1000 FREDERICK LANE, MORGANTOWN, WV 26508 • 304.285.5916

Firefighter Dies and Lieutenant Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Executive Summary

Photo 1: Truck 4 conducting roof ventilation at Box 1501. (*Courtesy of the fire department*)

On May 12, 2021, a 30-year-old career firefighter died, a lieutenant was seriously injured, and two firefighters suffered minor injuries while fighting a fire in a two-story multi-family residential structure. At 00:46 hours, the city's fire dispatch center transmitted a box alarm assignment for Box 1501 for a residential structure fire. The first Alarm dispatched was Car 34, Engine 15, Engine 9, Engine 6, Truck 4, Truck 1, Rescue 1, Special Operations Command (SOC) 1, and Emergency 2 (EMS 2). At 00:50 hours, the fire dispatcher alerted Car 34 there was an occupant still in the house on the 1st floor and the fire was in the basement. At 00:51 hours, Engine 15 advised this was a "working" fire. At 00:52 hours, Engine 9 indicated a female occupant was trapped in a bedroom on Side Delta and Side Charlie. Engine 6 arrived on-scene at 00:53 hours and backed down the street to Engine 15, which was the attack piece. Engine 6 Hydrant (deceased firefighter) took five lengths of 1¾-inch hoseline to Engine 15 and made the connection for fire attack. Engine 6 stretched the hoseline into the house to the 2nd floor. Engine 6 (PAR 3) got to the 2nd floor via the front stairs at 01:02 hours. Engine 6 Lieutenant (who was carrying a thermal imager), Engine 6 Pipe, and Engine 6 Hydrant also got to the 2nd floor using the front stairs. Engine 6 Lieutenant called for the hoseline to be charged and had Engine 6 Pipe cool down the front room (living room), which was also located on the 2nd floor. Engine 6 Lieutenant went into the Side Delta bedroom which was very hot. The End of Service Time Indicators (EOSTIs) for the Engine 6 firefighters began to sound and Engine 6 Lieutenant told Engine 6 Pipe and Engine 6 Hydrant that they needed to leave to change air cylinders. Engine 6 Pipe left the hoseline and exited the 2nd floor. Engine 6 Lieutenant and Engine 6

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Hydrant became separated. In this confusion, Engine 6 Lieutenant's facepiece and helmet became dislodged. Eventually, Engine 6 Hydrant ran out of air, became disoriented, and was trying to get out of the room. Engine 6 Hydrant walked/crawled and got between a radiator and a couch in the living room underneath two windows on Side Alpha. He was running low on air and called a Mayday at 01:16 hours, which was acknowledged by the incident commander (IC). At 01:17 hours, Engine 6 Lieutenant called IC and said "I have a firefighter down on the 2nd floor." At 01:18 hours, Engine 6 Lieutenant called a Mayday. Engine 6 Lieutenant was located by Rescue 1 Hook. The firefighter found Engine 6 Lieutenant in the living room near the entrance to the kitchen. Engine 6 Lieutenant had his facepiece off and was standing when the firefighter found him. He said, "Help me," and then fell into the firefighter. Engine 6 Lieutenant's helmet was found in the Side Alpha/Side Bravo corner near Engine 6 Hydrant and his gloves were off.

Rescue 1 Hook was trying to get Engine 6 Lieutenant to the stairs but ended up in a bedroom (Side Delta/Side Alpha corner) at approximately 01:20 hours. Rescue 1 Hook knocked the glass out of a window with a gloved hand. Firefighters from Engine 4 and Engine 9 got ground ladders to the windows. Rescue 1 Hook tried to get Engine 6 Lieutenant out the window, but he was too heavy. Rescue 1 Hook had to leave due to being low on air. Once he was on the ground, he advised Car 31 where Engine 6 Lieutenant was located. At approximately 01:21 hours, Rescue 1 Irons made his way into the living room. He found Engine 6 Hydrant lying prone near a couch with his facepiece on, but he was out of air. Rescue 1 Irons attempted to drag Engine 6 Hydrant to the front windows. The officer from Truck 1 climbed into the front window on Side Alpha at 01:23 hours. When he got into the front room (living room), he heard a personal alert safety system (PASS) alarm sounding. He found Rescue 1 Irons trying to get Engine 6 Hydrant out from between the couch and a radiator underneath the front windows. The firefighters tried to take Engine 6 Hydrant out through the front windows but were not able to do so. Rescue 1 Irons and the Truck 1 officer had to leave due to being low on air. Once outside, the Truck 1 officer described Engine 6 Hydrant's location to Engine 11. Engine 11 entered the building, went up the front stairs, and found Engine 6 Hydrant behind the couch. Engine 11 brought him down the front stairs to the outside at 01:33 hours. Firefighters from Engine 4 and Engine 9 got Engine 6 Lieutenant out of the house at at the same time. Both Engine 6 Lieutenant and Engine 6 Hydrant were transported to a local university trauma center at 01:36 hours. Engine 6 Hydrant was declared deceased at 02:12 hours. Engine 6 Lieutenant was later transferred to a trauma hospital with a hyperbaric chamber for treatment and recovery. The fire at Box 1501 was declared under control at 03:23 hours.

Contributing Factors

- *Scene size-up and risk assessment*
- *Crew integrity*
- *Air management and firefighter survival*
- *Basement/below-grade fire operations*
- *Mayday management*
- *Rapid intervention crew/team*
- *Incident Safety Officer (ISO)*
- *Incident Command Technician (ICT)*
- *Professional development*

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Key Recommendations

Fire departments should ensure:

- *Initial and ongoing size-ups and risk assessments are conducted throughout the incident.*
- *Company officers and firefighters maintain crew integrity when operating in the hazard zone.*
- *Fire officers and firefighters are properly trained and utilize the principles of air management and fireground survival procedures.*
- *Fire department operations include Standard Operating Procedures (SOPs)/Standard Operating Guidelines (SOGs) for operating at basements and below-grade fires.*
- *Fire officers and firefighters are trained in Mayday operations.*
- *A rapid intervention team/crew is dedicated, assigned, and in place before interior firefighting operations begin and throughout an incident.*
- *Response plans include a dedicated and trained ISO.*
- *Operational battalion chiefs are staffed with an ICT or staff aide.*
- *Implementation of a training, education, and professional development program that is based upon each rank.*

For further information, visit the program at http://www.cdc.gov/niosh/firefighters/fffipp/ or call 1-800-CDC-INFO (1-800-232-4636).

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Firefighter Dies and Lieutenant Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Introduction

On May 12, 2021, a 30-year-old career firefighter died, a lieutenant was seriously injured, and two firefighters suffered minor injuries while fighting a fire in a two-story multi-family residential structure. On May 14, 2021, the United States Fire Administration (USFA) notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On May 23–30, 2021, investigators representing the NIOSH Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) traveled to Connecticut to conduct the investigation which included a site visit and photographs of the fire building. During the visit, NIOSH investigators met with the fire chief, deputy chiefs, battalion chiefs, captains, firefighters, and the training chief involved in this incident. NIOSH investigators also met with other investigators from the Connecticut State Police, dispatchers at the department's fire alarm office, Connecticut Office of the Chief Medical Examiner, and the director of the Connecticut Fire Academy.

The NIOSH investigators reviewed the fire department's SOPs; training records for Engine 6 Hydrant and Engine 6 Lieutenant; the fire incident report, witness statements and photographs; and dispatch and tactical channel radio transmissions. The investigators evaluated and photographed the structural firefighting turnout ensembles of the firefighters involved. The fire department requested NIOSH to evaluate the self-contained breathing apparatus (SCBA) worn by Engine 6 Hydrant. The NIOSH investigators transported the SCBA to the NIOSH National Personal Protective Technology Laboratory (NPPTL) in Morgantown, West Virginia for further inspection.

Fire Department

The fire department provides fire protection and emergency medical services (EMS) to a population of over 134,000 people. The city has a total area of 20.1 square miles, 18.7 square miles is land, and 1.4 square miles is water. The fire department operates out of 10 fire stations, located throughout the city and is organized into two battalions: Car 33 (East Battalion) and Car 34 (West Battalion). The fire department operates with 10 engine companies, four truck companies, a heavy rescue company, mobile command unit, hazardous materials unit, brush truck, foam tender, fireground rehabilitation unit, three paramedic emergency medical units, and a fireboat along with several special units. The fire department has 400 members. The staffing number for each division (shift) is 72 members. The fire department has an Insurance Service Office (ISO) Fire Protection Class 1 rating.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Each engine and truck company are staffed by an officer and three firefighters/Emergency Medical Technicians (EMTs). Rescue 1 is staffed by an officer and four firefighters/EMTs. SOC 1 is staffed by an officer and a firefighter/EMT. Each EMS unit is staffed by a firefighter/paramedic and a firefighter/EMT. The hazardous materials unit and the rehab unit are crossed-staffed by the officer and firefighter/EMT from SOC 1. Each battalion is staffed by a battalion chief. The deputy chief serves as the city-wide tour commander. Truck 1 is a tower ladder, Trucks 2 and 4 are tractor drawn aerials, and Truck 3 is a rear mount aerial.

The Fire Suppression & EMS Division works three-night tours (0800–1800 hours) and three days off. The fire department operates four divisions or platoons. The fire department also provides advanced life support (ALS) and basic life support (BLS) to the city with three paramedic-staffed vehicles. EMS transport services are conducted by a private agency. The transport units provide response to medical emergencies with BLS (EMT) and ALS (EMT-Paramedic) capabilities. The fire department rank structure is shown in **Table 1**.

