



Career Lieutenant Killed Following a Walkway Collapse While Working to Evacuate a University Student Housing Building—Missouri

Executive Summary

On February 22, 2014, a 48-year-old male career lieutenant, attempting to evacuate a student housing building, lost his life after the walkway he was on collapsed. The lieutenant's department was dispatched for a reported roof collapse at a university student housing complex. The lieutenant arrived first with a crew of two on the department's snozzle apparatus. The lieutenant advised dispatch that nothing was showing and asked if they could confirm the address. The lieutenant and his fire fighter performed a walk around of Sides A, B, and D and a visual inspection of Side C before ascending a single flight of exterior stairs located on Side D along with a university police officer to access the exterior second-story walkway. The three of them began knocking on doors to speak with the occupants. The lieutenant walked past the other two, who were speaking with occupants through a window, to check on the next apartment. Suddenly, the outer edge of the concrete walkway gave way and the walkway swung down against the building, dropping the lieutenant to the sidewalk. The concrete walkway then broke away from the building and fell flat and upside down onto the sidewalk crushing the lieutenant. Lifesaving measures were immediately started after the lieutenant was extricated from underneath the walkway. The lieutenant was transported to a local hospital where he was pronounced dead.



Collapse area.
(Photo courtesy of university contracted structural engineer.)

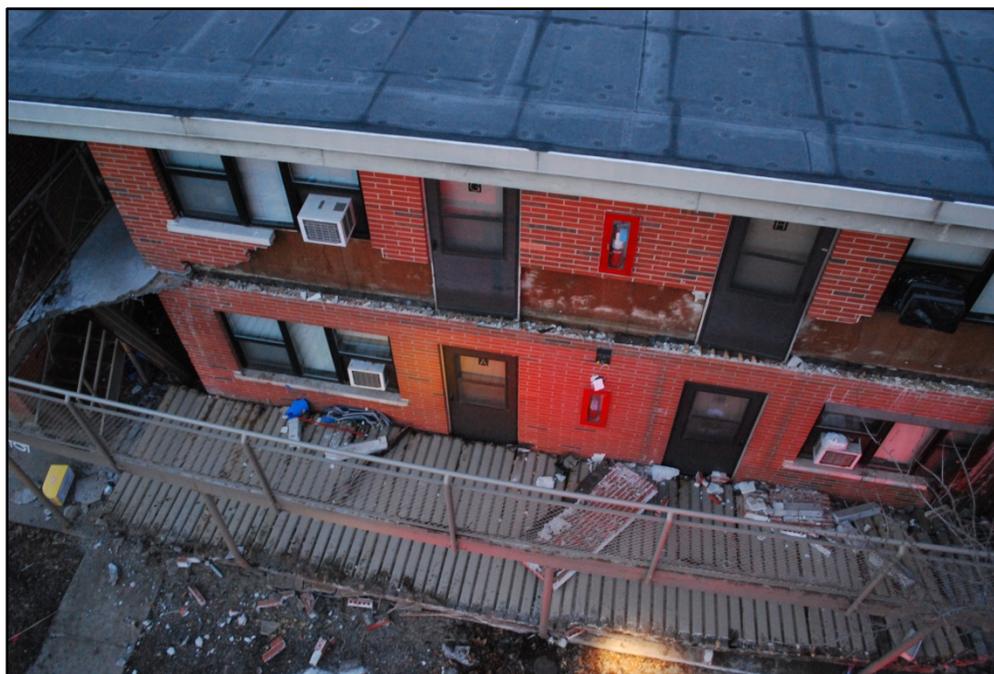
Contributing Factors

- *Deterioration and collapse of concrete walkway*
- *Awareness of the building condition not communicated to the fire department*
- *No site pre-planning*
- *Inadequate caller information influenced dispatch information provided to responding units*
- *Situational awareness.*

