

# LINE OF DUTY DEATH REPORT

REPORT F2020-01 CO • April 2024

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## Firefighter-EMT Dies After Falling from the Roof of a Five-Story Commercial and Residential Condominium Complex - Colorado

### Executive Summary

On December 7, 2019, at about 0214 hours, a 46-year-old firefighter-emergency medical technician (FF-EMT) slipped and fell off the roof of a five-story commercial and residential condominium complex. The FF-EMT was assigned to Truck 1 (T1) which was dispatched to a structure fire. T1 was the first fire department apparatus to arrive on-scene at 0156 hours and positioned on Side Alpha with the rest of the 1st alarm response enroute. The building's fire alarm had been activated and most residents/guests were in the process of evacuating the building. T1's officer, an acting lieutenant, established Command and conducted a scene-size up. He confirmed to dispatch that a small fire was coming from the chimney on the south (Side Charlie) side of the building. The building was a large five-story commercial (first-story) and residential (stories two through five) 32-unit condominium complex at a mountain resort. The building's apex was 68-feet 4-inches with a 4:12 roof pitch. T1 was unable to access Side Charlie due to the narrow openings on Sides Bravo and Delta. Although T1 had a 75-foot aerial ladder, this ladder could not extend over the roof's apex from its position on Side Alpha.



**Chimney chase fire on the roof of a five-story commercial and residential complex.**

*(Photo taken by the condominium owner and provided to NIOSH courtesy of the fire department.)*

The T1 attack crew (Command, FF-EMT, and a probationary FF-EMT) grabbed their tools and high-rise packs and met the building manager and resort security with access keys to the roof at the bottom of the eastern stairwell. They climbed the stairs to the top (fifth-story, fourth-floor) of the building to investigate ways to access the chimney fire. As the attack crew climbed the stairs, no smoke was observed in the stairwell or hallways inside the building. The building manager unlocked the fourth-floor ceiling scuttle-hole and the attic hatch providing access to the north-facing roof. Command instructed the two members of T1's attack team to investigate whether they could access the fire from the roof. Command then headed down the fourth-floor hallway with the property manager to investigate if any of the residential units would provide better access to the fire. Command was joined by two firefighters from Engine 2 (E2).

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The FF-EMT squeezed through the scuttle-hole. The probationary FF-EMT retrieved a dry chemical fire extinguisher from the fourth-floor stairwell's hose cabinet and hoisted this to the FF-EMT. The probationary FF-EMT then made several attempts to squeeze through the scuttle-hole (2 feet by 17 inches) but was unsuccessful. The FF-EMT then proceeded to climb through the attic hatch (approximately 3 feet by 3 feet) which opened onto the north-facing roof which was covered in snow and possibly ice from a previous winter storm. The FF-EMT reported to Command that the fire involved a chimney chase, and they would need a hose lay on the roof. Medic 2 (M2) staff, part of the 1st alarm response staging on Side Alpha, were surprised to see the FF-EMT on the north-facing roof considering the hazardous conditions (remaining snow and possible ice) on a 4:12 pitched roof.

Battalion 8 (B8) had arrived on-scene at 0207 hours but did not assume Command. After receiving a report from the resort security and from a county Sheriff, B8 walked around to Side Charlie where he saw the chimney chase fire. Command and E2 had entered unit 406 and were using a flashlight to look around. B8 saw these flashlights just below the chimney chase fire. B8 advised Command to access the fire through the unit's skylight. Command radioed B8 that one of T1's firefighters was on the roof with access to the fire. B8 responded that the best access would be the skylight. Command responded that he would try to access unit 406's skylight.

Command returned to the east end of the fourth-floor hallway and tasked the probationary FF-EMT to couple and stretch the hoses from the east stairwell to unit 406. There was conflicting information as to whether the FF-EMT was in the attic at this time or whether he was already on the roof. Establishing unit 406 as the base of fire suppression efforts was not radioed to dispatch or to on-scene firefighters.

At approximately 0214 hours, several witnesses observed a firefighter on the south-facing roof slip, fall, and slide down about 15 feet before falling 35 feet onto the first-floor sheet metal roof. The FF-EMT then slid down another 20 feet before coming to rest at the ice guard near the edge of the first-floor metal roof. The FF-EMT was unresponsive. He was extracted from the roof by Engine 8's (E8) crew. On-scene paramedics found the FF-EMT with severe head and chest trauma, unresponsive with no pulse or respirations. Despite immediate advanced life support administered on-scene, during transport, and in the local hospital, the FF-EMT succumbed to his injuries. He was pronounced deceased at 0242 hours. The death certificate and autopsy were completed by a forensic pathologist from a County Coroner's office. The death certificate listed several traumatic injuries "due to a blunt force trauma from [a] 34.5-foot fall."

### **Contributing Factors**

*Aerial apparatus could not be utilized due to lack of access to Side Charlie*

*Insufficient situational awareness*

*Adverse environmental conditions (snow and possible ice on the building's roof)*

*Breakdown in communication components of the department's incident command system*

*Lack of a fire department roof access/operations policy*

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*Insufficient roof training exercises*

*Breakdown of crew integrity.*

### **Key Recommendations**

*Fire departments should ensure all firefighters and other personnel responding to a fire scene are trained in situational awareness and personal safety, particularly during adverse environmental conditions*

*Fire departments should ensure all firefighters and fire officers follow NFPA 1561 (Standard on Emergency Services Incident Management System and Command Safety) and their individual department's standard operating guidelines (SOG) for incident command*

*Fire departments should develop and enforce an SOG for roof access/operations and develop classroom and practical roof training exercises*

*Fire departments should ensure firefighters responding to hazardous areas during emergency incidents maintain crew integrity.*

**For report slides that summarize this incident and recommendations: [F2020-01RS](#)**

The information in this report is based upon dispatch records, audio recordings, witness statements, and other information that was made available to the National Institute for Occupational Safety and Health (NIOSH). Information gathered from witnesses may be affected by recall bias. The facts, contributing factors, and recommendations contained in this report are based on the totality of the information gathered during the investigation process. This report was prepared after the event occurred, includes information from appropriate subject matter experts, and is not intended to place blame on those involved in the incident. Mention of any company or product does not constitute endorsement by NIOSH, Centers for Disease Control and Prevention (CDC). In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

For further information, visit the program website at [www.cdc.gov/niosh/fire](http://www.cdc.gov/niosh/fire) or call toll free 1-800-CDC-INFO (1-800-232-4636).



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### **Introduction**

On December 7, 2019, a 46-year-old career FF-EMT died when he fell off the roof of a five-story mixed-use commercial and residential complex while investigating a chimney fire. On December 7, 2019, the Colorado Division of Fire Prevention and Control (DFPC) Director notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. NIOSH was also notified by the U.S. Fire Administration on December 9, 2019. On January 27, 2020, a medical officer from the NIOSH Fire Fighter Fatality Investigation and Prevention Program and a senior epidemiologist from the NIOSH office in Denver, traveled to investigate this incident. The NIOSH investigators met with the fire chief, three deputy chiefs, the training chief, the department's fire marshal, and the department's human resources manager. The NIOSH investigators inspected the incident site and the victim's personal protection gear. The NIOSH investigators interviewed members of the fire department who responded to the first alarm and the emergency medical services (EMS) personnel who treated the injured FF-EMT on scene and transported the victim to the hospital. The NIOSH investigators obtained copies of the FF-EMT's training records, pertinent department standard operating procedures, dispatch audio records, and the death certificate. NIOSH also reviewed the origin and cause investigation report conducted as a collaboration between the fire department, the DFPC, and the local officer of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). Finally, NIOSH investigators toured and interviewed employees of the county dispatch center and the fire training center.

### **Fire Department**

This career fire department is composed of 127 members, 63 of which are sworn commissioned firefighters. They operate out of 4 fire stations serving a population of 17,500 permanent residents and more than 100,000 visitor and part-time residents in a geographical area of 419 square miles. The fire chief reports to a five-member publicly elected county Board of Directors. The department is organized into three divisions: operations, support services, and emergency medical services (EMS), managed by three deputy chiefs who report directly to the fire chief. The operations and EMS divisions operate three fire shifts (A/B/C) that work a 48 hours-on and 96 hours-off schedule. Each shift is supervised by one fire battalion chief and one EMS shift supervisor. The EMS shift commander oversees four medic units, one unit at each station staffed by either two paramedics or one paramedic/one EMT. The fire battalion chief oversees four fire suppression companies, one company at each station. Two of the stations are staffed by a

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company of four [one officer (captain or lieutenant), one engineer, and two FF-EMT/FF-paramedics (FF-P)]. The other two stations are staffed by a company of three [one officer (captain or lieutenant), one engineer, and one FF-EMT/FF-P]. The safety officer is the training chief.

The department is accredited every five years by the Center for Public Safety Excellence, a non-profit organization with the mission to lead the fire and emergency service to excellence through the continuous quality improvement process of accreditation, credentialing, and education. In addition to the five-year accreditation cycle, the department conducts its own internal compliance on a quarterly and yearly schedule. The fire department uses a passport-type system for personnel accountability tracking.

All fire department emergency and non-emergency dispatches originate from the city's joint fire and police emergency dispatch center. The dispatch center is staffed by ten employees working 10-hour shifts handling six phone lines using a new computer-aided dispatch (CAD) system installed in June 2018. In 2019, the center was involved in over 52,000 dispatches. Fireground audio is recorded.

The fire department had an extensive number of written operational guidelines serving as their Standard Operating Guidelines (SOGs). Relevant to this incident was Operational Guideline 501, Incident Command System, which is provided in Appendix One.

### **Training and Experience**

In 1979 the CDFPC established a voluntary certification program for firefighters. Rather than a statutory requirement that firefighters and first responders become certified, the program established a means to evaluate the proficiency of firefighters and first responders regardless of their department affiliation and regardless of being paid or volunteer [CDFPC 2017]. The certification program was accredited by the International Fire Service Accreditation Congress (IFSAC) in 1995, and the National Board on Fire Service Qualification System (Pro Board) in 2007.

The fire department has a written policy, process, and procedure for the hiring of individuals to become a firefighter in this department (see Appendix Two). In addition, the fire department maintains a structured officer development program. Lieutenants and above are required to earn a Fire Officer I and Fire Instructor I certification. Captains and above are required to earn Fire Officer II certification. Battalion chiefs and above are required to earn a Fire Instructor II certification. The officer development process involves a mixture of online training modules plus three days of skillset training at the fire academy.