Table 1: Fire Department Rank Structure

Staff Chiefs	Fire Suppression	Fire Marshals	Training Division
Chief of Department	Deputy Chief	Fire Marshal	Director of Training/Safety
Assistant Chief of Administration	Battalion Chief	Deputy Fire Marshal	Drillmaster
Assistant Chief of Operations	Captain	Supervisor of Fire Investigators	EMS Supervisor
	Lieutenant	Life Safety Compliance Officer	Assistant Drillmaster
	Private/Fireman 1st Grade	Public Assembly Inspector	
	Probationary Firefighter	Fire Inspector/Investigator	

In 2021, the fire department responded to 31,314 incidents of which 25,921 incidents (83%) were EMS calls and 5,393 (17%) were fire incidents. Fire investigators investigated 198 fires.

Training, Education, and Professional Development

To become a Connecticut career firefighter, individuals first apply for a position at the city or town that is hiring or posting for the entry position. For the city involved in this incident, the hiring process is managed by the Department of Human Resources (DHR). The hiring process includes a written examination, an oral interview, a physical ability test, and a medical examination that meets the requirements of NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*. Upon successfully meeting the requirements for recruit firefighter, a candidate is notified of hiring and is scheduled to attend the next recruit school. Table 2 outlines the qualifications for each position in the fire department.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Table 2: The various ranks in the fire department in Operations Division

Position	Time in Grade	Qualifications
Recruit Firefighter	NONE	22 weeks; NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, Fire Fighter I & II; NFPA 470, *Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders Incidents*, Hazardous Materials Awareness & Operations; (All ProBoard®); State of Connecticut EMT/B
Probationary Firefighter	30 weeks	Completed 1 year from date of employment; No examination or practical testing at the completion of probation
Firefighter (Private/1st Grade)		Appointment upon completion of probation
Chauffeur/Engineer	Two Years	10 hours of driving Code 3 (emergency response); "Q" License of Tiller position; Written examination (70% passing); Practical skills
Lieutenant	30 months as a Firefighter	Test application submitted to the DHR; Written examination; Oral interview
Captain	12 months as a Lieutenant	Test application submitted to the DHR; Written examination; Oral interview
Battalion Chief	12 months as a Captain	Test application submitted to the DHR; Oral interview
Deputy Chief	12 months as a Battalion Chief	Test application submitted to the DHR; Oral interview
Assistant Chief	Executive level position	Selected by the Fire Chief and the Board of Fire Commissioners

Engine 6 Hydrant (deceased firefighter) was hired by the fire department in July 2019 and was assigned to the 62nd Recruit Class. He successfully completed recruit school on November 26, 2019, and was assigned as a probationary firefighter to Engine 6. He held certifications as National Registry of Emergency Medical Technicians – EMT; NFPA 1001 Fire Fighter I and Fire Fighter II (Pro Board®); and NFPA 1072 Hazmat Awareness and Operations (Pro Board®). The other fire service training and certifications he completed were related to incident command, rescue technician core, and various company level training.

Engine 6 Lieutenant was hired by the fire department in February 2018 and assigned to 61st Recruit Class. He successfully completed recruit school in June 2018 and was assigned to Engine 11. He was promoted to lieutenant in March 2021. He held certifications as National Registry of Emergency Medical Technicians – EMT; NFPA 1001 Fire Fighter I and Fire Fighter II (Pro Board®); NFPA 1072

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Hazmat Awareness, Operations, and Technician (Pro Board®); NFPA 472 Hazardous Materials/Weapons of Mass Destruction Incidents (Pro Board®); NFPA 1041 Fire and Emergency Services Instructor I, II, and III (Pro Board®); and NFPA 1035 Public Fire and Life Safety Educator I (Pro Board®).

Building Construction

The structure in this incident was a single-family dwelling built in 1935. It was a 2½-story structure balloon frame, Type V construction with a full lookout basement. The exterior consisted mainly of grey colored horizontal vinyl siding exterior with a poured slab and concrete walled basement. The roof was gable pitched with asphalt shingles and wood underlayment. This residential structure was 3,358 total square feet. The basement was 918 square feet, the 1st floor was 984 square feet, the 2nd floor was 989 square feet, and the attic was 467 square feet.

It is unknown when the structure was converted into individual apartments on the 1st and 2nd floor. The 1st floor apartment was only accessible via the rear door (Side Charlie) because the occupant had placed a bookcase in front of the entrance door on Side Alpha. The basement and attic were used for storage and accessible from the 1st floor rear stairs (Side Charlie). The Connecticut State Police fire investigators termed the storage area in the basement as “excessive storage” (**see Diagrams 1, 2, 3 and 4**).

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

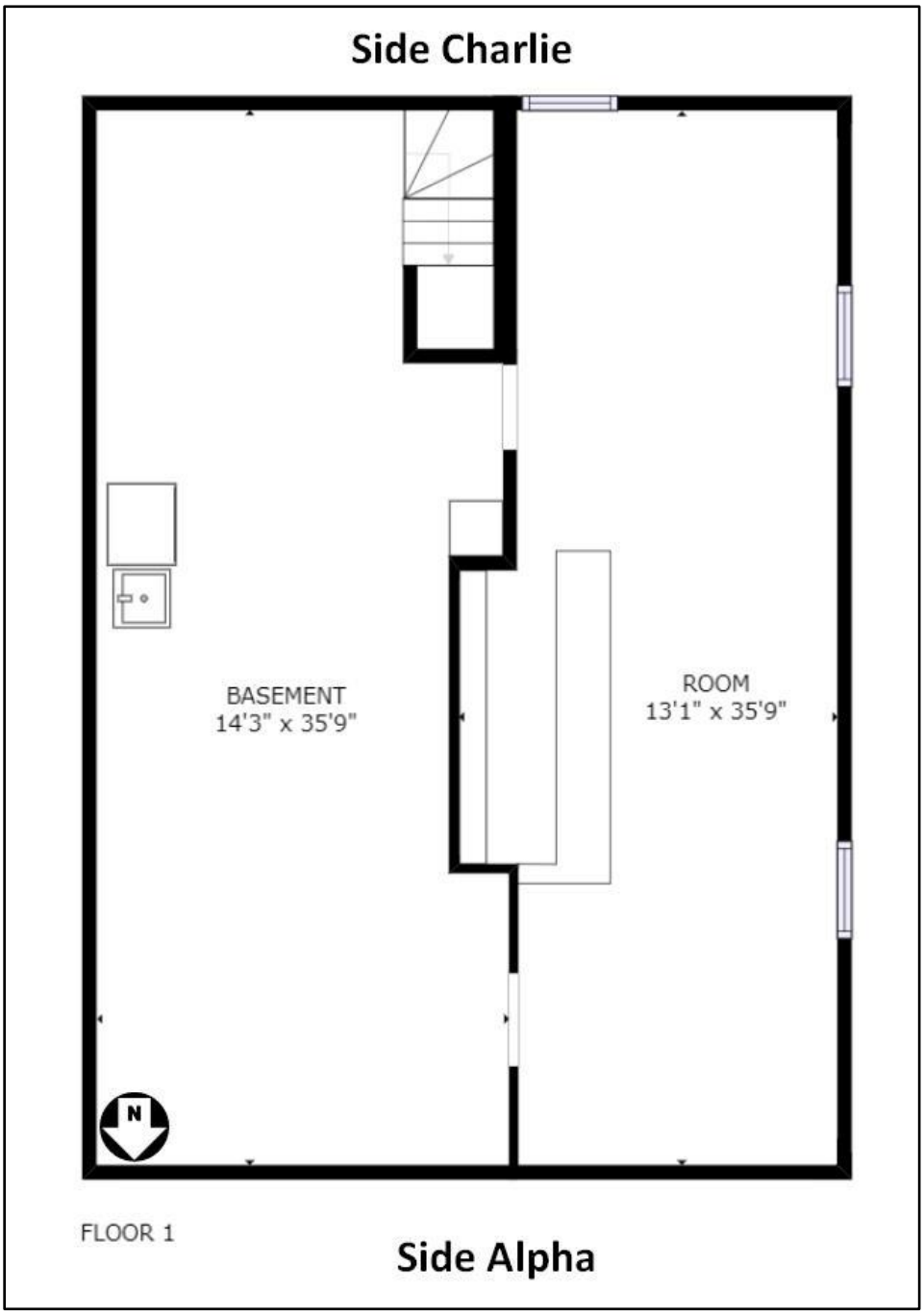

Diagram 1. Floor plan of the basement. Note: Identified as Floor 1 in the diagram provided by Envision Forensics.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