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Key Recommendations

- *Higher education facilities, sovereign entities, and authorities having jurisdiction should develop strategies for the inspection and remediation of student housing complexes and have programs in place to immediately address potential hazards*
- *Dispatch centers should ensure that all information taken by a call taker is clearly understood and provided to or simultaneously reviewed by a dispatcher so that all available information is provided to responding emergency personnel.*



*Aerial view of collapse area.
(Photo courtesy of fire department.)*

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1998, Congress appropriated funds to NIOSH to conduct a fire fighter initiative that resulted in the NIOSH “Fire Fighter Fatality Investigation and Prevention Program” which examines line-of-duty-deaths or on duty deaths of fire fighters to assist fire departments, fire fighters, the fire service and others to prevent similar fire fighter deaths in the future. The agency does not enforce compliance with State or Federal occupational safety and health standards and does not determine fault or assign blame. Participation of fire departments and individuals in NIOSH investigations is voluntary. Under its program, NIOSH investigators interview persons with knowledge of the incident who agree to be interviewed and review available records to develop a description of the conditions and circumstances leading to the death(s). Interviewees are not asked to sign sworn statements and interviews are not recorded. The agency's reports do not name the victim, the fire department or those interviewed. The NIOSH report's summary of the conditions and circumstances surrounding the fatality is intended to provide context to the agency's recommendations and is not intended to be definitive for purposes of determining any claim or benefit.

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



Death in the line of duty...



A summary of a NIOSH fire fighter fatality investigation

January 26, 2015

Career Lieutenant Killed Following a Walkway Collapse While Working to Evacuate a University Student Housing Building—Missouri

Introduction

On February 22, 2014, a 48-year-old male career lieutenant, attempting to evacuate a student housing building, lost his life after a walkway collapsed under him. On February 24, 2014, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On March 16–21, 2014, two safety and occupational health specialists from the NIOSH Fire Fighter Fatality Investigation and Prevention Program traveled to Missouri to investigate this incident. The NIOSH investigators met with and interviewed personnel from the university police department, residential life services, facilities planning and operations, campus facilities, and construction planning and management services. Additionally, the investigators met with and interviewed the fire chief and deputy chief, the incident commander (IC), fire department members involved with the incident, and the department’s assistant fire marshal assigned to the university as the safety representative and liaison. The NIOSH investigators also met with the city’s risk manager and safety specialist.

The NIOSH investigators visited, documented, and photographed the incident scene. The NIOSH investigators reviewed training records for the lieutenant and IC, witness statements, photos and fire department standard operating procedures related to the incident, as well as the fire department’s report for the National Fire Incident Reporting System. NIOSH investigators also reviewed university procedures and records related to the building involved in the incident and the university police report, photos, and statements. The NIOSH investigators visited the city’s public safety joint communications (PSJC) center, interviewed the administrative service manager, and reviewed the dispatch audio and written transcript for the incident. The NIOSH investigators also reviewed the medical examiner’s report.

The NIOSH investigators met with the structural engineering firm hired by the university to inspect the building following the collapse. The firm provided NIOSH with photos, drawings, and their investigative findings and report related to the collapse.

Fire Department

At the time of the incident, the career fire department was operating out of nine stations with 136 uniformed personnel and 4 full-time civilians, serving a population of over 100,000 within an area of about 62 square miles. On a daily basis, the fire department would staff seven quints, an engine, a snozzle, two ladder trucks, a medium-duty rescue, a single battalion chief, and a division chief.

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Field personnel worked 24-hour shifts (0700–0700) on a rotating schedule (24-on, 24-off, 24-on, 24-off, 24-on, 96-off), averaging 10,000–11,000 calls a year, with a minimum staffing of 37. Also, this fire department was rated as a Class 2 fire department by the Insurance Services Organization (ISO).^a In the ISO rating system, Class 1 represents exemplary fire protection, and Class 10 indicates that the area’s fire-suppression program does not meet ISO’s minimum criteria.