All firefighters are required to complete 20 hours of continuing education courses annually. This continuing education course content is accessed through an online learning management system. The fire department trains all officers to be Blue Card© certified.

The FF-EMT who died in this incident had 20 years of experience as a firefighter. From 2009 through 2018 he had completed 2,030 hours of training, and 342 hours between July 1, 2018, and

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December 31, 2019. He received fire service training in a large variety of subjects, including engine company operations, truck company operations, forcible entry, care and maintenance of forcible entry tools, ground ladder training, horizontal ventilation, search and rescue operations, hose lays, rope knots, and cleaning, inspecting, and maintaining personal protective equipment. He had received certification in basic life support (BLS), EMT, National Incident Management System (NIMS-700), Hazardous Materials Technician, Driver Operator Aerial, Fire Fighter II, and Incident Safety Officer.

T1's acting lieutenant had 11 years of experience as a firefighter and served as an acting lieutenant for 4 years. From 2009 through 2018 he had completed 941 hours of training, and 313 hours between July 1, 2018, and December 31, 2019. He had received training in a large variety of subjects, including engine company operations, truck company operations, technical rescue, care and maintenance of forcible entry tools, ground ladder training, vehicle extrication, forcible entry, hose lays, horizontal ventilation, pre-incident surveys, search and rescue operations, rope knots, and career development. He had received certification in BLS, advanced cardiac life support (ACLS), Paramedic, Hazardous Materials Operations, Incident Command System (ICS) (100, 200, 300, 400), NIMS-700, National Response Plan (NRP-800), Fire Officer I, Fire and Emergency Services Instructor I.

The battalion chief involved in this incident (B8) had over 30 years of fire service experience within this department. He had been a chief officer for 17 years. From 2009 through 2018 he had completed 885 hours of training, and 98 hours between July 1, 2018, and December 31, 2019. He had received training in a large variety of subjects, including division operations, technical rescue, special operations, and truck company operations. He has received certification in BLS, EMT, ICS (100, 200, 300, 400), NIMS-700, NRP-800, Incident Safety Officer, Fire Officer I and II, and a Fire and Emergency Services Instructor I and II.

### **Apparatus, Equipment and Personnel**

Appendix Three lists the fire apparatus located at each station.

The fire department's SOG sends the following resources to a structure fire (one truck, three engines, one battalion chief, and one medic unit). This incident was a structure fire. Consistent with the department SOGs, the following resources were dispatched: T1, E2, E4 (a mutual aid engine from the neighboring fire department), E8, M2, and B8.

The FF-EMT's (the victim) normal assignment was shift-C at station-2. At this incident he was working 24-hours of overtime (0800 hours to 0800 hours), on shift-A at station-1. Although he was not working with his assigned crew, he previously worked with, and was very familiar with, most of the firefighters and officers dispatched to this structure fire. The station-1 crew had responded to seven previous calls over the course of their shift: five medical calls and two stalled/defective elevator calls.

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### **Building Construction**

The structure was a five-story multi-family, mixed-use rectangular building. The east-to-west direction was 125-feet long, while the north-to-south axis was 115-feet wide (see Photos 1 and 2).



**Photo 1 and 2. Left photograph shows the multi-family residential building taken from the north (Slide Alpha), looking south. Right photo taken from the southwest corner (Side Charlie/Bravo) looking northeast. (Left photo courtesy of Google Earth. Right photo courtesy of the fire department's origin and cause report.)**

Side Alpha was the north side of the structure, Side Bravo was the east, Side Charlie was south, and Side Delta was the west. The first-floor was a parking garage and a medical clinic, while the 32 residential units (condominiums) were located on the second through fifth stories. Although the residential units began on the second-floor, the residential floors were labelled one through four, with the fourth-floor being the fifth-story of the building. The remainder of this report will follow the residential labeling of floors one through four. It is unclear how many of the residential units were occupied at the time of this incident.

The residential units were accessed by an elevator on the east side of the building and two stairwells on the east and west sides of the building. Much of the following building construction information was provided by ATF's origin and cause report.

The exterior walls of the building were constructed of concrete masonry units that were built on a concrete foundation. The interior walls were constructed of concrete, and metal studs finished with gypsum board. The ceilings were also finished with gypsum board. The floors were comprised of concrete and were finished with varying materials, including carpet, wood, and tile.

The building had four separate roofs. A single-story sheet metal roof extended over the building's lobby on the north (see Photo 1), and another single-story sheet metal roof covered the medical clinic on the south side of the building (see Photo 2). The third roof covered a three-story "bump

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out” (parking on the first-floor and residential units on the second- and third-stories) on the north side of the building (see Photo 1). The main roof over the fifth-floor of the residential units was gabled in the east-to-west direction and had the following measurements:

- 4:12 pitch
- height of 68-feet 4-inches from the eastern edge of the structure
- width of 35-feet 2-inches from the apex to the gutter edge.

This roof was constructed of metal rafters which supported a concrete roof deck. The roof was finished with wood furring strips and wood shake shingles. There was an enclosed soffit that extended around the perimeter of the roof and a metal ridge cap that extended east-to-west along the roof.

Access to the residential unit’s roof required climbing through two narrow openings. The first was a scuttle-hole located near the elevator in the fourth-floor hallway. The scuttle-hole opened into the building’s attic where the second opening (the roof access hatch) exited on the north side of the roof (see Photo 3). The roof access hatch was constructed of metal and located above the scuttle-hole. A metal ladder, affixed to the interior side of the building’s north wall, extended from the attic to the roof access hatch (see Photo 3).



**Photo 3. Photograph in the building’s attic. The photo shows a fixed black metal ladder extending from the scuttle-hole on the ceiling of the fourth-floor to the roof access hatch.**

*(Photo courtesy of the fire department.)*

The residential roof had seven skylights and four chimney chases. Chases are structures that surround most prefabricated metal chimneys. Two of the chimney chases were located on the exterior east and west sides of the building while the other two were in the mid-span of the building’s south side. The fire occurred in the third chimney chase (see Photo 4). The third chimney chase contained eight flues that vented the woodburning fireplaces in units 106, 108, 206, 208, 306, 308, 406, and 408 (see photo 5). Once the flues extended above the roofline, they



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entered the third chimney chase located on the roof between units 406 and 408. The third chimney chase measured 13.5-feet east-to-west, 3.25-feet north-to-south, and 8.5-feet in height.



**Photo 4 and 5. Left photo shows three of the building's four chimney chases. The fire occurred in the circled 3<sup>rd</sup> chase. The right photo is a close-up of chimney chase #3 with the fire damage. The 3<sup>rd</sup> chase contained eight flues from the units below.**  
*(Both photos courtesy of the fire department's origin and cause report.)*

Inside the building, the chases were framed with metal studs and lined with fiberglass batt insulation and Type X fire-rated gypsum board. Once the chimney chases penetrated the roof, the chases were constructed of wood framing above the roofline and finished with wood siding (see Photo 6). The building's mid-span chimney chases were tied into the gable roof via a dormer immediately upslope of the chimney chase. The wood-framed dormer was finished with a sheet metal roof.

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**Photo 6. Chimney chase number 2.**  
*(Photo courtesy of the fire department's origin and cause report.)*

Sheet metal was installed horizontally above the wood framing of the chimney chases (see Photo 6). The individual flues contained metal roof jacks that were affixed to the sheet metal. There was metal screening that surrounded the area above the sheet metal, where the flues terminated. There were no observed spark arrestors at the end of the flues. There was a metal cap that sat atop of the metal screening, above all the flues.

### **Fire Protection Systems**

The fire alarm control panel was in the garage. The panel was monitored by the building's security company. Standpipes were in the building's two stairwells. Dry chemical fire extinguishers were placed in the stairwell's hose cabinets on all floors. Individual units were equipped with hardwired smoke alarms. Unit 406's smoke alarm was either not installed or disconnected. This lack of a smoke alarm in unit 406 was not a factor in this incident because smoke was only present in the chimney chase above the roof. The first-floor of the complex was sprinklered.

### **Personal Protective Equipment and Fire Fighter Equipment**

The three-person T1 attack crew were all wearing bunker coats and pants, hoods, boots, helmets, and gloves. All three were wearing a self-contained breathing apparatus (SCBA) (off air) with an integrated personal alert safety system (PASS) and facepiece attached to the SCBA harness. All three had portable radios. Additional items recovered on the 1st floor roof with the fallen FF-EMT included a dry chemical fire extinguisher and a long-handled axe. Members of the T1 attack crew

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carried a high-rise pack weighing approximately 60 pounds and a long-handled axe to the fourth-floor.

### **Weather**

At 0156 hours on December 7, 2019, the temperature was 18 degrees Fahrenheit, and the relative humidity was 88%, with no wind. The skies were clear with no precipitation over the proceeding 24 hours [Weather Underground 2019]. However, precipitation several days earlier resulted in some residual snow and possible ice covering the north-facing roof. From drone footage at 1000 hours on December 7th, the southern-facing roof appeared dry, presumably due to the sun's radiant heat. It could not be determined if there were some icy spots on the southern facing roof.

### **Timeline**

This summary timeline outlines the sequence of events in which a 46-year-old career FF-EMT died. Not all incident events are included. The times are approximate and were obtained by studying the dispatch records, audio recordings, witness statements, security cameras, and forensic evidence courtesy of the local fire and police departments.

<b>Dispatch Communications and Fire Department Response</b>	<b>Time</b>	<b>Fireground Communications and Fireground Operations</b>
Dispatch received a 911 call about a fire at the "highest point" of a building. The caller was unsure of the building's address.	0148 Hours	The 911 caller accessed the first-floor lobby of the building and made multiple attempts to activate the fire alarm.
The following units were dispatched: T1 (PAR 4), E2 (PAR 3), E4 from a neighboring department (PAR 3), E8 (PAR 4), B8 (PAR 1), M2 (PAR 2).	0150 Hours	The 911 caller also notified resort security.
	0152 Hours	Security personnel on-scene.
	0153 Hours	Building's fire alarm sounded. Residents started to evacuate. The property manager, who lived in the building, walked around structure, and noted a chimney fire on the roof on the south side (Side Charlie) of the building. He notified T1 of this upon their arrival at 0156 hours.