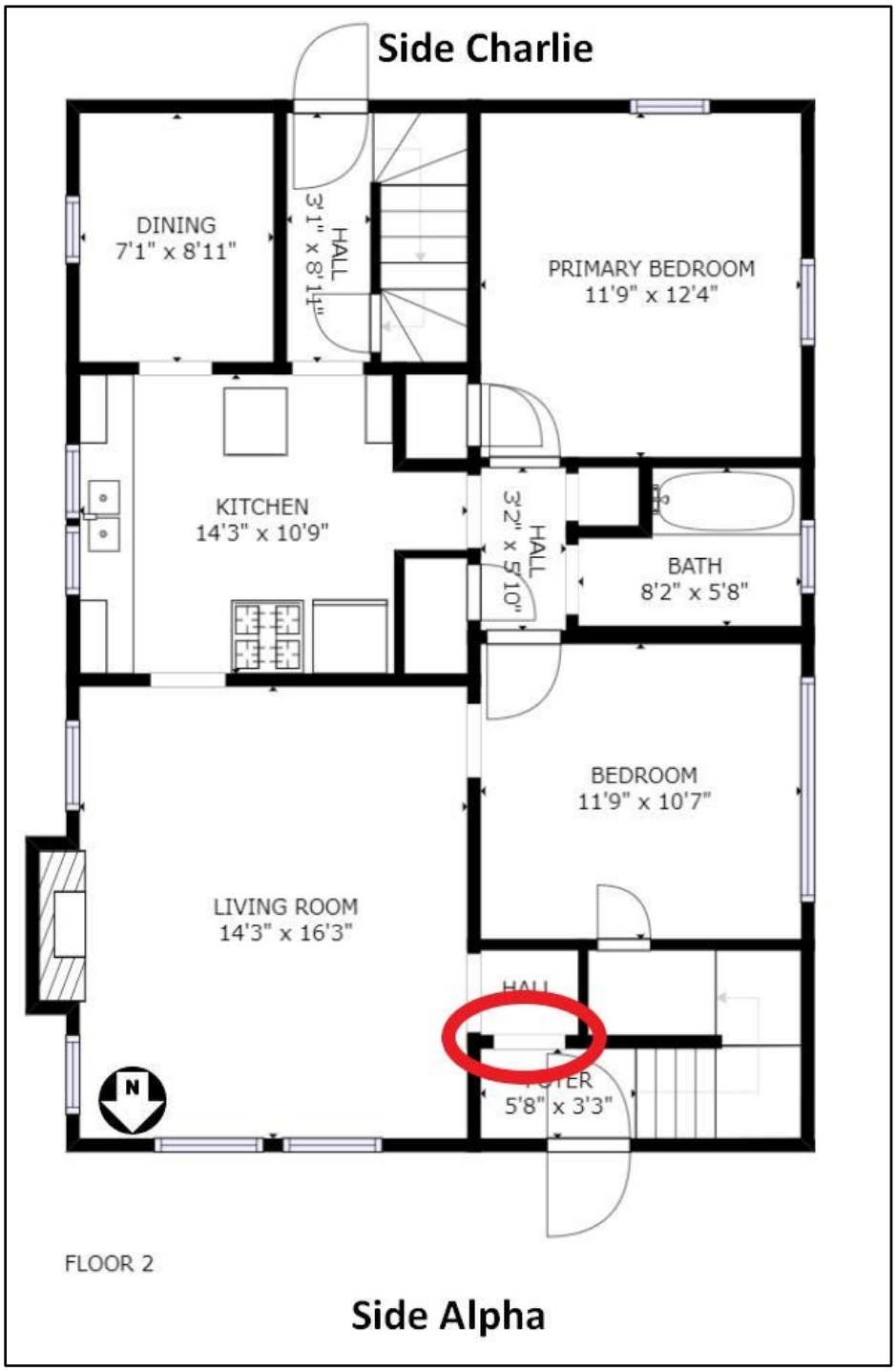

Diagram 2. The floor plan of the 1st floor apartment. The red circle indicates the doorway that was blocked with a bookcase for security reasons. The only access into this apartment was through Side Charlie. Note: Diagram provided by *Envision Forensics* labeled this Floor 2.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

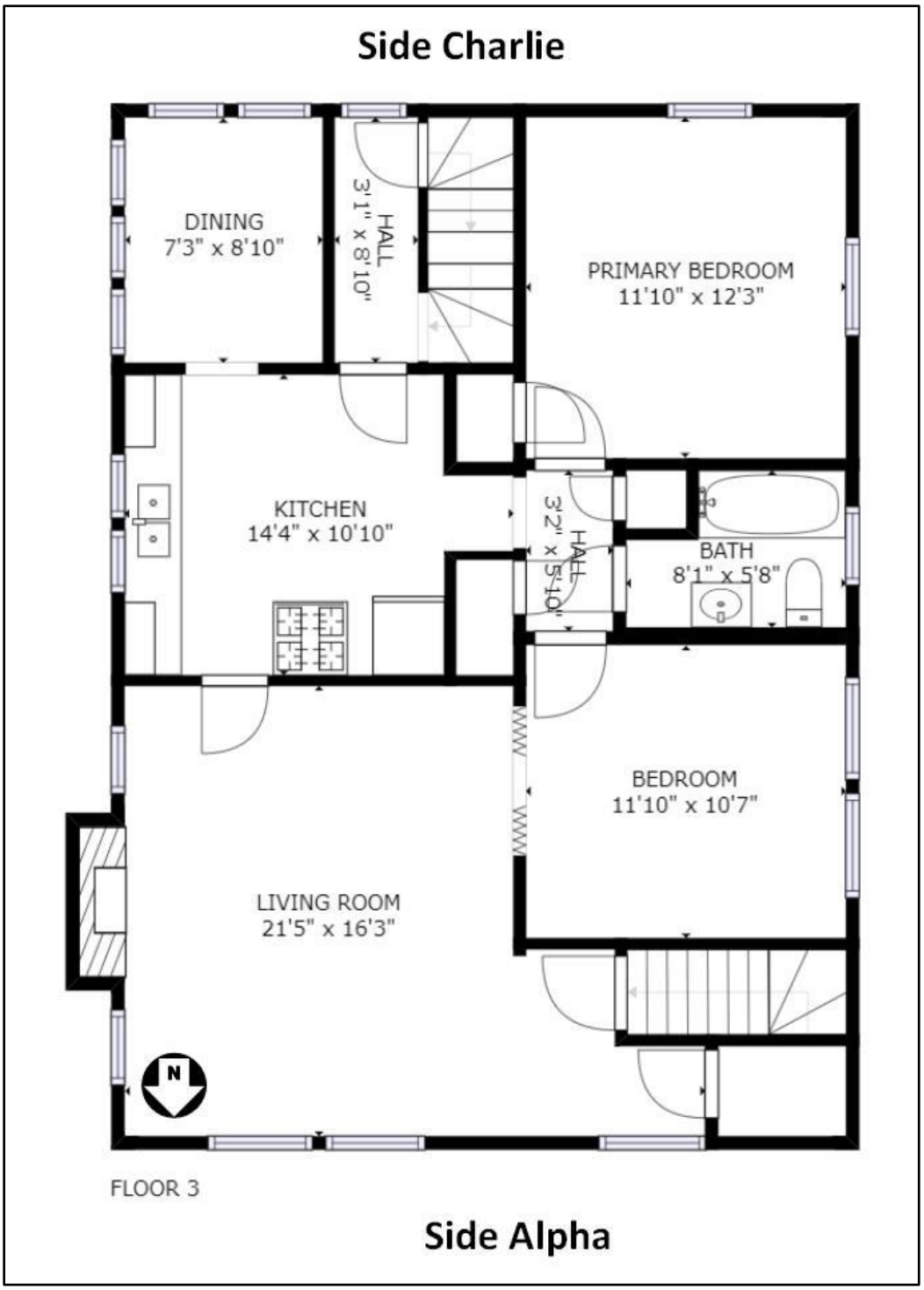

Diagram 3. The floor plan of the 2nd[nd] floor apartment. Note: Diagram provided by *Envision Forensics* labeled this Floor 3.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

