air-conditioning in the summer,
- unusable handicapped facilities or
- unsafe conditions.

A job that is time or fiscally sensitive on either the contractor's or property owners' part does not constitute an emergency. It must be a life safety issue.

Paid Details

Only upon approval will it be known as to whether a Paid Detail will be required. An instruction sheet will be attached to the permit in order for a Paid Detail to be ordered. **PERMIT NUMBERS WILL NOT BE GIVEN OUT IN ADVANCE; THE PERMIT MUST BE IN CONTRACTOR'S HAND IN ORDER FOR PAID DETAIL TO BE ORDERED.**

Extensions

The maximum time allowable under the law for this permit is six months. When requesting an extension your original permit with the request can be either faxed or hand delivered at least 2 weeks prior to its expiration. As long as the scope of work has not changed, permit has not expired, and the permission letter is acceptable it will be automatically extended. If the above is not the case it is a totally new application and all of the above is required.

Note: It is the contractor's responsibility to make copies and maintain original permit. All original permits must be posted and maintained on job-site. If lost, a copy may be requested, but will only be available **by pick-up** in Fire Prevention. **Faxed Permits are never valid.**

Boston Fire Department
Fire Prevention Division
1010 Massachusetts Avenue – 4th Floor
Boston, MA 02118
Tel: 617-343-2175 Fax: 617-343-3604

For BFD Internal Use Only:

Payment Received Date:_____

Payment Number:_____

Customer ID:_____

Permit Number:

APPLICATION FOR CUTTING-BURNING-WELDING PERMIT

Completed Permit should be:_____ Mailed _____E-mailed _____ Picked up

STARTING DATE_____ENDING DATE_____
(6 MONTH MAXIMUM)

JOB LOCATION_____

BUILDING OWNER'S NAME_____

BUILDING OWNER'S ADDRESS_____
Number Street

_____PHONE_____
City State Zip Code

CONTRACTOR'S NAME_____

CONTRACTOR'S ADDRESS_____
Number Street

_____PHONE_____
City State Zip Code

FAX:_____ E-MAIL ADDRESS:_____

COMPLETE SCOPE/DESCRIPTION OF WORK REQUIRED_____

_____

_____

STATE FLOORS AND/OR AREAS INVOLVED_____

Acetylene:	**Tanks_____ @ c.f._____ = _____**	**Liquid Oxygen:**	**Tanks_____ @ c.f._____ = _____**
Acetylene: (B)	**Tanks_____ @ c.f._____ = _____**	**Mapp Gas:**	**Tanks_____ @ c.f._____ = _____**
Argon:	**Tanks_____ @ c.f._____ = _____**	**Oxygen:**	**Tanks_____ @ c.f._____ = _____**
CO2:	**Tanks_____ @ c.f._____ = _____**	**Propylene:**	**Tanks_____ @ c.f._____ = _____**

# of Mig/Tigs:_____ # of Torches:_____ # of Welders:_____

APPLICANT'S NAME (PRINT)_____

APPLICANT'S SIGNATURE_____DATE_____

***PLEASE NOTE: You must obtain a release letter from the owner or management company stating the dates and floors you will be working on in accordance with CMR 39.**

********** PAYABLE AT TIME OF APPLICATION**********

Revised 3/2013

The following is a description of the test procedure followed when performing the Heat-Resistance Test in ANSI/UL 19, *Lined Fire Hose and Hose Assemblies*, and the Heat Resistance Test in FM Class Number 2111, *Factory Mutual Approval Standard for Fire Hose*. .

16 Heat-Resistance Test

16.1 General

16.1.1 A coupled sample of hose, while lying straight, shall comply with the requirements of the Hydrostatic Strength Test, Section 12, after exposure to a heated steel block, as described in 16.4.1.

16.2 Sample

16.2.1 The length of the sample is to be 18 inches (457 mm).

16.3 Equipment

16.3.1 An oven capable of maintaining a temperature of 260.0 ±2.0°C (500.0 ±3.6°F), a solid steel block 2-1/2 by 1-1/2 by 8 inches (63.5 by 38 by 203 mm), the hydrostatic equipment specified in 10.3.1, and a protective enclosure are to be used for this test.