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<b>Dispatch Communications and Fire Department Response</b>	<b>Time</b>	<b>Fireground Communications and Fireground Operations</b>
Resort security updated dispatch that the property manager is onsite with access keys (Knox®).	0155 Hours	
T1 arrived on-scene. T1's acting lieutenant assumed Command.	0156 Hours	T1's Officer reported a large four-story residential building with nothing showing from the front (Side Alpha).
Command reported findings from size-up to dispatch and dispatch repeated this information. Command stated they will be investigating the best access [to the chimney fire].	0158 Hours	Command conducted a size-up and saw a small amount of flame from the chimney on Side Charlie.  T1's engineer started efforts to connect to the hydrant on the Side AD corner using a five-inch supply line. Fire apparatus was unable to access Side Charlie due to the narrow openings on both Side Delta and Side Bravo.
Dispatch advised moving radio transmissions to Command 4.  Dispatch contacted gas and electric company to cut service to the building, but it would take several hours for the energy company to respond on-scene.	0200 Hours	Command returned to Side Alpha.  T1's attack crew (Command, FF-EMT, and a probationary FF-EMT) grabbed their tools and high-rise packs and moved to the bottom of the east stairwell. Objective was to climb the stairs to find the best access to attack the fire.
Command announced assignments to incoming resources.	0203 Hours	The property manager and resort security joined T1's attack team up the east stairwell. The property manager had access keys to the roof and residential units.
	~0204 Hours	T1's attack crew climbed the east stairwell to the fourth-floor stopping at each floor to check each hallway for smoke or fire (none found).

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Dispatch Communications and Fire Department Response	Time	Fireground Communications and Fireground Operations
E2 arrived on-scene.	0205 Hours	<p>E2 engineer assisted the T1 engineer with the hydrant connection and the two 3-inch lines to the west stairwell standpipe.</p> <p>E2's officer and FF-EMT started to prepare to climb the west stairwell to the fourth-floor with tools and high-rise packs as part of the fire attack team.</p>
M2 arrived on-scene.	0206 Hours	M2 staged ½ block away on Side Alpha.
	~0207 Hours	<p>Building manager unlocked the scuttle-hole and the attic hatch which allowed T1's attack crew to access roof.</p> <p>Command instructed FF-EMT to <b>investigate</b> possible roof access to the fire.</p> <p>Command headed down fourth-floor hallway with building manager to investigate whether any of the residential units provided better access to the fire.</p>
B8 arrived on-scene.	0207 to ~0210 Hours	<p>T1's FF-EMT climbed through scuttle-hole and attic hatch. T1's probationary FF-EMT was unable to squeeze through the scuttle-hole. FF-EMT reports to Command that they have an involved chimney chase fire and need a hose lay. Command states he will work with E2 on that.</p> <p>B8 positions vehicle on Side Alpha. B8 did not assume Command. B8 received a report from resort security and the county Sheriff's office. B8 walks to Side Charlie and sees fire on the chimney chase.</p>

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<b>Dispatch Communications and Fire Department Response</b>	<b>Time</b>	<b>Fireground Communications and Fireground Operations</b>
<p>E8 arrived on-scene and was assigned to stage on the ground floor until the fire is located.</p> <p>E4 arrived on-scene.</p>	<p>0211 to 0212 Hours</p>	<p>Building manager opened unit 406 which had a slight orange glow from the window. Command and E2 attack crew enter unit 406 with flashlights. B8 saw the flashlights through the window. B8 notified Command that they are in unit underneath the chimney chase.</p> <p>M2 paramedics, staging on Side Alpha, saw a firefighter's reflective turnout gear standing on the snow-covered north-facing roof.</p> <p>Command told B8 "...we do have one of our firefighters up on the roof. He says he's got access." Command asked B8 if this unit [406] provided the best access to the fire.</p> <p>B8 responded, "...your best access may be that skylight right above you [unit 406]."</p> <p>B8 copied that and said, "I will keep looking to see if I can get to [the skylight]."</p> <p>Command returned to the scuttle-hole and tasked the probationary FF-EMT to couple and stretch the hoses from the east stairwell to unit 406.</p> <p>Command and the probationary FF-EMT moved to unit 406.</p> <p><i>Establishing unit 406 as the base of fire suppression efforts was not radioed to dispatch or to on-scene firefighters.</i></p> <p>E4 assisted with evacuations.</p>

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<b>Dispatch Communications and Fire Department Response</b>	<b>Time</b>	<b>Fireground Communications and Fireground Operations</b>
B8 requested T11 be dispatched. T11 dispatched (PAR 3).	0213 Hours	B8 thought T11 (with a 100-foot aerial platform) might allow firefighters to safely access the chimney chase fire.  Command ready to charge west standpipe.
B8 asked Command to confirm a firefighter fell off the roof.  B8 notifies dispatch and all units by radio that a firefighter fell 60 feet off the roof.  B8 ordered M2 to Side Charlie and requests an engine crew to extract the firefighter from the roof.	0214 Hours	Two separate bystanders saw a firefighter fall off the roof. B8 notified.  Command radioed FF-EMT but got no response.  B8 ran around to Side Charlie and saw FF-EMT collapsed on first-story roof, not moving, with the PASS device sounding.
M2 asked dispatch to put flight-for-life helicopter on standby.	0216 Hours	E8 and E4 responded to Side Charlie with ladders. E8 extracted the FF-EMT from the roof. The FF-EMT was unresponsive with extensive traumatic injuries to his head and chest. He had no pulse or respirations. CPR initiated.
	~0218 Hours	M2 departed the fire scene enroute to hospital with advance life support in progress.
B8 requested 2nd Alarm. Units M10, E7, T6, B6, M8 dispatched.	0220 Hours	Attack team in unit 406 breached the skylight and flowed water onto the chimney chase fire. The fire was knocked down in 20 to 30 seconds.
T11 arrived on-scene.	0233 Hours	T11 was unable to access Side Charlie. Fire under control.

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<b>Dispatch Communications and Fire Department Response</b>	<b>Time</b>	<b>Fireground Communications and Fireground Operations</b>
	0242 Hours	T1 FF/EMT pronounced deceased at the local medical center.
	~ 0300 Hours	Firefighting duties were turned over to the 2nd alarm units while 1st alarm units reported to headquarters for debriefing.

### **Investigation**

On December 7, 2019, at approximately 0150 hours, 911 received a call that reported a fire on the “highest part” of a large commercial (first-story) and residential building at a mountain resort. The caller did not know the address of the building but, after some discussion with the dispatcher, mentioned the building housed the local medical clinic which helped dispatch identify the address of the building. The caller also notified the resort’s security personnel. The caller made his way to the first-floor lobby and made multiple attempts to activate the building’s fire alarm which was eventually activated at 0153 hours and residents started evacuating.

At 0150 hours the following units were dispatched for a structure fire:

- Truck 1 (T1) (PAR 4): an acting lieutenant, an engineer, an FF-EMT, and a probationary FF-EMT
- Engine 2 (E2) (PAR 3): an acting lieutenant, an engineer, an FF-EMT
- Engine 4 (E4) from a neighboring department (PAR 3): a lieutenant, an engineer, and an FF-EMT
- Engine 8 (E8) (PAR 4), a lieutenant, an engineer, a FF-EMT, and a FF-paramedic
- Battalion 8 (B8) (PAR 1): Battalion chief
- Medic 2 (M2) (PAR 2): Two paramedics.



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The property manager, who lived in the building, was awoken by the fire alarm. He exited the structure and conducted a walk around. He noted a chimney fire on the roof on the south side of the building (Side Charlie) (see Photo 7). He notified T1 of this information upon their arrival at 0156 hours.



**Photo 7. Chimney chase fire on the roof as seen from Side Charlie/Delta corner.**

*(Photo taken by the condominium owner and provided to NIOSH courtesy of the fire department.)*

T1 was the first fire department apparatus to arrive on-scene at 0156 hours. T1's officer updated dispatch that the structure was a large residential building with no smoke or fire showing from Side Alpha. T1's officer assumed Command and conducted a 360° clockwise size-up (Side Alpha, Side Delta, Side Charlie, and full view of Side Bravo) before returning to Side Alpha via Sides Charlie and Bravo. Command reported that small flames were showing from a Side Charlie chimney and that they would investigate how best to access. Dispatch repeated this size-up information to Command and advised moving radio transmissions to Command 4.

Upon returning to Side Alpha, T1 assembled their attack crew [acting lieutenant (Command), FF-EMT, and a probationary FF-EMT]. They grabbed their tools and high-rise packs and met the building manager and resort security at the bottom of the east stairwell. The building manager had access keys to the roof and the residential units. At about 0203 hours, Command made assignments over the radio to incoming resources:

- E2 engineer - assist T1 engineer with hydrant and west stairwell standpipe connections
- E2 officer and firefighter - assist with fire attack on the fourth-floor, bring high-rise packs
- E4 (PAR 3) – go door-to-door to ensure all occupants of the 32 residential units had evacuated
- E8 (PAR 4) – stage but prepare for fire attack
- M2 (PAR 2) – stage out of the way of incoming apparatus.

At approximately 0204 hours, the T1 attack team climbed the east stairwell to the top floor of the building (fourth-floor on the fifth story) to determine if the roof was an option to attack the

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chimney chase fire. As the team climbed the stairwell, they did not detect any smoke in the stairwell or down any of the hallways.

When the attack team arrived on the fourth-floor, the building manager unlocked both the scuttle-hole to the attic and the access hatch to the roof (see Photo 3). Command instructed, during a face-to-face meeting with the FF-EMT, an investigation of whether they could access the fire from the roof. Command then headed down the fourth-floor hallway with the property manager using flashlights to investigate whether any of the residential units would provide better access to the fire.

T1's FF-EMT squeezed through the scuttle-hole into the attic, but the probationary FF-EMT, after several attempts, could not squeeze through the 2-feet by 17-inch scuttle-hole due to the bulky SCBA pack. The probationary FF-EMT retreated to the east stairwell to retrieve a dry chemical fire extinguisher from the stairwell's hose cabinet. The probational FF-EMT then returned to the scuttle-hole and used webbing to hoist/pull the extinguisher up to the FF-EMT in the attic.