The city offered department members incentives for participating in the city’s wellness program. Department members also received a physical every 2 years by a contracted doctor and would receive medical clearance and fit-for-duty evaluations. The department also offered a voluntary fitness program for its members.

Public Safety Joint Communications Center

The city’s 9-1-1 dispatch center routes all 9-1-1 calls through their call center except for calls for the university police department. Fire/emergency medical services (EMS) calls for service are entered into the computer-aided dispatch (CAD) system by the call-taker. The incident details are viewed by the fire/EMS dispatcher, who then verbally dispatches the incident details to recommended apparatus and personnel. Additionally, initial incident details from the CAD are sent to printers at the assigned stations for responding personnel. This process was used on the morning of the incident.

At the time of this investigation, the call center employees worked 8-hour shifts, providing 24-hour coverage within the 9-1-1 center. The 9-1-1 center operated under a conventional UHF-band radio system. The 9-1-1 center had eight positions with one of those dedicated as a fire/EMS dispatcher. Personnel rotated between positions annually. Mobile data terminals were not utilized within response units but fire department apparatus were equipped with iPads® for routing information. At the time of this investigation, the center was accredited for fire dispatch under the International Academies of Emergency Dispatch (IAED).

According to the PSJC administrative services manager, the PSJC utilized IAED-structured call taker cards, which have been developed by fire service personnel. The call taker card used for this incident was “Confined Space/Structure Collapse.”

The PSJC required all dispatchers to have the following training certifications:

- Emergency Telecommunicator (IAED)
- Advanced Emergency Medical Dispatcher (IAED)
- Emergency Fire Dispatcher (IAED)

^a The Insurances Services Organization (ISO) is an independent commercial enterprise that helps customers identify and mitigate risk. ISO can provide communities with information on fire protection, water systems, other critical infrastructure, building codes, and natural and man-made catastrophes. ISO’s Public Protection Criteria program evaluates communities according to a uniform set of criteria known as the Fire Suppression Rating Schedule. More information about ISO and their Fire Suppression Rating Schedule can be found at <http://www.isogov.com/about/>.

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CPR for Healthcare Provider (American Heart Association)
Missouri Uniform Law Enforcement System (Missouri State Highway Patrol)

Additional non-certification courses included Incident Command System, National Incident Management System, and Hazmat Awareness. Both the call taker and the fire/EMS dispatcher held current certifications.

The call taker had been employed at the PSJC for 4½ years and had 4½ years of experience as a call taker and as a dispatcher. The fire/EMS dispatcher had been employed for the last 6 months and had approximately 6 months of experience as a call taker and as a dispatcher.

Training and Experience

The fire department operated a fire training academy that was overseen by a battalion chief and a training captain. An incoming recruit class would attend the academy for 11 to 12 weeks, completing 440 hours of required training and meeting Fire Fighter II requirements as outlined in National Fire Protection Association (NFPA) 1001 *Standard for Fire Fighter Professional Qualifications*. The state of Missouri provides state testing for certification equivalent to NFPA 1001 Fire Fighter I and II. Since 2006, all recruit class graduates are Driver/Operator certified. Following graduation from the academy, the recruit is on probation for 18 months and assigned a field training officer. While on probation, the recruit will also be provided the opportunity to obtain certification as an emergency medical technician.

The lieutenant had been with this department for the past 23 years. He was certified to NFPA 1001 Fire Fighter II. He was also certified as a Fire Instructor I and as an Emergency Medical Technician. Additional training included several courses on the incident command system, firefighting tactics, rapid intervention crew (RIC) operations, hazardous materials, and fire behavior.

The IC had been with this department for the past 18½ years, holding the current rank of division chief for the last 2 years. He was certified to NFPA 1001 Fire Fighter II. He was also certified as a Fire Instructor I/II, Fire Officer I, Incident Safety Officer, and as an Emergency Medical Technician. Additional training included several courses on the incident command system, search and rescue, building construction, fire fighter safety and survival, RIC operations, hazardous materials, command safety, and fire behavior.