16.4 Test method

16.4.1 The sample is to be sealed at one end, filled with tap water, sealed at the other end, and conditioned for 24 hours in a room maintained at 23.0 ±2.0°C (73.0 ±3.6°F). The steel block is to be heated for at least 16 hours in an oven maintained at 260.0 ±1.0°C (500.0 ±1.8°F), removed from the oven, and within 5 seconds placed so that the longitudinal axis of the steel block is perpendicular to the longitudinal axis of the sample. The contact area is to be the midpoint of the 2-1/2 inch (63.5 mm) wide side of the steel block and the midpoint of the sample. A metal knife edge is to be used as a support near one end of the steel block to balance the steel block and obtain maximum force on the hose. After 60 seconds, the steel block is to be removed. After the hose has cooled, it is to be laid straight and subjected to the Hydrostatic Strength Test, Section 12.

	Boston Fire Specifications	
	Specification: Attack Hose Specification	
	Approved for use By:	Effective Date:12/4/2013 Revision Dates:12/5/2013-Coupling Sizes 12/6/2013: Verbiage regarding specifications changed per RF

Attack Hose Specifications

Scope:

The bidder's product must meet or exceed NFPA compliant attack hose. It shall be of double jacket construction with a minimum service test pressure of 400 PSI/ 2755 KPA. All hose manufactured in this specification will be of superior quality and workmanship and shall be designed to withstand the rigors of front line firefighting.

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

_____
_____
_____
_____

General Specifications:

Sample of Hose

Hose manufactures shall make arrangements to submit one 25 foot section of hose being bid with couplings attached for testing and inspection purposes. The section shall be delivered no later than 7 days after the close of bidding or the bid, at the sole discretion of Boston Fire Department, will be considered withdrawn. It shall be at no cost to the Boston Fire Department.

	Boston Fire Specifications	
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Hose Manufacture

The hose must be manufactured, coupled, and tested in the same facility. The fire department will not accept hose that is purchased by one manufacture and coupled by a third party. A letter stating that their hose meets this specification must be submitted on company letterhead with each vendors bid.

Failure to Deliver on or Meet Specification

If the hose that has been delivered by the manufacture & Vendor fails to meet this specification, it is the responsibility of the manufacture / vendor to pay for all shipping costs back to the hose manufacturing facilities at no cost to the City of Boston or the Boston Fire Department.

Delivery of Hose

Upon notice of award and issuance of a Purchase Order, the winning bidder shall deliver the hose within 30 business days. All delivery costs shall be included in the bid price as a separate line item. Delivery shall be made at a mutually agreed upon time and location during regular business hours, which for the purposes of this bid, shall be 0900-1500 Monday-Thursday (excluding holidays).

Letter Stating Specifications Met

A letter from the hose manufacture stating that their hose meets this specification must be submitted with each vendors bid. This letter shall include the Model and inside diameter of the hose they are bidding along with all current technical specifications for the hose. This shall be submitted on Company letter head by the manufacture of the hose

Comply:_____	Exception:_____

.	Boston Fire Specifications	
	Specification: Attack Hose Specification	
	Approved for use By:	Effective Date:12/4/2013 Revision Dates:12/5/2013- Coupling Sizes ~~12/6/2013: Verbiage regarding specifications changed per RF~~

Hose Lengths:

For the purpose of this bid, the following hose lengths shall be provided:

Item Number	Hose Diameter/ Coupling Size	Hose length	Hose Color	Quantity
1	2.5”/2.5”	50’	Yellow	125
2	1.75”/1.50”	50’	Yellow	30
3	3”/2.5”	50’	Blue	12
4				

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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	Boston Fire Specifications	
	Specification: Attack Hose Specification	
	Approved for use By:	Effective Date:12/4/2013 Revision Dates:12/5/2013-Coupling Sizes 12/6/2013: Verbiage regarding specifications changed per RF

Jacket Construction:

The inner hose Jacket alone shall be a NFPA compliant Attack hose made with 100% filament polyester warp & weft yarn. The Outer Jacket shall be made with virgin spun polyester warp yarn and a minimum of 10 filament polyester weft yarn picks per inch (394 per meter). The jacket shall have two 3/16" (4 mm) red stripes running the length of the jacket ¼" apart, running the full length of the jacket. The Outer jacket shall be impregnated in one of the standard NFPA colors, as specified above.