T1's FF-EMT continued up the fixed attic ladder to the attic hatch. The attic hatch opens onto the north-facing roof. The north-facing roof had snow, and possibly ice, from precipitation days earlier. The snow on the southern-facing roof had melted, but there may have been some remaining icy sections. At this time, it was unclear whether the FF-EMT remained in the hatch or climbed up to the roof's apex before reporting to Command. He reported to Command that he could see a chimney chase fire and that they would need a hose lay on the roof.

Command copied that information and asked whether the hoseline should follow the same route the FF-EMT had taken. The FF-EMT responded that he believed so. Command copied that information and stated that he would work with E2 to provide that. About this same time, on Side Alpha, M2's paramedics and E2's engineer saw a firefighter's reflective turnout gear standing on the snow-covered north-facing roof. M2's paramedics were surprised to see the FF-EMT on the north-facing roof considering the hazardous conditions (remaining snow and possible ice) on a 4:12 pitched roof.

At 0207 hours B8 arrived on-scene but did not assume Command. B8 got a report from resort security and the county Sheriff's office. He then walked around to Side Charlie and saw fire in the chimney chase. B8 returned to Side Alpha, but shortly thereafter returned to Side Charlie because T1's Acting Lieutenant was having difficulty locating the fire from the interior.

From Side Charlie, B8 saw flashlights in the unit just below the chimney chase fire. B8 reported this observation to Command. Command was in unit 406 with two E2 firefighters who accessed the 4th floor from the west stairwell. Command asked B8 whether the window in unit 406 would give access to the fire. Command also mentioned to B8 that, "...we do have one of our firefighters up on the roof. He says he has access." B8 responded, "Yeah, your best access might be that skylight right above you." Command responded that he would try to access unit 406's skylight.

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Command then returned to the east side of the fourth-floor where the probationary FF-EMT was removing his SCBA in an effort to gain access into the attic. Command tasked the probationary FF-EMT to connect the hoses from the high-rise pack and stretch these from the east stairwell to unit 406. There was conflicting information as to whether the FF-EMT was in the attic at this time or whether he was already on the roof. In either case, there was no radio transmission stating the fire suppression efforts would take place from the skylight in unit 406.

At 2013 hours, B8 requested T11 be dispatched to the fire scene. T11 had a 100-foot aerial ladder platform (rather than T1's 75-foot ladder) that could potentially stream water to chimney chase from Side Alpha without accessing the roof. Given B8's requesting T11, the acting lieutenant assumed that B8 had assumed Command. At this point, other on-scene units were also unclear who was in Command.

At about the same time, T1's engineer notified T1's acting lieutenant that the west standpipe was ready to charge. T1's officer asked whether the east and west standpipes were interconnected in the building; T1's engineer responded that he thought "negative." T1's officer copied that information.

At about 0214 hours, a bystander on Side Charlie screamed when she saw a firefighter fall off the roof. She ran around to Side Alpha and notified B8. B8 checked with T1's officer who was unaware of any firefighter falling and tried to radio T1's FF-EMT, the only firefighter with access to the roof. T1's officer got no response.

Another bystander saw a firefighter standing upright on the south-facing roof. He saw the firefighter slip, fall, slide down the roof from the apex to the gutter edge (about 35-feet), then fall approximately 35-feet to the first-floor metal roof. The firefighter then slid another 20-feet down the metal roof coming to rest at the ice guard near the edge of the 1st story's roof.

B8 and the T1's engineer ran to Side Charlie and could hear a PASS device alarming. B8 ordered M2 to Side Charlie and asked for an engine crew to extricate the firefighter from the roof. E8, E4, and the engineer from T1 responded with ladders to Side Charlie. The E8 crew extracted T1's FF-EMT from the roof using a 14-foot ladder.

At 0216 hours M2 requested that dispatch place the flight-for-life helicopter on standby. Given that the local hospital was less than 10 miles away, the decision was made to transport the FF-EMT by the M2 ambulance (see resuscitation section below).

At 0220 hours, B8 requested a second alarm. The following units were dispatched:

- Engine 7
- Truck 6
- Medic 10
- Medic 8
- Battalion 6

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At this point three firefighters were in unit 406: the acting lieutenant from T1, the probationary FF-EMT from T1, and the acting lieutenant from E2. This attack team had pulled a hose from the west standpipe to the skylight in unit 406. They had retrieved an attic ladder to access the skylight. They requested T1's engineer to charge the standpipe and then started to breach the skylight. They notified B8 that they were just about ready to put water on the chimney chase fire. With water flowing, the fire was knocked down in about 20-30 seconds.

T1's officer requests permission from B8 to force open four unsearched units on the fourth-floor. Permission was granted by B8. One of those units was 408 which was undergoing construction. Unit 408 provided a different angle to flow water into the smoldering chimney chase.

B8 wanted no one to access the roof. When T11 arrived at approximately 0233 hours, B8 had them work with the resort security to try to squeeze through Side Delta to access Side Charlie with the hope of using the aerial platform to perform overhaul. Unfortunately, T11 was unable to position on Side Charlie. Due to accessibility issues on Side Charlie, suppression and overhaul were performed by crews on the interior of the building directly below the chase on the 4th floor.

The fire was knocked down at approximately 0230 hours, and it was declared out shortly after daybreak by the crews who arrived on the 2nd alarm assignment.

### **Resuscitation Efforts**

The FF-EMT had extensive traumatic injuries to his head and chest. At 0220 hours, he was unresponsive with no pulse, no cardiac rhythm, and no respirations. His pupils were fixed and dilated. Cardiopulmonary resuscitation (CPR) was initiated by the on-site paramedics. In addition to CPR, care included c-spine stabilization, interosseous (IO) fluid administered by the left tibia, airway management (intubation was unsuccessful due to jaw position and blood/secretions in the airway), bilateral chest decompressions, and two rounds of IO epinephrine. This care was administered either on-scene or enroute to the local hospital by three paramedics, one EMT, and one EMT student. Despite immediate advanced life support administered on-scene, during transport, and in the local hospital, the FF-EMT succumbed to his injuries. He was pronounced deceased at 0242 hours.

### **Cause of Death**

The death certificate and autopsy were completed by a forensic pathologist from a County Coroner's office. The death certificate concluded that the FF-EMT died as a result of "medullary brainstem laceration, [multiple brain hemorrhages], and a thoracic aorta transection due to a blunt force trauma from [a] 34.5-foot fall."

### **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

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investigators identified the following items as key contributing factors in this incident that ultimately led to the fatalities:

- Aerial apparatus could not be utilized due to lack of access to Side Charlie
- Insufficient situational awareness
- Adverse environmental conditions (snow and possible ice on the building's roof)
- Breakdown in communication components of the department's incident command system
- Lack of a fire department roof access/operations policy
- Insufficient roof training exercises
- Breakdown of crew integrity.

### **Recommendations**

***Recommendation #1: Fire departments should ensure all firefighters and other personnel responding to the fire scene are trained in situational awareness and personal safety.***

Discussion: Situational awareness is defined as “...your ability to perceive and understand what is happening in the environment (in the context of how time is passing), and then, in turn, to accurately predict future events in time to avoid bad outcomes” [Gassaway 2017].

Situational awareness is a component of fireground safety. All firefighters, fire officers, and other personnel operating at an incident, must maintain situational awareness. Because fireground dangers and hazards are constantly evolving, situational awareness should be maintained throughout an incident. Any unsafe or changing conditions should be reported to the IC and other members in their environment.

Situational awareness is a 3-level process:

- Level 1 - Perception
- Level 2 - Comprehension
- Level 3 - Prediction [Gassaway 2022].

#### Level 1 - Perception

In the fire service, perception, also referred to as sensing or observing, is often associated with size-up. While size-up typically focuses on visual observations, effective perception should involve all 5 senses (hearing, taste, touch, sight, and smell). This first level in the situational awareness process must be deliberate, accurate, and ongoing.

#### Level 2 - Comprehension

Properly interpreting one's perception on the fireground is the second level of situational awareness. Proper interpretation comes from education, knowledge, training, and experience. If firefighters have any doubts about what they are comprehending, they should re-evaluate, and when possible, seek the input of others. Different understandings of what is occurring on the fireground can arise due to misinterpretation, different frames of reference, or different

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perspectives. Thus, firefighters and officers with different grasps of the situation should not be simply dismissed. A shared understanding on the fireground at the task, tactical, and strategic levels are critical for success.

### Level 3 – Prediction

Projecting, forecasting, or visioning is the third and final level of situational awareness known as prediction [Gassaway 2022]. Since the fireground is constantly changing and evolving, plans must not be based solely on what is currently happening. Like comprehension, a firefighter and officer's ability to forecast fire progression relies on their education, knowledge, training, and experience. When firefighters are insufficient in this ability, they should seek input from others with the necessary skills for the situation.

Firefighters must be aware of and avoid the various obstacles to situational awareness such as:

- task fixation or tunnel vision
- distraction
- task saturation
- mind drift
- short-term memory overload [Gassaway 2019].

Effectively utilizing these 3 levels of situational awareness increases the chances of a safe and successful operation [Gassaway 2017, 2019, 2022].

During this incident, task fixation or tunnel vision probably obscured the firefighter's and the fire officer's situational awareness. In addition, sleep inertia due to awakening at 0156 hours may have contributed to not comprehending the fall hazard associated with accessing a 4:12 pitched gabled roof on a high-rise structure covered with some residual snow and possible ice. The following adverse environmental conditions may have also contributed to the danger:

- limited visibility due to darkness during the early morning hours
- cold temperatures
- snow and possible ice on the roof's northern-, and possibly, the southern-facing surfaces.

Finally, as mentioned earlier, situational awareness requires reporting unsafe or changing conditions to the IC and other members. In this incident, fire department members operating or staging on Side Alpha reported seeing a firefighter standing on the roof's north face whose surface was covered in snow and possibly ice. They were surprised and concerned about the firefighter's risk of falling given the dangerous conditions. These safety concerns were not radioed to Command.

***Recommendation 2. Fire departments should ensure all firefighters and fire officers follow all aspects of NFPA 1561 (Standard on Emergency Services Incident Management System and Command Safety) and their individual department's standard operating guideline (SOG) for incident command.***

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Discussion: Effective incident command and communications are critical to the efficiency and safety of any emergency response. This importance is highlighted by the NFPA developing a standard specific to the incident management system and command safety (NFPA 1561) and fire departments having SOGs devoted to these topics. In this incident, most components of NFPA 1561 and the department's SOG 501 were followed. However, NIOSH investigators have identified three communication issues which may have contributed to this tragic line-of-duty-death.