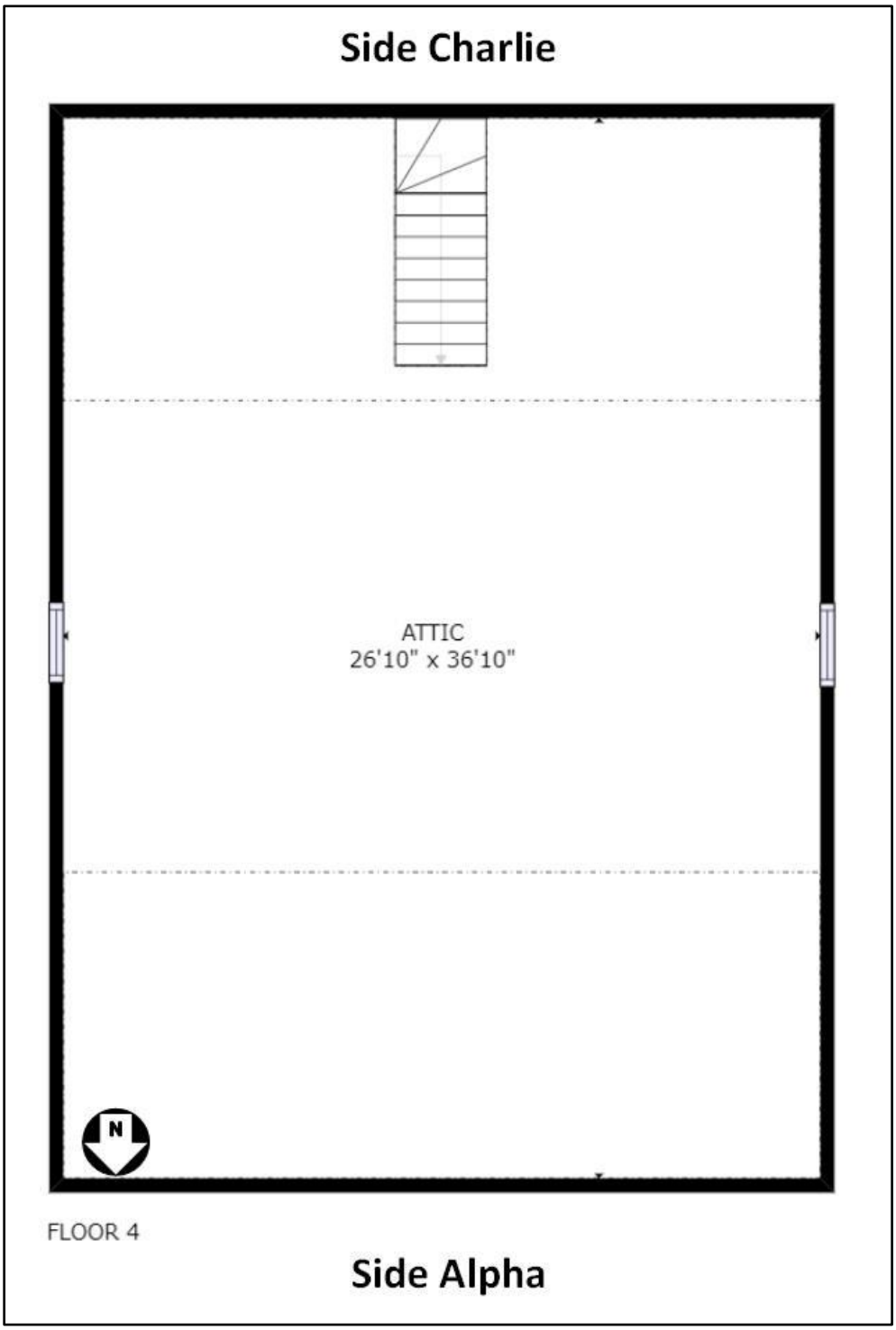

Diagram 4. The floor plan of the attic containing storage. Note: Diagram provided by *Courtesy of Envision Forensics* labeled this Floor 4.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

The structure was heated by heating oil and natural gas. All meters and panels for the utilities were in the basement on Side Alpha/Side Bravo corner walls. There were smoke detectors found in the 1st and 2nd floor apartments. Because the smoke detectors were damaged during the fire, investigators could not determine if the smoke detectors functioned properly during the incident.

Apparatus, Staffing, and Communications

At 00:46 hours on May 12, 2021, the city's communications center dispatched Box 1501 for a residential structure fire. Car 34, Engine 15, Engine 9, Engine 6, Truck 4, Truck 1, Rescue 1, SOC 1, and EMS 2 were dispatched. The staffing for each engine and truck was an officer, chauffeur, and two firefighters. Additionally:

- Rescue 1 – officer, chauffeur, and three firefighters.
- Car 34 – battalion chief
- SOC 1 – one officer and one firefighter
- EMS 2 – staffed by a firefighter/EMT and firefighter/paramedic.

Company riding positions are shown in **Table 3**:

Table 3: Company Riding Positions

Engine	Truck	Rescue
• Officer • Chauffeur • Pipe • Hydrant	• Officer • Chauffeur • Inside firefighter • Tiller/vent	• Officer • Chauffeur • Irons • Hook • Can

Each firefighter and fire officer was assigned a portable radio, which was identifed by their riding position at each company. Each portable radio was equipped with an emergency alert button (EAB), monitored by the fire dispatcher at Public Safety Communications.

The Division of Public Safety Communications is the public safety answering point for the city's 9-1-1 and dispatches for the fire depatment, police department, and EMS response. In 2021, Public Safety Commuinicaitons dispatched more than 130,000 incidents for fire, EMS, and law enforcement response. Upon receipt of a 9-1-1 call, the call taker sends the information to the fire dipatcher. The computer aided dispatch (CAD) system formulates a box alarm response to the incident. For a multi-company response, a tactical channel is assigned.

Timeline

The timeline is a summary of events that occurred as the incident evolved. Not all incident events are included in this timeline. This timeline lists the dispatch communications, fire department response, fireground communications, and fireground operations. The times to the second were taken from the fireground radio transmissions, the fire alarm office communications records, and the data log information from Engine 6 Hydrant's SCBA.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Time May 12, 2021	Fireground Operations, Response, and Details
00:44 Hours	• The original 9-1-1 call received at 9-1-1 Position 8 stated a house was on fire and someone was trapped inside.
00:45 Hours	• CAD Event created for Box 1501. • A second 9-1-1 call was received at 9-1-1 Position 9 reporting a house on fire.
00:46 Hours	• Fire Dispatch transmitted Box 1501 for a residential structure fire. ○ Car 34, Engine 15, Engine 9, Engine 6, Truck 4, Truck 1, Rescue 1, SOC 1, and EMS 2 were dispatched.
00:47 Hours	• A third call 9-1-1 call was received at 9-1-1 Position 1 reporting a house on fire. • Engine 15, Engine 6, and Truck 4 enroute.
00:48 Hours	• Engine 9, Rescue 1, Truck 1, and Car 34 enroute.
00:49 Hours	• EMS 2 enroute, but never arrived. Was replaced by EMS 3. • SOC 1 enroute.
00:50 Hours	• Fire Dispatch reported to all companies responding on Box 1501, that a person was in the house on the 1st floor rear and the fire was in the basement.
00:51 Hours	• Engine 15 arrived on-scene and transmitted a “working fire” for Box 1501. • Engine 9 on-scene. • Fire Dispatch transmitted a “working fire” for Box 1501. • Engine 4, Car 32 (Duty Deputy Chief), EMS 3, FM3 (Fire Marshal), and Car 86 (Safety Officer) were dispatched.
00:52 Hours	• Engine 4 and Car 32 enroute. • Engine 9 reported to IC there was one person trapped in a window on Side Delta near the corner of Side Charlie. • Car 34 on-scene and assumed IC at Box 1501.
00:53 Hours	• EMS 3 and Engine 6 on-scene.
00:54 Hours	• Rescue 1 and Truck 1 on-scene.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Time	Fireground Operations, Response, and Details
00:55 Hours	• IC provided Fire Dispatch with a follow-up radio report. ○ IC stated, "This is a 2½-story wood frame. This is a working fire and there is fire showing from a basement window on Side Delta."
00:56 Hours	• SOC 1 and Truck 4 on-scene.
00:57 Hours	• Engine 9 had a female occupant out of the house and on the back deck on Side Charlie. Firefighters provided patient care to the occupant. • Car 32 on-scene.
00:58 Hours	• Engine 4 on-scene.

00:59 Hours	• Car 32 assumed IC at Box 1501.
	• Engine 6 called Engine 6 Lieutenant saying he was going to charge the hoseline, if needed.
	  ○ Engine 6 (PAR 3) was assigned to the 2nd floor on Side Alpha.
	  ○ No response from Engine 6 Lieutenant.

01:02 Hours	• Engine 6 Lieutenant reported heavy smoke conditions and high heat on the 2nd floor.
	  ○ IC instructed Engine 6 to get to the Side Charlie/Side Delta corner and open up the walls.
	  ○ Engine 6 Lieutenant asked to have the hoseline charged.

01:03 Hours	• Car 31 (Fire Chief) responded to Box 1501. • Car 34 was assigned as "Interior Division." • Interior Division was assigned to Engine 15, Engine 9, and Engine 6. Emergency 3, Truck 1, and Truck 4 were assigned to IC.

01:06 Hours	• IC called Engine 6 Lieutenant for a status report.
	  ○ Engine 6 Lieutenant reported high heat on the floor.
	  ○ Engine 6 was still searching the 2nd floor.

01:08 Hours	• Engine 9 attempted to make entry into the basement.
01:09 Hours	• Car 31 arrived on-scene. • IC advised Engine 9 not to make entry into the basement. • Companies attempted to knock down the fire in the basement from the exterior on Side Charlie and Side Delta.
01:11 Hours	• IC directed Engine 6 to the Side Alpha/Side Delta corner to open up the walls.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Time	Fireground Operations, Response, and Details
	○ IC also advised Engine 6 to have their hoseline charged and ready.
01:12 Hours	• IC requested a 2nd[nd] Alarm for Box 1501. • Fire Dispatch transmitted a 2[nd] Alarm for Box 1501. Engine 5 and Engine 11 were dispatched.
01:14 Hours	• Engine 5 and Engine 11 enroute.
01:15 Hours	• Engine 6 Hydrant told Engine 6 Lieutenant that he was disoriented on the 2nd floor (Division 2).
01:16 Hours	• Engine 6 Hydrant transmitted a Mayday from Division 2. • IC advised Engine 6 Hydrant to get to a window so the rescue company could locate him.
01:17 Hours	• Engine 6 Lieutenant told IC that he had a firefighter down on the 2nd floor.
01:18 Hours	• IC directed companies not involved with the Mayday to switch to the Tac Channel 3 and report to Car 31. • Interior Division advised IC that the fire has extended to the 1[st] floor. • Engine 6 Lieutenant declared a Mayday. Truck 4 officer radioed to the Mayday to activate his PASS alarm. • Engine 5 and Engine 11 arrived on-scene.
01:19 Hours	• Rescue 1 Hook heard the Engine 6 Lieutenant calling for help. ○ Rescue 1 Hook was near Engine 6 Lieutenant in the living room close to the kitchen entrance.
01:21 Hours	• Rescue 1 Irons found Engine 6 Hydrant. ○ Rescue 1 Irons attempted to drag/pull to Engine 6 Hydrant to a window on Side Alpha on the 2nd floor.
01:23 – 01:24 Hours	• Rescue 1 Hook drug Engine 6 Lieutenant towards the front stairs, but accidentally went into the bedroom, off the living room on Side Delta. • Rescue 1 Hook knocked a window out to get help.
01:25 Hours	• Rescue 1 Irons and Truck 4 Officer moved Engine 6 Hydrant to the window on Side Alpha. ○ Due to being low on air, Truck 4 Officer left the room by going out the front window to a ground ladder. • Truck 1 Officer entered the living room.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Time	Fireground Operations, Response, and Details
01:26 Hours	• Rescue 1 Hook was trying to get Engine 6 Lieutenant to the window, but Engine 6 Lieutenant was too heavy.