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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	Boston Fire Specifications	
	Specification: Attack Hose Specification	
	Approved for use By:	Effective Date:12/4/2013 Revision Dates:12/5/2013-Coupling Sizes 12/6/2013: Verbiage regarding specifications changed per RF

Lining

The lining (or waterway) shall be made from a suitable material. The waterway shall be a virtually inseparable unit, yielding an extremely low friction (pressure) loss by filling the corrugations of the weave, creating an ultra-thin and smooth waterway.. In addition, the lining must be approved for use with potable water.

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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_____
_____

Cold Temperature Flexibility

Hose must remain flexible to -65F (-55C).

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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	Boston Fire Specifications	
	Specification: Attack Hose Specification	
	Approved for use By:	Effective Date:12/4/2013 Revision Dates:12/5/2013-Coupling Sizes 12/6/2013: Verbiage regarding specifications changed per RF

Flow and Friction Loss

1 ¾ (44mm) diameter, 100 US GPM (379 LPM), shall not exceed 8 PSI (55 kPa) loss per 100 feet (30.5M)

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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Service, Test, Burst Pressures

Minimum service, test, and burst pressure shall be as detailed in the specification table

Comply:_____	Exception:_____

	Boston Fire Specifications	
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Please Explain Exception(Add Additional Pages as Needed) :

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Kink Test

Each length of fire hose shall withstand a hydrostatic pressure of 600 psi/ 4140 kPa while kinked.

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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_____
_____
_____

Weight

Each Length of hose shall not weigh more than indicated in the specification table

Comply:_____	Exception:_____

	Boston Fire Specifications	
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Please Explain Exception(Add Additional Pages as Needed) :

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Couplings

The hose shall come complete with NST (national Standard Thread) aluminum couplings. The female couplings must have reflective arrows that are visible from any position. The reflective arrows must be engraved into and below the surface of the coupling to resist abrasion. The arrows must point in the direction of the water source. The couplings must be available in the sizes specified. The couplings must conform to NFPA standards.

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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	Boston Fire Specifications	
	Specification: Attack Hose Specification	
	Approved for use By:	Effective Date:12/4/2013 Revision Dates:12/5/2013-Coupling Sizes 12/6/2013: Verbiage regarding specifications changed per RF

Manufacture

It is preferred that both the hose and couplings be domestically manufactured in North America.

Comply:_____	Exception:_____

Please Explain Exception(Add Additional Pages as Needed) :

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Warranty

The fire hose shall have a 3-10-l warranty, as described below.

“3” denotes three years “all hazards” warranty against any damage incurred during firefighting applications.

“10” Denotes ten year warranty against manufacturing defects

“L” denotes lifetime against liner dimensions

	Boston Fire Specifications	
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Hose Identification

Each section of hose supplies shall be stenciled, legibly, with the words “Boston Fire Department” and a hose number unique to that hose. It shall be stenciled the entire length of each hose at an even interval. The identification number shall be eight digits in length, and numbered in based on the attached identification table.