The first incident involved communication between Command and the FF-EMT on the fourth-floor as the T1 attack team prepared to access the roof. In their face-to-face meeting Command reported assigning the FF-EMT to **investigate** whether firefighters could access the chimney chase fire from the roof. The FF-EMT may have mistaken the assignment as gaining access to the roof to potentially knock down the chimney chase fire. During the NIOSH interviews, Command stated he never considered the FF-EMT would attempt to climb onto the roof due to the dangerous conditions.

To prevent miscommunication, both NFPA 1561 section 6.2.2 and the department's SOG 501 section B.4.a (see Appendix One) requires all communications to be clear and concise [NFPA 1561, 2020]. SOG 501 goes on to require that after the messenger **transmits**, the receiver **acknowledges and repeats** the basic content of the message. Then the messenger **confirms** or corrects the repeated message. This sequence: transmit - acknowledge & repeat - confirm was followed in most radio transmissions between firefighters and dispatch. However, during radio transmission between on-scene firefighters the receiver typically just said, "copy," or "copy that."

The second issue occurred when Command realized the best and safest access to the chimney chase was through the skylight in residential unit #406 prompting a strategic/tactical change. This change in tactics should have been announced to dispatch and the crews on-scene (SOG 501 Section B.1.b) [NFPA 1561, 2020].

The third issue involved the transfer of command with firefighters being unclear who was in Command once B8 arrived on-scene. Typically, the transfer of Command occurs when the most senior officer arrives on-scene. Company officers should be relieved of command as soon as possible into an incident with a strategic level incident commander (IC). However, SOG 501 Section A.6.c allows for Command to remain with the lower-ranking officer. Nonetheless, NFPA 1561 section 5.3.3 states the incident management system must clearly identify who is in overall command at the scene [NFPA 1561, 2020]. In addition, SOG 501 Section A.6.c lists all the information that must be orally transferred, preferably during a face-to-face meeting:

- current incident situation
- action plan in effect
- status of resources committed to the incident
- any unusual safety concerns
- location of the command post
- communicating the transferring of IC to all appropriate resources.

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***Recommendation #3. Fire departments should develop and enforce an SOG for roof access/operations and develop classroom and practical roof training exercises.***

Discussion: From 2010 to 2019, the involved fire department responded to 22 chimney-related calls. These numbers suggest that chimney or roof fires/calls represent an extremely small number of the fire department's responses (a low frequency event). Low frequency events are less likely to have SOGs developed, or training associated with the event [NIOSH 2012]. However, a slip, trip, or fall on a roof presents a significant risk for severe injury or death (a high-risk event). Identifying low frequency/high risk events should be a risk management priority when an IC develops an incident action plan and tactical worksheet [Schaeffer 2020].

Accessing a roof to perform vertical ventilation is an important tool in fire suppression. So important that NFPA considers it a requirement for firefighter I certification (see section 4.3.12) [NFPA 1001, 2019]. The fire service has published extensively on how to safely access a roof for ventilation using aerial platforms, roof ladders, etc. [DeBello 2020; Egan 2021; Gorman 2020; Kerber 2013; Norwood 2015; Pronesti et al. 2022; Sipe 2016; van der Feyst 2018]. Unfortunately, few, if any, of these articles or SOG, specifically address roof access for fighting chimney or chimney chase fires.

Fire departments looking to develop a SOG on this topic may find the Occupational Safety and Health Administration (OSHA) a helpful resource. While OSHA does not have a standard on fall protection for firefighters, they do have a standard ([1926.500](#)) for fall protections for construction workers operating on roofs. The standard's fall protection requirements are determined by the slope of the roof. Steep sloped roofs (defined as greater than 4:12) with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems [[1926.501](#)]. Low slope roofs (defined as less than or equal to 4:12) are allowed more flexibility in selecting their fall protection options [[1926.501\(b\)\(10\)](#)].

In addition to developing a roof access SOG and roof training exercises, fire departments may want to identify structures with fall hazards for pre-incident planning. In addition to knowing a roof's slope, section 5.2.2.2 of NFPA 1620, *Standard on Pre-incident Planning* includes additional data on roof construction useful for pre-incident planning [NFPA 1620, 2020].

In this incident, T1's attack team climbed up to the fourth-floor to investigate the best option to access the chimney chase fire. The strategy focused on two potential tactics: 1) access the roof or 2) breach a window or skylight from one of the residential units. A third option, using T1's 75-foot aerial ladder was not feasible due to the narrow openings on Sides Bravo and Delta precluding T1 from accessing Side Charlie. Given the environmental conditions, the roof tactic seemed to be the riskier option. Had a roof access SOG been in place and roof training exercises been conducted before this incident perhaps firefighters and officers would have initially selected the safer tactic of breaching a window or skylight to access the chimney chase fire.



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***Recommendation #4. Fire departments should ensure firefighters responding to hazardous areas at emergency incidents maintain crew integrity.***

Discussion: Crew integrity means firefighters stay together as a team of two or more. Section 8.6.4 of NFPA 1500 states “members operating in hazardous areas at emergency incidents shall operate in crews of two or more” [NFPA 1500, 2021]. In addition, section 8.6.6 states “crew members shall be in proximity to each other to provide assistance in case of emergency.” Maintaining crew integrity reduces the risk of firefighters becoming unaccounted for, lost, or missing. The International Association of Fire Chiefs (IAFC) simplifies this concept in their *Rules of Engagement for Firefighter Survival*: “Go in together, stay together, come out together” [IAFC 2012].

Crew integrity starts with the company officer ensuring that all members of the company understand their riding assignment. Upon arrival at the incident, the company officer is responsible for clear communication to ensure the crew understands the assignment and the means and methods that will be used to accomplish their assignment. Company officers should give an accountability report upon entering or exiting the hazard zone to either Command or their assigned division or group supervisor.

It is every firefighter’s responsibility to stay connected with crew members. When operating in the hazard zone, the officer should maintain constant contact with their assigned members by sight, touch, voice, or radio contact. It is the officer’s responsibility to ensure members are not separated or lost.

Crew integrity is also essential to fireground accountability. All firefighting operations should be conducted under the department’s accountability system. A personnel accountability system should have the capability of always identifying who is operating in the hazard zone, their assignment, and their location. Whatever accountability system a fire department uses, the system needs to be able to identify the location of assigned crews within a small geographic area of an incident scene [IAFC 2012].

At this incident, crew integrity was not maintained.

***The following recommendations are not considered contributing factors in this incident but are being provided as accepted SOGs and best practices.***

***Recommendation #5. Fire departments should consider strengthening building codes requiring the use of non-combustible materials for chimney chases.***

Discussion: NFPA estimates an average of 343,100 home structure fires per year of which approximately 4% are confined chimney or flu fires [Hall 2023]. The origin and cause investigation of this incident (see the Additional Information section at the end of this report) identified the following key information:

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- the owner of the condominium unit had burned wood in the wood-burning fireplace from 1730 hours to 2230 hours
- the chimney was serviced [cleaned] earlier in the year
- there was no evidence of creosote or other material accumulating in the flues
- the individual flues were not equipped with fire arrestors
- there was a hole in the metal screen around the chimney cap area.

The four investigators concluded that firebrands and/or embers from the fireplace in unit 406 probably escaped containment in the metal screen chimney cap and settled on the combustible material below the cap igniting a fire on the [wooden] chimney chase. Given this scenario, fire departments should consider advocating for stronger building codes requiring the use of non-combustible materials for chimney chases.

***Recommendation #6: Fire departments should consider making an incident commander (IC) aide available during working structure fires when three or more companies are dispatched under a single IC.***

Discussion: The staff aide (e.g., chief's aide, emergency incident technician, incident command technician, field incident technician, or staff assistant) is an essential component of the incident management system [Brunacini 2004]. Chapter 8 of NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, states that "an IC supervising three or more companies or crews under their command shall have an additional person (staff aide) assigned to facilitate the tracking and accountability of the assigned companies or crews" [NFPA 1561, 2020].

This department dispatches one truck and three engines (a total of four companies) for 1st alarm structure fires in a hydranted area. For 1st alarms, the department's Personnel Accountability System (SOG 204) allows the IC to use the daily roster as the initial accountability record. This raises a discrepancy between the department's policies and NFPA 1561 as mentioned above.

***Recommendation #7: Fire departments should ensure all firefighters follow their department SOGs.***

Discussion: In this department's SOG 501, Section A.6.a mentions that the initial IC should conduct a 360° size-up. The SOG acknowledges that, in some circumstances, barriers or obstacles may preclude a completed 360° size-up. However, in that situation, the IC shall transmit those barriers to those on-scene. In this incident, the initial IC was able to completely visualize Side Delta but did not walk down due to snow conditions. These snow conditions were not transmitted to firefighters on-scene.

In addition, in this department's SOG 501 Section B.7.a states that standard terminology of the building's geographic orientation shall be used. The Command Post location will be called Side Alpha, with Side Bravo being to its left, Side Delta to its right, and Side Charlie will be the rear. While Command mentioned Side Charlie to dispatch as part of his size-up report, subsequent

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transmissions by one-scene personnel used the term “rear of the building” to what should have been called Side Charlie.

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### **Investigator Information**

This incident was investigated by Thomas Hales, MD, MPH. Dr. Hales is an Investigator with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV. Dr. Hales was accompanied by Corey Butler, MA, a senior epidemiologist specializing in wildland firefighter safety and health working out the NIOSH Denver Office. An expert technical review was

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provided by Brian Kazmierzak. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division.

### **Additional Information**

An origin and cause report was issued by four inspectors from three organizations: the fire marshal and the fire inspector from the affected fire department, a special agent/certified fire investigator candidate from the ATF, and an investigator with the DFPC. The report highlights the following key information: 1) the owner of the unit had burned a fire in his wood burning fireplace the evening prior to the chase fire from 1730 hours to 2230 hours; 2) the chimney was serviced earlier in the year; 3) there was no evidence of creosote or other material accumulating in the flues; 4) the individual flues were not equipped with fire arrestors, and 5) there was a hole in the metal screen around the chimney cap area. The report concluded that the firebrands and/or embers from the fireplace in unit 406 probably escaped containment in the metal screen chimney cap and settled on the combustible material below the cap which igniting a fire on chimney chase #3.