01:28 Hours	• Rescue 1 Irons and Truck 1 Officer got Engine 6 Hydrant to the window.
	  ○ Truck 1 Officer and Rescue 1 Irons left the 2nd floor due to being out of air.
	  ○ Truck 1 Officer communicated to Engine 11 where Engine 6 Hydrant was located on the 2nd floor.

01:29 Hours	• Ambulances arrived on-scene.

01:30 – 01:31 Hours	• Rescue 1 Hook had to leave due to low air.
	  ○ He exited through the bedroom window on the second floor onto a ground ladder.
	  ○ On the ground, he told Car 31 where Engine 6 Lieutenant was located in the bedroom.

01:33 Hours	• Firefighters from Engine 4 and Engine 9 climbed two ground ladders to the 2nd floor bedroom. They removed Engine 6 Lieutenant to the outside. • Engine 6 Hydrant was removed from the building by Engine 11 via Side Alpha stairs. BLS and ALS patient care were initiated on the firefighter.
01:36 Hours	• Engine 6 Lieutenant and Engine 6 Hydrant were transported to the university trauma center.
01:39 Hours	• Car 31 advised IC the basement was fully involved.
01:42 Hours	• Car 31 assigned Car 34 as Delta Division supervisor.
01:51 Hours	• All companies have PAR.
01:52 Hours	• Delta Division advised IC the 2nd floor was now on fire.
01:53 Hours	• IC initiated Fire Dispatch; all companies were operating in the defensive strategy.
02:15 Hours	• Engine 6 Hydrant declared deceased at the university trauma center.
03:23 Hours	• IC advised Fire Dispatch to mark the fire under control at Box 1501.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Personal Protective Equipment

At the time of the incident, Engine 6 Lieutenant and Engine 6 Hydrant were wearing structural firefighting turnout gear and SCBA. The structural firefighting turnout gear was not considered a contributing factor to the fatalities in this incident. NIOSH investigators conducted no further evaluation or testing of the turnout gear. The fire department requested that the SCBA worn by Engine 6 Hydrant be evaluated. NIOSH investigators transported the SCBA to NPPTL in Morgantown, WV. On June 15, 2021, the SCBA was visually examined, component by component, in the condition received to determine the conformance of the unit to the NIOSH Approved® configuration. The unit was identified as a NIOSH Approved Scott® Safety Air-Pak Model 4.5, 30-minute, 4500 psi unit, bearing NIOSH approval number TC-13F-76CBRN. NIOSH determined that there was no need for corrective action with regards to the approval holder or users of SCBAs manufactured under the approval numbers granted to these products [NIOSH 2022a]. The entire evaluation, NPPTL Report Number TN-25967, is available on the NIOSH website.

Weather Conditions

On May 12, 2021, the weather was fair with a temperature of 53°F at 23:53 hours. The dew point was 38°F, the humidity was 57%, the winds were from the NW at a speed of 5 mph, and the barometric pressure was 30.17 inches. There had been no precipitation in the past 24 hours [Weather Underground 2021].

Investigation

At 00:46 hours, the city's communications center dispatched Box 1501 for a residential structure fire. Car 34, Engine 15, Engine 9, Engine 6, Truck 4, Truck 1, Rescue 1, SOC 1, and EMS 2 were dispatched. At 00:50 hours, the fire dispatcher told Car 34 there was an occupant still in the house on the 1st floor and the fire was reported to be in the basement.

At 00:51 hours, Engine 15 arrived on-scene and said this was a "working" fire. Engine 15 laid dual 3-inch supply lines from a hydrant east of the structure. Engine 15 pulled past the fire building and the officer of Engine 15 observed a lot of police officers around the house. Engine 15 Officer advised there was smoke showing from the 1st floor and fire showing from a basement window on Side Delta. Engine 15 stretched a 1¾-inch hoseline and forced open the front door. Engine 6 arrived on-scene at 00:51 hours and backed down the street to Engine 15, which was the attack piece. Engine 6 Pipe took five lengths of 1¾-inch hoseline to Engine 15 and made the connection for fire attack. Engine 6 stretched the hoseline down Side Bravo to Side Charlie. Car 34 arrived on-scene and assumed IC. Engine 15 got into the front stairwell and tried to force the door to the 1st floor apartment. The door was blocked and the Engine 15 Officer advised IC they could not make entry through the front door. Engine 15 then went to Side Charlie.

At 00:52 hours, Engine 9 indicated that one occupant was trapped in a bedroom on Side Delta near the Side Charlie corner. Engine 9 officer went to Side Delta. Engine 9 stretched a 1¾-inch hoseline to Side Delta. The Engine 9 Officer was told there was an occupant in the back bedroom (Side Delta/Charlie corner) by several city police officers. He climbed in the window and did a primary search. He could

not find the occupant and went outside through the window he originally entered. Engine 9 was coming down Side Delta with a 1¾-inch hoseline. He ordered Engine 9 Pipe to put water in the basement window that had fire showing on Side Delta. The Engine 9 Officer and Engine 9 Hydrant entered the house through the rear door and found the female occupant, removing and placing her on the deck.

Truck 4 arrived on-scene at 00:56 hours. The Truck 4 Officer and Truck 4 firefighter went to Side Charlie. The Truck 4 Chauffeur and Tiller went to vent the roof via the aerial ladder. When Truck 4 arrived on Side Charlie, they took the female occupant to Side Alpha for medical treatment and transport. The time was approximately 00:58 hours. Engine 6 was ordered to the 2nd floor apartment by IC. Engine 6 took the hoseline and went to the 2nd floor via the front stairs on Side Alpha at 01:02 hours. Engine 6 Lieutenant (who was carrying a thermal imager) was with the two firefighters from Engine 6. He ordered Engine 6 Pipe to cool down the front room (living room). Engine 6 Pipe penciled the fire 4–5 times. Engine 6 Lieutenant went into the bedroom located on Side Delta, which he stated was very hot.

Car 31 arrived on-scene at 01:09 hours and did a "360," observing fire in the basement showing from a window on the Side Delta/Alpha corner. Car 31 borrowed a portable radio from SOC 1 for use on the fireground. After Truck 4 vented the roof, Engine 9 and Truck 4 were assigned to the basement. Car 31 asked "Interior Division" (i.e., Car 34) where the fire was located. Car 34 said that crews could not locate the fire. Then Engine 4 and Truck 1 were assigned to the basement and Engine 9 and Truck 4 were out. The Engine 9 Officer and the Truck 4 Officer went to the basement with a hoseline to try and knock down the fire. Engine 9 Pipe was going into the basement, but had to leave due to an issue with his SCBA. The Engine 9 Officer went into the basement, but struggled to move around the excessive clutter. The Truck 4 Officer had to leave due to his EOSTI sounding. The fire was spreading and the basement was very hot. The Engine 9 Officer, who was alone in the basement, managed to get back to the stairwell and up the stairs to the 1st floor. The officer was trying to transmit a condition, actions, and needs (CAN) report but his portable radio got changed to Bank "C." A CAN report of the deterioring conditions in the basement was never transmitted to IC. The Engine 9 officer went to Side Alpha to change cylinders. The time was approximately 01:10 – 01:11 hours (**see Diagram 5**).

The EOSTIs on all Engine 6 firefighters' SCBAs were sounding. Engine 6 Lieutenant told the firefighters they needed to leave to change air cylinders and to stay on the hoseline. He then radioed IC that Engine 6 was coming out for air. Engine 6 Lieutenant couldn't find Engine 6 Hydrant. Engine 6 Pipe handed Engine 6 Lieutenant the nozzle and looked for Engine 6 Hydrant with the thermal imager. Engine 6 Pipe left the apartment due to low air at 01:15 hours. Engine 6 Hydrant had radioed he was disorientated and could notfind his way out of the room. Further, in the confusion that emerged during the search and rescue, Engine 6 Lieutenant's facepiece and helmet became dislodged.

Engine 6 Hydrant walked/crawled and got between a couch and radiator in the living room underneath two windows on Side Alpha. He was running low on air and called a Mayday at 01:16 hours stating "Mayday, Mayday, Mayday, Engine 6 Hydrant," which was acknowledged by IC. At 01:17 hours, Engine 6 Lieutenant called IC and advised, "I have a firefighter down on the 2nd floor." At 01:18 hours, Engine 6 Lieutenant called a Mayday, stating "Mayday, Mayday, Mayday" (**see Photo 2**).

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Engine 6 Lieutenant was located by Rescue 1 Hook who found Engine 6 Lieutenant in the living room near the entrance to the kitchen. Engine 6 Lieutenant had his facepiece and gloves off and was standing when the firefighter found him. He said, "Help me," and then fell into the firefighter. Engine 6 Lieutenant's helmet was found in the Side Alpha/Side Bravo corner near the firefighter from Engine 6. Rescue 1 Hook tried to get Engine 6 Lieutenant to the stairs but got him into a bedroom (Side Delta/Side Alpha corner) at approximately 01:23–01:24 hours. Rescue 1 Hook knocked the glass out of a window. Firefighters from Engine 4 and Engine 9 got ground ladders to the windows. Rescue 1 Hook tried to get Engine 6 Lieutenant out the window, but he was too heavy. Low on air, Rescue 1 Hook had to leave, using the window and ground ladder set up by Engine 5 and Engine 9. Once he was on the ground, he advised Car 31 where Engine 6 Lieutenant was located. Firefighters from Engine 4 and Engine 9 got Engine 6 Lieutenant out of the house at 01:33 hours.