Specification Table

The following specifications shall be considered the minimum acceptable for this hose:

Trade Size	Bowl Size	Weight per 50’ section (uncoupled)	Coil Diameter 50’ Section	Service Pressure	Proof Pressure	Burst Pressure
1.75 In	2 1/8 In	14.0 lbs	17.0 In	400 PSI	800 PSI	1500 PSI
2.5 In	3 In	21.o lbs	19.0 In	400 PSI	800 PSI	1450 PSI
3.0 In	3 5/16 In	26.0 lbs	21.0 In	400 PSI	800 PSI	1250 PSI

ANGUS PREMIER

1½", 1¾", 2½", 3"
NYLON, Double Jacket, EPDM Rubber-Lined
FIRE HOSE SPECIFICATION

SCOPE

Quality: The Fire Hose to be supplied under this specification is a premium quality, double jacket municipal fire hose. All materials used in the fabrication of the hose shall be of the best quality commercially available.

Service Life: The Fire Hose furnished under the terms of this proposal has a potential service life of 10 years, barring mistreatment or accidental damage that would render the hose unfit for service. Upon delivery, the fire hose shall be in first-class condition free from defects in workmanship and materials. There shall be a materials and workmanship warranty of 2 years. The supplier shall provide replacement of any such hose as may be defective without any charge whatsoever to the Fire Department.

TECHNICAL INFORMATION

Quality Assurance: The manufacturer must be committed to a Total Quality Management program**.** Quality Management procedures shall regulate twisting of yarns, weaving of jackets, extruding of linings, coating of outer jacket, vulcanizing and coupling of hose, and physical and laboratory testing of all raw materials and finished hose. The manufacturer shall maintain current calibrations on all test apparatus traceable to the National Institute of Standards and Technology (NIST). No exceptions are to be allowed.

NFPA Standard: The hose must meet all the requirements of **NFPA 1961**, *Standard on Fire Hose (Latest Edition).*

Jackets: The jackets shall be evenly and firmly woven, free from unsightly defects, dirt, knots, lumps, and irregularities of twist that might affect the serviceability of the finished product.

Each jacket shall be seamless and shall have polyester filler yarns woven around the hose throughout its length, with the warp ends interwoven with warp yarn and covering the filler yarn.

Warp ends of both the inner and outer jackets shall be nylon 6,6 entangled filament yarn, structured to allow total saturation with Hypalock. The use of polyester or staple yarns in the warp is not allowed.

Filler yarns of both the inner and outer jackets shall be high-tenacity filament polyester developed, designed, and processed for fire hose jacket filler yarns. These filament polyester yarns shall be free from defects that are unsightly or may affect the serviceability of the finished hose. The entangled nylon warp ends must completely cover and protect the filament polyester filler yarns.

Armour Jacket Impregnation: When specified, each outside jacket shall be completely impregnated by a mechanical process to provide coverage of an abrasion-resistant, water-repellent Armour Jacket compound prior to the jackets and liner being combined. Armour Jacket applied to finished hose, allowing varied absorption to the inside jacket, is not acceptable.

Lining: The rubber lining shall be a single ply extrusion of EPDM polymer, which naturally resists ozone and oxidation. Styrene butadiene rubber (SBR), which is not a natural resistor, is not acceptable. Thermoplastic liners such as polyurethane are also not acceptable. The surface must be smooth and free from corrugations. The lining thickness shall be tightly controlled to reduce weight and kink radius.

Thickness:

1½", 1¾, & 2½":	0.034 to 0.046"
3":	0.042 to 0.046"

Tensile Strength: 1200 psi minimum.

Elongation: 400% minimum

Ozone Resistance: Lining specimens shall be subjected to ASTM D 1149-99, "Standard Test Method for Rubber Deterioration — Surface Ozone Cracking in a Chamber". Specimens shall be prepared in accordance with ASTM D 518-99, "Standard Test Method for Rubber Deterioration — Surface Cracking", Procedure C, and shall be elongated 15%. Ozone concentration shall be 100+/- 5 parts per hundred million by volume. Temperature shall be 40.0° +/- 1.0° C (104° F). Time shall be 100 hours.

There shall be no appearance of cracking or crazing when viewed under a 7-power magnifying glass at any time during or at the end of the 100-hour exposure.