### **Disclaimer**

The information in this report is based upon dispatch records, audio recordings, witness statements, and other information that was made available to the National Institute for Occupational Safety and Health (NIOSH). Information gathered from witnesses may be affected by recall bias. The facts, contributing factors, and recommendations contained in this report are based on the totality of the information gathered during the investigation process. This report was prepared after the event occurred, includes information from appropriate fire service subject matter experts, and is not intended to place blame on those involved in the incident. Mention of any company or product does not constitute endorsement by NIOSH, Centers for Disease Control and Prevention (CDC). In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

## ***Firefighter-EMT Dies After Falling from the Roof of a Five-Story Commercial and Residential Condominium Complex - Colorado***

### **Appendix One OPERATIONAL GUIDELINE 501**

#### **Incident Command System**

##### **Purpose**

The intent of this procedure is to institute an incident command system that provides operational coordination and effectiveness during emergency operations. This system shall identify and address safety and health objectives while meeting the requirements of NFPA 1500 and NFPA 1561. The fire department will utilize the National Incident Management System (NIMS) as its incident management system.

#### **A. SYSTEM STRUCTURE**

##### **1. IMPLEMENTATION**

- a) The Incident Command System (ICS) shall be used at all emergency incidents.
- b) The ICS shall be applied to all drills, training exercises and situations that have hazards similar to those found at actual emergencies.

##### **2. INCIDENT TACTICAL PRIORITIES**

- a) The Incident Commander shall be responsible for the incident's tactical priorities.  
The Tactical Priorities are:
  - 1) Provide for safety, accountability, and welfare of personnel throughout incident
  - 2) Life safety of endangered occupants and treatment of the injured
  - 3) Incident stabilization
  - 4) Protection of the environment
  - 5) Property conservation.

##### **3. SIZE-UP (ARRIVAL REPORT)**

- a) The first arriving unit at an incident shall communicate an arrival report to the dispatcher and other initially responding units.
- b) The five W's of an arrival report:
  - 1) What do you have?
    - a) Brief description of the incident situation, (building size and construction, occupancy, problem, strategy, or description.)
  - 2) What is it doing?
    - a) Conditions found (working fire, location of fire, Haz-Mat release, multiple patients, etc.)
  - 3) What are you doing?
    - a) Brief description of initial action plan and strategy, such as investigating, fast attack, defensive, establishing zones, etc.
  - 4) What do I need?
  - 5) Who is Command?
    - a) There must be an incident commander, ON SCENE, even if command is being passed to a later arriving unit.

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- b) The initial incident commander shall conduct a 360 size-up and air a follow-up report to include:
  - 1. Structure Fire
    - a. Occupants in need of rescue
    - b. Threatened exposures
    - c. Fire/smoke conditions and extent/location of fire
    - d. Basement or other pertinent building information.
    - e. Any change in strategy/tactics
    - f. Building systems, access issues, weather concerns, downed power lines, any other needed information or safety concerns.
      - \* In the event a 360 cannot be completed, the IC shall air the reason why and update with any additional information that was obtained.
  - 2. Haz-Mat (items not listed due to being irrelevant to this incident).
  - 3. Wildland Fire (items not listed due to being irrelevant to this incident).
  - 4. Technical Rescue (items not listed due to being irrelevant to this incident).
  - 5. Mass Causality (items not listed due to being irrelevant to this incident).

#### **4. RISK ASSESSMENT**

- a) Simply stated, the officer will determine whether to do one of the following:
  - 1) Risk a lot
  - 2) Risk a little
  - 3) Risk nothing.
- b) Risk management provides a basis for the following:
  - 1) Standard evaluation of the situation
  - 2) Strategic decision making
  - 3) Tactical planning
  - 4) Plan evaluation and revision
  - 5) Operational command and control.
- c) Chapter 8, Section 8.3.2 of NFPA 1500, Standard on Fire Department Occupational Safety and Health program, 2007 edition, states: Risk management shall be used on the basis of the following principles:
  - 1) Activities that present a significant risk to the safety of members shall be limited to situations where there is a potential to save endangered lives. (Risk a lot)
  - 2) Activities that are routinely employed to protect property shall be recognized as inherent risks to the safety of members, and actions shall be taken to reduce or avoid these risks. (Risk a little)
  - 3) No risk to the safety of members shall be acceptable when there is no possibility to save lives or property. (Risk nothing)
  - 4) In situations where the risk to fire department members is excessive, activities shall be limited to defensive operations.
- d) The acceptable level of risk is directly related to the potential to save lives or property.

#### **5. GOALS AND OBJECTIVES**

- a) Goals shall be developed on the basis of the incident's tactical priorities and information obtained during the size-up.
- b) Objectives shall be planned to achieve the desired goal(s).

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- c) Objectives should be specific but flexible enough to deal with a rapidly changing situation.

### **6. ESTABLISHING AND TRANSFER OF COMMAND**

- a) Command shall be established at all incidents. Command shall be included in the Arrival Report and re-iterated after a 360 size-up has been completed and a follow-up report given.
- b) The first-in apparatus, or the Battalion Chief's Command Vehicle, shall serve as the Command Post and Communications Group for a mobile command, unless otherwise designated. At small incidents or during the initial stages of larger incidents, the IC may be mobile until the resources needed arrive on scene.
- c) Any transfer of IC shall include an oral report of:
  - (1) The current incident situation
  - (2) The action plan in effect
  - (3) The status of resources committed to the incident
  - (4) Any unusual safety concerns
  - (5) The location of the command post.
- d) Transfer of command should be done face to face whenever possible.
- e) A higher ranking officer arriving on scene shall contact the IC and determine at what capacity that officer will serve (Command, Group Officer or Observer).
- f) The transferring of IC shall be communicated to all appropriate resources.
- g) The IC shall transfer Command to law enforcement prior to their departure of motor vehicle accidents.
- h) Command shall be transferred to an officer of equal or higher rank, but can be transferred to a senior firefighter after the incident has stabilized.
- i) The IC may transfer command to law enforcement, or EMS, prior to their departure from incidents if circumstances dictate.

### **7. INTERAGENCY COORDINATION**

- a) The CP shall be under the direction of the IC unless the IC elects to establish a unified command with personnel from other agencies.
- b) When the incident is under the command authority of the fire department, the IC should provide a liaison to coordinate the efforts of all other cooperating agencies.

### **8. COMMAND STRUCTURE**

- a) The IC shall decide which levels and elements of the ICS are to be used and shall develop a command structure by assigning supervisory responsibilities at each incident.
- b) The command structure shall depend on the size and complexity of the incident.
- c) The command structure at every incident shall maintain an effective span of control at each level of the organization.

### **9. TRAINING AND QUALIFICATIONS**

- a) The IC shall make assignments based on the availability and qualifications of the personnel.
- b) Positions that require specific expertise shall be filled by qualified personnel to the best of our ability.



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### **B. ICS FUNCTIONS / ROLES AND RESPONSIBILITIES**

#### **1. INCIDENT COMMANDER**

- a) The IC shall be responsible for establishing a command structure that meets the needs of the incident, for:
  - 1) Determining the strategy to be employed.
  - 2) Summoning and assigning resources to deal with the incident.
  - 3) Evaluating progress and changing the strategy as appropriate.
  - 4) Communicating and interpreting progress reports from assigned personnel.
  - 5) Bringing the incident to termination.
- b) The IC shall determine the overall strategy for the incident and shall communicate this strategy to all supervisory levels of the ICS. Any change in the strategy shall be communicated to all supervisory personnel.
- c) The IC shall be responsible for the coordination and direction of all activities and the health and safety of all personnel involved with the incident.
- d) When an incident increases in size and complexity, the IC shall expand the command structure to maintain an effective span of control at all levels.
- e) The IC shall make assignments and provide direction to manage the activities of all personnel and other resources at the scene.
- f) The IC shall use standardized terminology and predefined job descriptions when making supervisory assignments.
- g) The IC shall make assignments to create an organizational structure based on the needs of the incident.
- h) The assignment of duties and responsibilities to individuals shall also include the authority necessary to fulfill the assignments.
- i) As an incident escalates, or at large scale incidents, the IC may activate the County Incident Support Group (ISG). This will dispatch various command level personnel from throughout the county to help manage the incident. ISG members may fill the roles of Command and General Staff functions at these larger scale incidents.

#### **2. COMMAND STAFF**

- a) The IC shall be responsible for three staff functions until the span of control is exceeded. A Safety Officer (SOFR), Liaison Officer (LOFR), and a Public Information Officer (PIO) shall then be appointed by the IC to support the staff functions.
- b) The Safety Officer shall be responsible for the management of the safety of all personnel at the incident. The Safety Officer shall inform the IC of all present and potential hazards and shall suggest actions to prevent or minimize the risks. The Safety Officer shall have the authority to bypass the chain of command to correct unsafe acts or situations that pose imminent danger. The IC shall be notified of any corrective action implemented by the Safety Officer.
- c) The Liaison Officer shall coordinate the management of assisting agencies. For effective coordination, the Liaison Officer shall contact agency representatives that have the decision-making authority of their agency. The Liaison Officer shall be responsible for the coordination of and the safety of all assisting agencies.
- d) The Information Officer shall meet with the media and provide them with accurate and consistent information that has been approved for release by the Incident Commander. When necessary, a

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press area shall be established. This area shall be away from the CP and all incident activities. Media personnel shall be informed of the location of the press area and the importance for them to report there and stay there.

### **3. OPERATIONS SECTION CHIEF**

- a) The operations function shall refer to the tactical components of the ICS that are directly involved in rescue, fire suppression, and other activities that are within the primary mission of the fire department.
- b) The Operations Section Chief (OSC) shall support the overall plan, as directed by the IC, and work toward the accomplishment of their tactical objectives.
- c) OSC shall be responsible for supervising the activities of all resources under their span of control and for coordination with higher levels of the command structure and other supervisors at the same level.
- d) The safety and health of all personnel shall be the primary concern.