At approximately 01:21 hours, Rescue 1 Irons made his way into the living room. He found Engine 6 Hydrant lying prone with his facepiece on but out of air. Rescue 1 Irons tried to move Engine 6 Hydrant from between the couch and a radiator underneath the front window. Truck 1 Officer came into the front room (living room) and heard a PASS alarm sounding. He assisted Rescue 1 Irons and Truck 1 Officer with dragging Engine 6 Hydrant to the window. The firefighters tried but were unable to get Engine 6 Hydrant out through the front windows. Rescue 1 Irons and Truck 1 Officer went outside due to being low on air. Truck 1 Officer met Engine 11 and described Engine 6 Hydrant's exact location in the living room. Engine 11 entered the building, went up the fronts stairs, and found Engine 6 Hydrant behind a couch near the windows on Side Alpha. Engine 11 brought Engine 6 Hydrant down the front stairs to the outside at 01:33 hours. Both Engine 6 Lieutenant and Engine 6 Hydrant were transported to a local university trauma center. Engine 6 Hydrant was declared deceased in the emergency room at 02:12 hours. Engine 6 Lieutenant was later transferred to a trauma hospital with a hyperbaric chamber for treatment and recovery. IC advised Fire Dispatch that the fire was under control at Box 1501 at 03:23 hours.

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

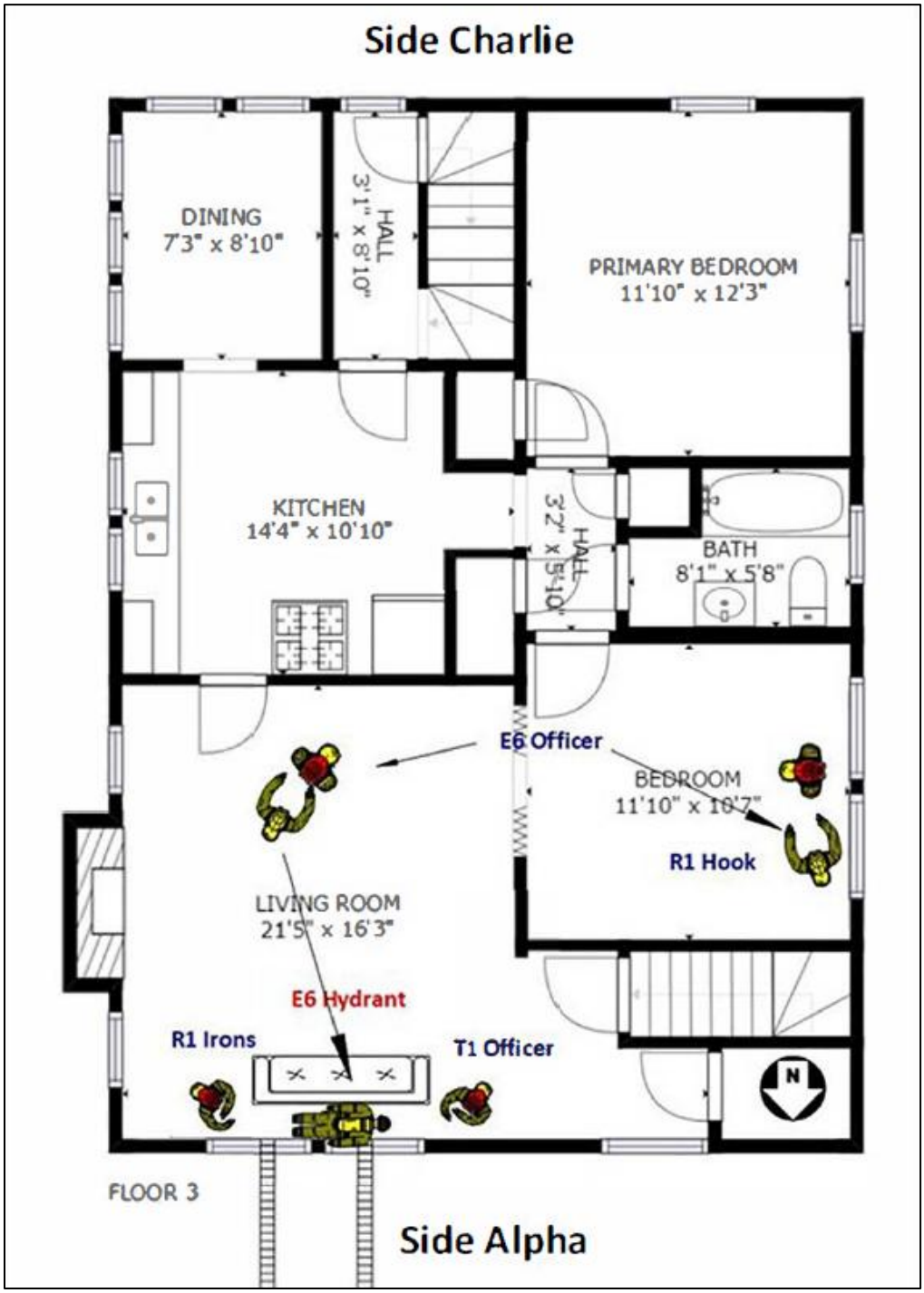

Diagram 5. On the 2nd floor, the location of Engine 6 Hydrant and the Engine 6 Lieutenant (labeled as officer) after the Mayday occurred. The arrows indicate the paths of Engine 6 Officer took to the bedroom and Engine 6 Hydrant to the front window. (*Prepared by NIOSH*)

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Photo 2. The 2nd floor window on Side Delta where Engine 6 Lieutenant was rescued from by Engine 4 and Engine 9
(*Courtesy of the fire department*)

Fire Origin and Cause

Connecticut State Police's fire origin and cause investigation determined that the fire at Box 1501 started in the basement of the structure and spread to the 1st and 2nd floors, causing severe fire and collapse damage. Investigators have not been able to determine the cause of the fire due to the extent of damage and lack of physical evidence, but there is no criminal aspect.

Contributing Factors

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident that ultimately led to the fatality and serious injury:

- Scene size-up and risk assessment
- Crew integrity
- Air management and firefighter survival
- Basement/below-grade fire operations
- Mayday management
- Rapid intervention crew/team
- ISO
- ICT
- Professional development

Cause of Death

According to the death certificate from the State of Connecticut, Department of Public Health, Office of the Chief Medical Examiner, the cause of death for Engine 6 Hydrant was asphyxiation and his death was accidental.

Recommendations

Fire departments should ensure:

Recommendation #1: Initial and ongoing size-ups and risk assessments are conducted throughout the incident.

Discussion: At this incident, the initial focus of the first-due companies was to rescue the female occupant located on the 1st floor. There was no initial scene-size-up or risk assessment conducted that was communicated to IC.

Continuous communication supports effective risk assessments. It also allows the IC and all personnel operating at an incident to be aware of changing conditions and adjust to avoid hazards or mitigate risks. Performing a 360-degree is an important component of the scene size-up and can be used in the risk assessment. The International Association of Fire Chiefs' *Rules of Engagement for Structural Firefighting* recommends that the first rule for ICs is to rapidly conduct or obtain a 360-degree situational size-up of the incident. Many incidents contain obstacles that prevent the viewing of all sides of a structure. When 360-degree reconnaissance is achieved, it provides the IC and personnel knowledge of the building layout, construction, access/egress points, fire location and direction of spread, and obstacles or hazards [NIOSH 2017].

An ISO can perform initial and ongoing size-ups throughout the incident. Expectations and authority for the ISO include determining hazardous incident conditions, advising the IC to modify control zones or tactics to address corresponding hazards, communicating fire behavior and forecasting growth, and estimating building/structural collapse hazards. The ISO also has the authority to stop or suspend incident operations based on imminent threats to firefighter safety [NFPA 1550 2024]. The ISO should be separate from the IC, operations, or accountability positions so they can focus on their responsibilities and the primary objective of continually assessing all on-scene hazards to firefighter life and safety [NIOSH 2025a].

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Recommendation #2: Company officers and firefighters maintain crew integrity when operating in the hazard zone.

Crew integrity is essential to fireground accountability. NFPA 1550, *Standard for Emergency Responder Health and Safety*, states in Paragraph 10.5.6 that company officers shall maintain an ongoing awareness of the location and condition of all company members. Paragraph 10.5.7 states that, where assigned as a company, members shall be responsible to remain under the supervision of their assigned company officer [NFPA 1550 2024]. It is the responsibility of every firefighter and company officer to always stay in communication or contact with crew members by visual observation, voice, or touch while operating in the hazard zone. All firefighters should maintain the unity of command by operating under the direction of their company officer. The ultimate responsibility for crew integrity and ensuring no members get separated or lost rests with the company officer. A Mayday should be called if any member cannot be accounted for during a personnel accountability report [NIOSH 2024].