Accelerated Aging: Lining specimens shall be subjected to ASTM D573-04, "Standard Test Method for Rubber — Deterioration in an Air Oven". Specimens shall be exposed to 70° +/- 1° C temperature for a duration of 166 +/- 2 hours and shall be allowed to rest for 24 +/- 1 hours before testing. The tensile strength and ultimate elongation of the rubber lining after aging shall not be less than 75 percent of the original tensile and elongation.

Adhesion: The adhesive must be of uniform thickness around the circumference of the lining. Calendered adhesive with an overlap is Not Acceptable. The adhesion shall be such that the rate of separation of a 1½" strip of lining, transversely cut, shall not be greater than 1" per minute under a weight of 18 lbs. - No Exceptions. Thickness of liner and adhesive shall not exceed 0.052" for 1½" through 2½" hose, and 0.062" for 3" hose.

Low Temperature Flexibility: the hose shall be capable of performing in extreme cold temperature conditions. A 3-foot section of hose shall be exposed to a temperature of -54° +/- 2° C (-65° +/-3° F) for a period of 24 hours. At the end of the exposure period, and while maintained at the –54 °C exposure temperature, the hose shall be rapidly bent 180° double on itself, first one way and then the other. There shall be no cracking or breaking of the jacket or liner. Leakage shall be cause for rejection.

Hydrostatic Test:

(A) The hose shall be coupled and tested at the point of manufacture. Hydrostatic tests shall be conducted on hose equipped with the couplings to be delivered in accordance with NFPA 1961 (Latest Edition).

(B) Each length of hose is to be subjected to a hydrostatic proof test pressure of 800 psig for at least 15 seconds and not more than 1 minute. Higher test pressures, which may weaken the hose, are expressly forbidden.

(C) Twist: The hose shall not twist more than 4-1/4 turns per 50 ft for the 1½" and 1¾" sizes, and not more than 1-3/4 turns per 50 ft for the 2½" and 3" sizes under a pressure of 800 psig. No final twist in a direction to loosen the couplings shall be permitted.

(D) Warp: The hose shall not warp more than 20" from a straight line drawn from center to center of the fittings at the ends of the hose, and the hose shall not rise from the table.

(E) Expansion: The expansion in circumference of the hose between 10 and 800 psig shall not exceed 8%.

(F) Elongation: The elongation between 10 and 800 psig shall not exceed 8% for the 1½, 1¾", and 2½" sizes, and shall not exceed 10% for the 3" size.

Burst Test: A 3-foot sample of hose chosen at random shall stand without failure a hydrostatic pressure of 1200 psig while lying straight or curved on a 27" radius. Retention of the coupling to the hose shall equal or exceed the burst pressure.

Kink Test: A full length shall withstand, while kinked, without failure, a hydrostatic pressure of 600 psig.

Diameter: The hose shall have an internal diameter of not less than the trade size of the hose, except that internal diameter of the 2½" hose shall not be less than 2-9/16".

Weight Chart:

Hose Size	Stock Number	Proof Test Pres. (Psig)	Service Test Pres. (Psig)	Burst Test Pres. (Psig)	Kink Test Pres. (Psig)	Cplg. Bowl Size (in.)	Weight Per 50' Uncpld. (Lbs)	Coil dia. Per 50' (In.)	Flat Width
1½"	011058	800	400	1200	600	1-15/16	15	18	2-11/16
1¾"	011059	800	400	1200	600	2-1/8	17	18	3-1/8
2½"	011060	800	400	1200	600	3	28	20	4-1/4
3"	011061	800	400	1200	600	3-9/16	35	21	5-1/4

Method of Testing:

(A) All measurements and tests necessary to determine compliance of the fire hose with the specified requirements shall be made in accordance with ASTM D 380-94, "Standard Test Methods for Rubber Hose", except as otherwise specified.

(B) All tests shall be conducted at the point of manufacture, or at a laboratory equipped for such testing. All tests shall be performed as specified in NFPA 1961 (Latest Edition). Hydrostatic tests shall be conducted under controlled conditions employing equipment capable of supplying a uniform pressure.

Factory Inspection

The Fire Department reserves the right to inspect the above hose at the factory at anytime during the production process.