### **4. COMMUNICATIONS**

- a) All communications shall be clear and concise. Once the messenger and receiver have made contact:
  - 1) The messenger shall transmit the message.
  - 2) The receiver shall acknowledge and repeat the basic content of the message.
  - 3) The messenger shall then confirm or correct the repeated message.
- b) The IC shall utilize BENCHMARK TERMS and communicate to dispatch that the benchmark have been achieved.
  1. 360 COMPLETE - The incident commander will notify all crews that a walk-around the building was completed and update any finding, including specifics related to basements.
  2. OPERATIONAL STRATEGY (Offensive, Defensive, Transitional, Direct Attack, Indirect Attack, Confine and Control) – The incident commander shall notify all crews of the strategy when initiated, when command is transferred, and following any change of operations.
  3. ASSUMPTION OF COMMAND - The incident commander will notify dispatch that they will ‘assume command’ over the radio frequency, re-declare the operational strategy, and advise where the command post is located.
  4. PRIMARY COMPLETE – The incident commander will notify dispatch when he feels rescue is no longer a consideration.
  5. ALL CLEAR - The incident commander will notify dispatch when he feels a comprehensive search of the building has occurred and there are no potential victims remaining.
  6. UTILITIES SECURED - The incident commander will notify all units on scene and dispatch that utilities have been secured.
  7. FIRE UNDER CONTROL – When the fire is knocked down, IC will notify dispatch.
  8. LOSS STOPPED – The hazard has been mitigated to a point in which no additional damage is occurring.
  9. CLEAR TO REMOVE SCBA – Command may give the “all clear” to remove SCBA after monitoring for oxygen, CO, H<sub>2</sub>S, HCN, and Phosphine and no unsafe levels of gas have been detected. Command may also choose to have all crews remain on SCBA during overhaul if they feel inhalation hazards may still be present.

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- c) Fire ground communications between dispatch and command as well as between command and other divisions will normally be on the command channel assigned by dispatch (for larger scale incidents refer to the County Communications Plan).

### **5. PERSONNEL ACCOUNTABILITY**

- a) All personnel shall follow the fire department Standard Operational Guideline on Accountability #204.
- b) The IC, Safety Officer, or Accountability Officer should insure all incoming automatic or mutual units and personnel are accounted for at all times.

### **6. REST AND REHABILITATION**

- a) All personnel shall follow the fire department Standard Operational Guideline on Personnel Rehabilitation #202.

### **7. STANDARD GEOGRAPHICAL DESIGNATIONS**

#### **a) BUILDING DESIGNATIONS**

- 1) The side of the structure (usually the street side) where the Command Post (if on scene) is located shall be designated as the A (or Alpha) Side.
- 2) The side of the structure, left of A Side shall be designated B (or Bravo) Side.
- 3) The rear of the structure shall be designated C (or Charlie) Side.
- 4) The side of the structure, right of A Side, shall be designated D (or Delta) Side.
- 5) Exposures have the same designation as each side of the structure. (Example: B Exposure would designate an exposure on the B side).

### **8. GEOGRAPHIC DIVISIONS or TASK GROUPS**

- a) If the IC or Operations Officer are assigning areas of responsibility by a geographical location the designation would be by division. Examples would be the Division A, Division 2, Basement Division, etc. When operating with multiple floors below grade, the use of subdivisions is appropriate (Sub-1 Division).
- b) If the IC or Operations Officer are assigning areas of responsibility by task the designation would be by Group. Examples would be Search Group, Fire Attack Group, Ventilation Group, etc.

### **9. STAGING**

- a) Level 1 Staging should be established approximately one block from the incident scene, but not past the last tactical objective.
- b) Level 1 Staging should be established on incidents if the IC does not give you an assignment prior to arrival. The officer should call 'on scene- level 1 staging' and then the IC will give assignments.
- c) Level 2 Staging should be established and managed by a Staging Area Manager (STAM), away from the incident scene when large number of resources are responding to an incident.
- d) The Staging Officer shall maintain a log on the amount and types of apparatus in the staging area.

#### **Note:**

Refer to the National Incident Management System (NIMS), authorized by Homeland Security Presidential Directive (HSPD)-5 Management of Domestic Incidents, for more details on ICS and Incident Management.

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### **Appendix Two**

#### **Fire Department Policy and Procedure for Hiring Firefighters**

**Step One:** At the time of their application, applicants must be:

- eligible to work in the United States
- at least 21 years old (by the date of their employment)
- eligible to obtain a CO driver license (within 30 days of employment)
- in excellent physical condition
- able to read, write, speak, and understand English
- have a high school diploma or GED certificate
- certified as an EMT-B or EMT-P in Colorado or by national registry
- certified in CPR/AED by the American Heart Association (AHA) / Am Red Cross
- certified as a Firefighter I in CO or by IFSAC
- certified in hazardous materials awareness in CO or by IFSAC
- certified wildland Firefighter (S-130/S-190) (by the time of hire)
- certified in incident command (I-200, IS-700)
- submit a cover letter and resume
- submit the application for employment.

**Step Two:** Successful applicants will be invited to take the written examination: a 1.5-hour multiple choice aptitude test. Dependent on an applicant's test score and the needs of the fire department, some candidates will be invited to take the physical ability test (PAT) (see Appendix Four). The PAT is a pass/fail test to complete seven firefighting tasks within a specific amount of time. Following the PAT, the candidates will be divided into two groups: Tier 1 and Tier 2.

**Step Three – Interviews:** Tier 1 candidate will be invited to an oral board interview conducted by at least one person from each shift from a variety of ranks and the human resources manager. These interviews last about 20 minutes. The top three candidates may be selected for “ride-alongs” prior to final review by the fire chief. Tier 2 candidates are placed on an eligibility list and could be interviewed later depending on the needs of the department. The department has approximately three openings each year.

**Step Four – Conditional Job Offer:** Successful candidates will receive a conditional job offer from the fire chief pending:

- medical evaluation (see Appendix Five)
- background investigation for criminal history, motor vehicle violations, etc
- employment and personal reference checks
- firefighter I and EMT skills check.

**Step 5 - Probationary FireFighter:** Probationary firefighters are assigned to a specific station and company for their first ten shifts. After ten shifts at their initial assignment, probationary firefighters are rotated around at various stations and companies within their battalion.

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The training academy is staffed by five employees (chief, two firefighters and one civilian).

One year after the date of hire (start of fire academy class), the probationary firefighter is promoted to the rank of firefighter. All firefighters must complete Incident Command System (ICS) 100, 200, 700 and 800 certification training. After three years from their date of hire, a firefighter is eligible to take an examination for promotion to the rank of engineer. After promotion to the rank of engineer, eligibility for promotion to each successive rank requires two years in rank:

- Firefighter
- Engineer
- Lieutenant
- Captain
- Battalion Chief.

Assignments to the rank of assistant chief and deputy chief are appointed by the fire chief.

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### **Appendix Three Fire Department Apparatus at Each Fire Station**

#### **Fire Station No. 1 Apparatus**

<b>Equipment Identification</b>	<b>Year, Manufacturer &amp; Model</b>	<b>Pump capacity in gpm*</b>	<b>Other Information</b>
Truck 1 (T1)	2017 Sutphen SL75	1,500	500-gallon booster tank
Medic 1	2014 Dodge 4500	N/A	Advanced life support (ALS) unit
Medic 1 Z	2014 Chevrolet G-3500	N/A	Reserve ALS unit
Engine 1	2017 Sutphen, Pumper	1,500	750-gallon booster tank
Engine 1 Z	1992 E One Cyclone	1,500	750-gallon booster tank
Wildland 1	1998 Ford F350	95	300-gallon booster tank

\*gpm = gallons per minute

#### **Fire Station No. 2 Apparatus**

<b>Equipment Identification</b>	<b>Year, Manufacturer &amp; Model</b>	<b>Pump capacity in gpm</b>	<b>Other Information</b>
Engine 2 (E2)	2016 Pierce Enforcer	1,500	500-gallon booster tank
Medic 2 (M2)	2017 Dodge 4500	N/A	ALS Unit
Medic 2 Z	2016 Ford E-350	N/A	Reserve ALS unit
Medic 22	2012 Chevrolet G 3500	N/A	Reserve ALS unit
EMS 10	2016 Chevrolet Tahoe	N/A	Medic supervisor
Wildland 2	2008 Ford 550	105	300-gallon booster tank
Hazmat 2	1993 E One Cyclone	N/A	County hazmat response
Squad 2	2006 Ford	N/A	Rescue
Rescue Trailer	2006 Pace American	N/A	Trench rescue equipment

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Appendix Three cont.

### **Fire Station No. 8 Apparatus**

<b>Equipment Identification</b>	<b>Year, Manufacturer &amp; Model</b>	<b>Pump capacity in gpm</b>	<b>Other Information</b>
Engine 8 (E8)	2014 Rosenbauer CDR	1,500	500-gallon booster tank
Battalion 8 (B8)	2016 Ford F-150	N/A	Battalion chief (BC)
Medic 8 (M-8)	2019 Ford F-450	N/A	ALS unit
Medic 8 Z	2015 Ford F 350	N/A	Reserve ALS unit
Wildland 8	2008 Ford Super-duty	105	300-gallon booster tank
Tender 8	2017 Rosenbauer FX	750	3,000-gallon tank
Reserve B-8	2017 Ford F-150	N/A	Reserve vehicle

### **Station No. 11 Apparatus**

<b>Equipment Identification</b>	<b>Year, Manufacturer and Model</b>	<b>Pump capacity in gpm</b>	<b>Other Information</b>
Truck 11 (T11)	2010 Sutphen SPH100	1,500	300-gallon booster tank. 100-foot aerial ladder platform
Medic 11	2014 Dodge 4500	N/A	ALS unit
Engine 11	2005 Pierce Dash	1,500	500-gallon booster tank
Wildland 11	2017 SVI International	1,250	750-gallon booster tank

### **Auxiliary Fire Station Apparatus**

<b>Equipment Identification</b>	<b>Year, Manufacturer and Model</b>	<b>Pump capacity in gpm</b>	<b>Other Information</b>
Medic 12	2017 Dodge 4500	N/A	ALS unit
Air Trailer	2010 Airquest	N/A	Support trailer-Air compressor
Investigation Vehicle	2009 Chevy Express	N/A	Fire investigation
Fire Corps	1998 GMC 1 Ton	N/A	Logistical support

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### **Appendix Four Fire Department's Physical Ability Test (PAT)**

NOTE: The physical ability test (PAT) will be conducted at the Training Center, located at an altitude of 9,200 feet.