The International Association of Fire Chiefs' Safety, Health, and Survival Section redefined the Rules of Engagement for Structural Fire Fighting. One of the objectives is for firefighters to enter a burning building as a team of two or more members and another is that no firefighter be alone at any time while operating in or exiting a building. These objectives align with the definition of crew integrity (i.e., staying together as a team of two or more) [IAFC 2012].

Recommendation #3: Fire officers and firefighters are properly trained and utilize the principles of air management and fireground survival procedures.

The only respiratory protection for firefighters in the toxic smoke environment is the air in their SCBA cylinder. [Gagliano et al. 2008]. Air management is a program that the fire service can use to ensure that firefighters have enough breathing air to complete their primary mission and escape an unforeseen emergency.

Air management happens at the individual firefighter level, the crew level, and the command level. Aspects of air management for which firefighters are responsible include:

- Ensure their air supply is adequate (full cylinder) at the start of the shift
- Monitor their air usage during an event
- Recognize the 50% heads-up display (HUD) light flash and communicate this information to crew members
- Exit an IDLH atmosphere before they go into their emergency reserve air and their EOSTI alarms

A low-air emergency for one crew member should be treated as an emergency for the entire team, requiring the entire team to exit simultaneously, maintaining crew integrity. If they are not out of the IDLH atmosphere and go into their emergency reserve air, they need to immediately communicate this emergency with their crew and IC. Firefighters should not wait until their EOSTI alarms activate or they are out of air to communicate or address this situation.

NFPA 1404, *Standard for Fire Service Respiratory Protection Training* states that firefighters should exit from an IDLH atmosphere before the consumption of reserve air supply begins. It is critical that

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

firefighters understand that the initial 67% of the air supply is the "working and exiting air" [NFPA 1404 2018]. This includes air used for gaining access, working toward the tactical objectives, and exiting the hazard zone.

Firefighters may not pay attention to their air usage until they get into their emergency reserve air and their EOSTI sounds or vibrates. Once the SCBA air supply reaches approximately 50%, the light begins to flash. Some change color to yellow when below 50% then change to red in the EOSTI mode. This is designed to alert the firefighter to take action that would ensure they have enough escape time to exit the building with their reserve air intact. Once the air supply reaches the EOSTI level, the SCBA will provide another signal (bell, whistle, and/or vibration signal) that alerts the user they are nearing the end of the usable air in the cylinder. On pre-2013 edition SCBAs, this level was approximately 25% (+/-2). For SCBAs manufactured to the 2013 edition of NFPA 1981 and newer edition SCBAs, the EOSTI level was increased to 33% (+/-2).

Repetitive skills training with an SCBA is vital for the safety of firefighters working inside an IDLH atmosphere. Training should be performed regularly to ensure that firefighters "know their SCBA." Repetitive skills training with an SCBA may provide increased comfort and competency levels, decreased anxiety, lower air consumption, increased awareness of the user's air level (noticing and using the HUD), and an automatic muscle memory response for the vital function controls, such as the don/doff buttons, main air valve, emergency bypass operating valve, and auxiliary air connections (i.e., RIC/universal air connection and the buddy breather connection). Repetitive skills training also provides the user with an increased ability to operate these functions and controls in a high-anxiety moment or an emergency. Many times, using these skills is necessary with gloved hands, limited vision, and reduced ability to hear commands from others. Performed in conditions that are non-IDLH, repetitive skills training helps build the firefighters muscle memory so their hands will be able to activate the controls with gloves on and the operation will be a conditioned or second-nature response in case of an emergency [NIOSH 2011; NIOSH 2012].

Every firefighter should be equipped with a portable radio provided by the fire department when operating in the hazard zone [NFPA 1550 2024]. If a firefighter becomes lost or trapped in a hazard zone, the firefighter should activate the EAB on the portable radio prior to transmitting a Mayday. This action will provide the best chance for the dispatcher and/or IC to acknowledge the Mayday in a timely manner. This process should be supported by a SOP/SOG and practical training [NIOSH 2022b].

The rescue of a lost, missing, trapped, or injured firefighter is time sensitive. A very narrow window of survivability exists for a firefighter who is out of air or trapped in a hazardous environment. Firefighters must not delay in communicating a Mayday, ensuring the IC is notified. When it comes to rapid egress or removing a downed firefighter, the most appropriate action due to conditions may be to use a window in the immediate area. A task such as this can be challenging if it is not trained on or practiced regularly. It is important to remember that the safest way to remove a downed firefighter from an upper level of a building is by using a staircase if at all feasible.

Firefighters may be forced to use windows for removal for a variety of reasons. The route taken into the structure may have been altered or changed during operations by collapse, deteriorating fire

conditions, the malfunction of a SCBA, an air-supply issue or disorientation. Factors such as surroundings, fire conditions, collapse or building construction can further increase the challenges that must be overcome. A constricted-space window removal requires at least three rescuers. These maneuvers are labor intensive and require a rapid intervention crew (RIC) to be operating on the exterior as well as the interior. Communication between these crews is of highest priority. The exterior RIC will need to know the specific equipment and exact location necessary to affect the rescue. This will normally take place after the initial RIC locates the downed firefighter. Two of the most common ways to perform a removal of this nature are the "Denver" and "Fulcrum" techniques [Pindelski 2010].

Recommendation #4: Fire department operations include SOPs/SOGs for operating at basements and below-grade fires.

Discussion: At this incident, the fire department had no defined tactics for fighting a basement fire. The only access to the walkout basement was via the stairs on Side Charlie.

Early identification of basements and their access points are critical during the initial on-scene size up and a component of the 360-degree size up. If the use of basements is a common component of building design within a particular community, then a basement should be considered as part of the scene size-up. The presence or lack of a basement must be communicated to everyone involved to minimize or eliminate the opportunity for fire crews to end up working above a basement without their knowledge. The immediate dangers include falling through the floor and working in the exhaust portion of a flow path.

Between 1998 and 2017, NIOSH documented 24 below grade fires that resulted in 32 firefighter fatalities and 19 serious injuries. Typically, these cases involved the firefighters falling through a wood floor assembly into a burning basement or firefighters being overwhelmed by high velocity hot gases flowing from the basement on to an upper level [Madrzykowski and Weinschenk 2018]. Project Mayday conducted by Don Abbott reported that one of the top causes of a Mayday is falling into basements. From more than 2,700 career department Maydays reported to the project, 19% were attributed to falling into the basement. Similarly, of the more than 1,900 volunteer department maydays reported to the project, 24% were due to falling into a basement [Mayday Monday 2021].

Recognizing a below-grade fire is essential to developing proper strategy and tactical objectives. If there is a chance of a basement fire, tactics should reflect this scenario during risk management decisions. Below-grade fires, particularly those in private dwellings, are one of the most dangerous and difficult fires for firefighters to locate and fight. These types of fires are low frequency/high risk events for several reasons. Below-grade fires may be difficult to detect initially; may be difficult to access; require additional staffing for hoseline placement, operation, and ventilation; and firefighters may be working over the fire [NIOSH 2018; NIOSH 2022c]. There is increased risk to firefighters due to:

- Limited entry and egress into a basement
- Unusual and/or unanticipated void spaces
- Working above the fire on potentially weakened floor joists and flooring materials
- Being caught in the fire’s exhaust portion of the flow path

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

- Unknown and frequently excessive fire loading
- Restricted ventilation options
- Utility panels and meters plus connections
- Separate areas connected by non-fire stopped utility penetrations
- Hanging wires and ductwork
- Distribution of contents (e.g., furniture, appliances).

When developing an SOP/SOG for basement or below-grade fires, consider the following topics [Madrzykowski and Weinschenk 2018]:

- Community risk assessment
- Pre-incident planning
- Scene size-up
- Building construction
- Strategy and tactics
- Use of a thermal imager
- Ventilation considerations
- Proper size and adequate hoselines

If the size-up indicates there is a fire in the basement (e.g., floor to ceiling smoke not lifting significantly once the basement walk-out door was opened) the basement needs to be investigated and cleared before crews can safely operate above it. Opening a door is ventilation and will increase the size of a ventilation-limited fire. Basement fires need to be considered ventilation limited until proven otherwise so if the fire location is not known, then ventilation should be limited until sufficient water can be applied to what is burning.

Recommendation #5: Fire officers and firefighters are trained in Mayday operations.

Firefighters should be trained and have confidence in how to call a Mayday when in danger [IAFF 2010]. Any delay in calling a Mayday reduces the chance of survival and increases the risk to other firefighters trying to rescue the "downed" firefighter. When a Mayday is transmitted, ICs have a narrow window of opportunity to locate the lost, trapped, or injured member(s) and may need to restructure the strategy and tactics to include a priority rescue [NFPA 1550 2024]. A Mayday tactical worksheet can serve as a tailored guide to any fire department's Mayday procedures such as a reminder to prompt the firefighter to activate their emergency alert button for priority radio transmissions and other important items such as personal alert safety system activation, air status, and location information. This worksheet can be easily located on the back of a tactical worksheet to assist ICs in ensuring the necessary steps are taken to clear the Mayday as quickly and safely as possible. This process is too important to operate from memory and risk missing a vital step that could jeopardize the outcome of the rescue of a firefighter who is missing, trapped, or injured [IAFF 2010; NIOSH 2024].

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Recommendation #6: A rapid intervention team/crew is dedicated, assigned, and in place before interior firefighting operations begin and throughout an incident.