#### **Preparing for the physical ability test**

It must be emphasized that regardless of a person's level of fitness, individuals should be in good health before beginning any physical training program that emphasizes cardio-respiratory (heart-lung) fitness, strength and muscular endurance and flexibility. Most people can improve their level of physical fitness through an intensive training program that could include anything that would improve cardio- respiratory fitness, weight-lifting to develop muscular strength, and stretching exercises to increase flexibility.

#### **How to evaluate your level of physical fitness**

From a training standpoint, candidates should gradually work up to the point where they can run 1.5 miles in 12 minutes or less to establish their cardio-respiratory fitness. Strength should be gradually developed to where the candidate can do 7 chin-ups, 20 push-ups and 40 sit-ups with comparative ease. This is about the minimum fitness level for a candidate to safely complete the physical agility test. It must be emphasized that following the guidelines is no guarantee for passing the test. However, your chances for passing will be greatly increased if adequate preparatory physical training has taken place.

#### **Cardio-respiratory fitness**

Cardio-respiratory fitness is the ability of the heart to deliver oxygen to the muscles and other tissues. This is called the aerobic power. Simply stated, the ability to perform exercise and/or physical work is directly dependent upon how well the body delivers oxygen to the working muscles. A highly fit person will be able to deliver large amount of oxygen to the muscles and therefore, be capable of prolonged muscular exercise (for example: fighting fires). On the other hand, the out-of-shape individual will not be capable of delivering adequate amounts of oxygen to the muscles and therefore, will fatigue quickly and be forced to stop working much sooner.

#### **Muscular strength**

Strength can be defined as the ability to apply force. Since nearly all movements are performed against some resistance, a certain degree of muscular strength is needed to perform any activity. Firefighters perform activities against much greater resistance than the average individual. Therefore, the firefighter must have above average muscular strength, endurance and power in order to effectively and safely handle firefighting equipment and perform the duties of a firefighter.



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### **Flexibility**

Flexibility allows an individual to perform required moves without causing injury. Firefighting and many extremely vigorous activities can be performed more safely if the person has good flexibility.

### **The importance of preparation**

Do not take this physical ability test lightly. It is more difficult than it appears. Your chances for passing the test will be greatly increased if adequate preparatory training has been undertaken. Physical training should emphasize cardio-respiratory (heart/lung) fitness, strength and muscular endurance. Running and weight training are two of the best approaches.

### **What to bring & How to dress**

Candidates that have been determined eligible for testing should arrive 15 minutes prior to their appointment time. Candidates must sign and the *Waiver of Liability* forms. A portion of the test will be performed with provided bunker coat, helmet and SCBA pack. Another portion will be performed with a provided weight vest. Candidates should wear comfortable athletic clothing with supportive shoes and bring proper fitting work gloves. In the interest of Candidate safety, Candidates will be required to provide a pre-test and post-test vital record to a qualified EMT. Candidate vitals are not considered with other test results. Candidates may be restricted from performing the PAT and moving forward in the hiring process. Authority personnel and Medical Control personnel retain the final authority to restrict a candidate from PAT testing, or to end a PAT test at any time prior to its conclusion in the interest of candidate safety.

### **PAT Review**

There will be an opportunity for candidates to review and be instructed on the physical ability test prior to performing the test.

### **The Physical Ability Test**

The PAT is a pass/fail test that consists of seven (7) tasks that must be completed correctly, in order, and within a set amount of time. The PAT is comprised of two-timed sections. Section 1 must be completed within five (5) minutes: It is comprised of six (6) fire ground tasks. Section 2 must be completed within three and one-half (3½) minutes and is a wildland aerobic capacity event. The PAT is a score-based test with a minimum time requirement to pass. Each task will be explained and demonstrated to the candidates. To pass the physical ability test the candidate must properly complete all tasks within the acceptable time limit.

#### **Rules:**

1. Candidate must strike every step with one of his/her feet in all sections of the tower. Failure to strike each and every stair will result in immediate disqualification. There will be no running allowed inside the tower.

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2. Candidate may run in all phases of the PAT course that occur outside of the tower.
3. Candidate must complete each station in its entirety before transition to the subsequent station may occur, Failure to correctly complete each station will result in termination of the test.
4. Failure to complete stations 1-6 in 5 minutes or less will result in automatic termination of the Physical Ability Test.
5. Failure to complete the Wildland Task - station 7 in less than 3 ½ minutes will result in automatic termination.
6. PAT scores will be based on successful completion of the entire course.
7. Time will start when the candidate steps on the first stair. The candidate shall wear a bunker coat, gloves, and SCBA (without face piece) for stations 1-6.
8. The candidate will wear a 45-pound vest for station 7. The time will start and stop when the candidate crosses the line with any part of his/her head or body.

### **Section 1 Tasks:**

**Station 1: Tower Climb:** Time will start when the candidate steps on the first stair. The candidate will enter on the north side fence door leading to the exterior tower stairs and carry a hose pack consisting of one 50 ft. section of 2½ inch hose up to the 5<sup>th</sup> floor. Candidate shall drop the high-rise pack at the top of the 5<sup>th</sup> floor.

Station 1-2 Transition: Descend one level to the 4<sup>th</sup> floor

#### **Critical Failures:**

- Failure to use every step while ascending or descending.
- Running while inside or outside of the tower.

**Station 2: Equipment Hoist:** While standing inside of the box, hoist a 50-pound sandbag, using a rope and pulley, to the 4<sup>th</sup> floor using a hand over hand method. Candidate shall be in complete control of the sandbag. The proctor shall notify the candidate when the sandbag is fully raised.

Station 2-3 Transition: Exit tower striking each and every stair. Upon exit of tower candidate may choose to run or walk the remainder of the course. Candidate will move to station 3 on the south side of the tower as fast as individually possible.

#### **Critical Failures:**

- Stepping outside of the box.
- Failure to hoist the load in a hand over hand method.
- Failure to control the load - Allowing the rope to slide through hands.
- Failure to use every step while descending down tower stairs.

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**Station 3: Ladder Extension:** Candidate will assume a "ready position". The candidate will raise a 30-pound sandbag on a rope and pulley to simulate a 3-section 35' extension ladder. The sandbag shall be raised until it has reached the pulley, then lowered to the starting position. The rope shall be operated in a hand over hand method at all times with thumbs up or thumbs down. Candidate shall be in full control at all times.

Station 3-4 Transition: Advance to station 4 by moving towards the southwest corner of the training grounds to the charged hose line.

### **Critical Failures:**

- Allowing waist to drop more than 12" from the starting position.
- Failure to extend the sandbag the required distance.
- Failure to fully return the sandbag to the start position.
- Failure to operate the rope in a hand over hand method.
- Wrapping rope around hand or arm.
- Failure to control the sandbag; letting the rope slip through hands.

**Station 4: Charged Hose Line Extension:** Candidate will drag a charged 1 ¾ inch hose line 75 feet and place the nozzle on the ground. (Do not show water)

Station 4-5 Transition. Advance to station 5 by proceeding diagonally to position A or B, depending on where the dummy is at.

### **Critical Failures:**

- Failure to drag the hose line 75 feet.
- Throwing or dropping nozzle to the ground.

**Station 5: Dummy Drag:** Candidate shall drag/carry the 165 pound "victim dummy" 75 feet. Station 5-6 Transition. Advance to station 6 by moving diagonally to the west to the fan carry,

### **Critical Failures:**

- Failure to drag the dummy 75 feet.
- Lifting the dummy completely off the ground.

**Station 6: Fan Carry:** Candidate shall remove a box fan from a platform, carry the fan 75 feet, and return box fan to the platform in an upright position. Time for section 1 will stop when the fan is placed back on the platform.

### **Critical Failures:**

- Failure to carry the fan the entire distance.
- Failure to replace the fan on the 4-foot platform.

## ***Firefighter-EMT Dies After Falling from the Roof of a Five-Story Commercial and Residential Condominium Complex - Colorado***

Dropping the fan during any portion of this event.  
Failure to complete stations 1 -6 within the allotted time.

Station 6-7 Transition: Walk directly to the equipment station, where the candidate will be assisted in removing SCBA, bunker coat, and gloves. Candidate is permitted a two-minute recovery period. Candidate must keep walking during this time. With 30 seconds remaining, candidate will be assisted with putting on a 45-pound weight vest and moved to the start position of station 7.

### **Section 2 Task:**

**Station 7: Wildland Aerobic Capacity Evaluation:** Candidate shall walk or run with a 40-pound weight vest ¼ mile. There will be a posted half way point on the course. The clock will start when the candidate crosses the starting line. The Physical Ability Test is complete and clock stops when candidate passes over the ¼ mile finish line, with any part of the head or body.

#### **Critical Failures:**

Failure to complete entire ¼ mile distance.  
Failure to complete ¼ mile walk/run in the allotted time.

## Appendix Five

### Firefighter Medical Evaluation Test Order Form

On their initial physical, employees should have all the required and standard tests conducted to obtain a baseline. Tests will then be done either every 2 years, when exposed to blood borne pathogens, hazardous materials, etc., or when the physician requires.

#### Required Tests (initial, every 3 years or physician recommended)

Blood tests including;

Complete blood count, lipids, chemistries (7),

Hepatitis B (surface antibody, surface antigen, core antigen), and C

HIV,

Thyroid stimulation hormone (TSH)

Audiogram, peak flow spirometry, urinary (dipstick), tuberculosis screening test (PPD)

Prostate exam for males age 50 and older

#### Standard Tests (initial, exposed, physician recommended)

Spirometry, chest radiographs (two views), 12-lead electrocardiogram

Tetanus vaccination (dependent on last immunization)

- Hepatitis A and B vaccination

Quick Dip Drug Screen

**Physician Required** - Additional tests/procedures the physician requires before they will sign off on the Essential Job Task Form stating the employee is cleared for firefighter duties. The fire department is responsible for paying the cost of these tests/procedures.

\_\_\_\_\_  
\_\_\_\_\_

**Physician Recommended** – The costs for additional tests/procedures recommended by the physician, but not required for clearance for firefighter duties, are the responsibility of the employee through their normal health insurance benefit.

\_\_\_\_\_  
\_\_\_\_\_

Tests need to be authorized by either a Peer Fitness Trainer, **HR** Manager or a FD Physician. The selected tests have been authorized by:

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Title: \_\_\_\_\_