Effective RIC operations are dependent on proactive efforts. Upon arrival, the RIC officer, accompanied by one member of the RIC, receives a report from the IC before performing an incident scene survey while the remaining RIC members assemble the RIC equipment. During the 360-degree survey, the RIC officer and members should look for ways in and out of the structure, including window configurations, fire escapes, and construction features. The RIC officer should note the feasibility for placement of ground ladders for rescue or escape purposes. The RIC officer has a responsibility to set up and secure a suitable secondary egress for interior crews [Rowett 2018; Toledo Fire & Rescue Department 2012]. After these tasks are completed, the RIC equipment is put in place and the RIC officer informs the IC that a 360-degree survey is complete and the RIC is ready to intervene, if necessary. The entire RIC should stay in an area immediately accessible to the building for rapid deployment and maintain radio contact with the IC. The RIC officer should brief all RIC members with the results of the incident scene survey [Toledo Fire & Rescue Department 2012]. The RIC officer and members will coordinate with the IC to formulate rescue plan contingencies and to monitor radio and fireground conditions. RIC protection is not a passive assignment. This is a process of ongoing information gathering and diligent scene monitoring until the unit is released by the IC [NIOSH 2024; NFPA 1407 2020].

Additionally, fire departments should provide and utilize a rapid intervention operation training program consistent with the requirements outlined in NFPA 1407. In this incident, firefighters were able to locate Engine 6 Hydrant and Engine 6 Lieutenant multiple times. However, they struggled to get them out of the building. This program may include declaring a Mayday, enhanced search techniques, access and extrication, air supply, ropes, protecting the downed firefighters in place and getting them to safety, and firefighter self-rescue techniques. The established RIC teams should be trained along with all of the firefighters on scene as research shows most Maydays are rescued by the individual calling the Mayday, their crew, or other crews already operating in the building [NFPA 1407 2020].

Recommendation #7: Response plans include a dedicated and trained ISO.

An ISO should be trained to NFPA 1550 which defines the requirements for the IC, including establishing a fixed command post, personnel accountability, the use of staff aides and RICs, and the appointment of an ISO and assistant safety officer(s) (as needed). The standard addresses the expectations and authority of the ISO. Expectations and authority include determining hazardous incident conditions, advising the IC to modify control zones or tactics to address corresponding hazards, communicate fire behavior and forecast growth, and estimate building/structural collapse hazards. This also includes the authority to stop or suspend incident operations based on imminent threats posed to firefighter safety [NFPA 1550 2024]. The ISO should be separate from the IC, operations, or accountability positions so they can focus on their responsibilities and the primary objective of continually assessing any and all on-scene hazards to firefighter life and safety [NIOSH 2025b].

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Recommendation #8: Operational battalion chiefs are staffed with an ICT or staff aide.

An ICT can also be known as a field incident technician, emergency incident technician, staff aide, or staff assistant. An ICT is defined by NFPA 1550 as a firefighter or fire officer assigned to an operational chief officer to assist with the logistical, tactical, and accountability functions at an emergency incident. The duties and responsibilities of an ICT are divided into two functions: administration and operations. Though the administration component is important, the command and control of an emergency incident is critical to firefighter safety and health [NFPA 1550 2024].

When an incident is dispatched, the accountability begins while resources are enroute and monitoring tactical activities of the first-arriving companies. An initial essential role of the ICT is function as the driver or chauffeur for the battalion chief. This allows the battalion chief to initiate documentation of the incident on a tactical worksheet. This also allows the IC to start developing the incident action plan for the incident. Without an ICT, this process doesn't start until arrival on-scene [NIOSH 2025c].

The key functions of an ICT include but are not limited to [NIOSH 2025c]:

- maintain radio and other communications
- maintain the tactical worksheet
  - personnel accountability
  - diagram of incident operations
- May be assigned with the battalion chief to the hazard zone as part of a tactical assignment (e.g., division or group supervisor).

Recommendation #9: Implementation of a training, education, and professional development program that is based upon each rank.

Fire departments should make sure that training and professional development are offered to any personnel who may be expected to perform outside of their normal functional area but within their experience level. In this specific incident, the lack of experience and knowledge prevented critical task level information from being shared with the IC as it relates to the rapidly changing fire conditions and environment. The primary focus of training, education, and professional development programs is to reduce injuries, illnesses, and fatalities in the fire service by providing the needed technical and academic competencies. Fire departments need to incorporate both technical skill and hands-on task completion, while also addressing academic knowledge and the understanding of "why" things are happening in their training [NIOSH 2025d].

When developing a professional development plan, each department must recognize the needs of the community, services offered by the fire department, and available resources such as funding, staffing, and experience levels. A goal to establishing a professional development plan should be to meet or exceed the NFPA professional qualifications. NFPA 1550, Standard for Emergency Responder Health and Safety, states in paragraph 7.1.2 that the fire department should provide training, education, and professional development for all department members commensurate with the duties and functions that they are expected to perform [NFPA 1550 2024].

Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

Professional development plans should be customized to fit within a fire department's resources and capabilities while striving to reach a national standard. A successful professional development plan might include [NIOSH 2025d]:

- Training programs on technical competencies (hands-on skills)
- Task and mentoring books (technical and academic competencies)
- Mentorship programs (experience)
- Self-guided study classes and programs (academic competencies)

The primary goal of all training, education, and professional development programs is to reduce occupational injuries, illnesses, and fatalities. As members progress through various duties and responsibilities, the department should make sure knowledge, skills, and abilities (KSAs) are introduced to members who are new in their position while continuing development of existing skills. A successful training plan is developed in a systematic and functional manner. Training occurs in the fire service to improve the KSAs and competencies of firefighters and fire officers. The results enhance the overall response capabilities of the department while meeting national standards. A structured plan should meet all these criteria [Clark 2017].

Every fire department should have a professional development plan. NFPA 1201, Standard for Providing Fire and Emergency Services to the Public states in 4.11 Professional Development, "The fire and emergency services shall have training and education programs and policies to ensure that personnel are trained, and that competency is maintained in order to effectively, efficiently, and safely execute all responsibilities" [NFPA 1201 2020].

When developing a formal training plan, the first step is to evaluate and build upon existing training standards, such as the NFPA professional qualifications standards. Each fire department is structured differently to meet the needs of their community. Therefore, training plans must be designed based on services provided by a fire department and the department's mission statement. NFPA 1550, Chapter 6, "Fire Department Administration," states in paragraph 6.2.2, "The fire department shall prepare and maintain written policies and standard operating procedures that document the organization structure, membership, roles and responsibilities, expected functions, emergency operations. and training requirements, including the following [NIOSH 2025d]:

- The types of standard evolutions that are expected to be performed and the evolutions that must be performed simultaneously or in sequence for different types of situations.
- The minimum number of members who are required to perform each function or evolution and the manner in which the function is to be performed in accordance with NFPA 1710 or NFPA 1720.
- The number and types of apparatus and the number of personnel that will be dispatched to different types of incidents in accordance with NFPA 1710 or NFPA 1720.
- The procedures that will be employed to initiate and manage operations at the scene of an emergency incident.
- Post-incident control and mitigation of emergency scene contaminants".

These programs should include information to make sure members are trained prior to performing individual duties, and that members receive ongoing professional development to maintain competency. The training plan serves as a comprehensive all-hazards approach that meets or exceeds federal, state, and local regulations as well as the needs of fire department personnel. This approach allows the department to maintain operational and response capabilities to the customers they serve. The plan is designed to be specific yet allow flexibility in the event training is made available or as departmental needs dictate. The plan includes a detailed calendar for the year, which allows the company officers and command staff to balance other duties and priorities throughout the course of the year [Clark 2017].

The responsibility of the fire service is to save lives, stabilize incidents, and conserve property. This is accomplished through effective and structured training before emergency response. A well-developed annual training plan will ensure continuity across a fire department and will maintain and improve the KSAs of all members. All members must continually improve and train new fire service members so the department can respond effectively to any emergency incident [NIOSH 2025d].

Post-Incident Fire Department Prevention Actions

After this incident, the fire department implemented changes to incident response and fireground operations. These changes included:

- **Size-ups/risk assessments:** As part of their annual NFPA 1403 live fire training, the department started to focus more on refreshing and enforcing size-up/risk assessment skills of firefighters and fire officers. This includes mock incidents and conducting after action reviews. The department also provides a size-up class for every newly promoted fire officer.
- **Crew integrity:** Crew integrity and PARs are now completed as a part of the annual NFPA 1403 live fire training to refresh and enhance skills for real incidents.
- **Air management/firefighter survival:** The department conducts a weekly Mayday drill in each battalion and companies are rotated to ensure they each perform the fully interactive drill. Air management techniques are coached in this drill, status of air must be announced during the mayday as well as techniques to self-extricate and survive. PASS devices are used as well and radio "panic buttons."
- **Basement/below grade fires:** The department has developed new basement fire and tunnel SOGs.

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Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

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Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

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Firefighter Dies and Lieutenant is Seriously Injured at a Multi-Family Residential Structure Fire – Connecticut

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Additional Information

International Association of Fire fighters Fire Ground Survival Program

The IAFF Fire Ground Survival Training addresses Mayday prevention and Mayday operations for firefighters, company officers, and chief officers. Firefighters must be trained to perform potentially life-saving actions if they become lost, disoriented, injured, low on air, or trapped. Funded by the IAFF and assisted by a grant from the U.S. Department of Homeland Security through the Assistance to Fire fighters (FIRE Act) grant program, this comprehensive fireground survival training program applies the lessons learned from fire fighter fatality investigations conducted by the NIOSH. It was developed by a committee of subject matter experts from the IAFF, the IAFC, and NIOSH.

Disclaimer

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