The fire department offered a systematic program for promoting its members. In order to test at the rank of lieutenant, a member must be a fire fighter for 6 years. In order to test at the rank of captain, a member must be a lieutenant for 2 years. The rank of battalion chief is a promotional position with approval from human resources and requires a minimum of 1 year at the rank of captain to be considered.

Equipment and Personnel

The initial dispatched assignment for the incident included the following units:

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Fire Department

- Snozzle 1 (SZ1) with a step-up engineer (FF2), the lieutenant, and a fire fighter/paramedic (FF1)
- Engine 2 (E2) with an engineer, a step-up lieutenant, and a fire fighter
- Quint 3 (Q3) with an engineer, a lieutenant, and a fire fighter
- Squad 3 (SQ3) with an engineer and a captain
- Ladder 1 (L1) with an engineer, a captain, and two fire fighters
- Chief 6 (C6), a division chief in rank, responded in the department's chief vehicle
- Battalion 3 (B3), a battalion chief in rank, responded in the department's battalion vehicle
- Air truck (AT) with a fire fighter
- Rescue Trailer (RT), towed behind the AT.

University

- 3 police department units
- Medic 211 (M211) advanced life support ambulance.

Timeline

This timeline is provided to set out, to the extent possible, the sequence of events according to recorded and intelligible radio transmissions. Times are approximate and were obtained from review of the dispatch records, witness interviews, and other available information. Times have been rounded to the nearest minute. NIOSH investigators have attempted to include all intelligible radio transmissions, but some may be missing. This timeline is not intended, nor should it be used, as a formal record of events.

- **0441- 0444 Hours**

Dispatch receives a 9-1-1 call:

Call Taker: "911, what's the address of your emergency?"

Caller: "Hello how are you doing? Hello?"

Call Taker: "Hi, this is 9-1-1."

Caller: "Yes ma'am, actually umm, we have a problem with our apartment, the roof has just fell down to the ground."

Call Taker: "Ok, what's your address?"

Caller: "Our address is _____, apartment 707."

Call Taker: "Ok and the roof fell in?"

Caller: "Yes, the sidewalk actually of the second roof fell down on the first roof."

Call Taker: "Is anybody hurt?"

Caller: "I don't know ma'am actually we just actually woke up just suddenly like that, we don't we aren't sure yet, we just shocked."

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The Call Taker asked for and verified a callback number and name for the caller.

Call Taker: “Ok and you don’t know if anyone is trapped or hurt?”

Caller: “Well we don’t, we are not sure ma’am, but we cannot go out of our apartment actually we are trapped here.”

Call Taker: “Ok.”

Call Taker: “So you are trapped in your apartment?”

Caller: “Yes, ma’am...”

Call Taker: “And how many...”

Caller: “...we are afraid...”

Call Taker: “How many are in your apartment?”

Caller: “Two.”

Call Taker: “And you’re still, you’re still in your apartment, right? You haven’t fallen through?”

Caller: “Yes ma’am, yeah we are really afraid because we are not sure if that will be fall again.”

The call taker verifies no hazardous materials are involved, advises caller that the fire department is on the way, and provides the caller with safety instructions (e.g., do not attempt to rescue any trapped persons or no one re-enters the area).

Caller: “... it looks very bad.”

Call Taker: “Are you above or below ground?”

Caller: “We are the second floor?”

Call Taker: “Ok.”

Caller: “Yeah, actually it’s just in front of our apartment.”

Call Taker: “Ok, and is anyone injured?”

Caller: “...I told you ma’am we are not sure actually...”

Call Taker: “Are you or your wife injured?”

Caller: “No, no we are fine we are just shocked actually because you know we were sleeping.”

Call Taker: “Ok, once, if it’s safe to do so I want you to keep all bystanders away from the area. I know that you’re trapped in your apartment but if anybody.”

Caller: “Yes.”

The call taker tells caller to stay away from hazardous areas, help is on the way, and to call back if things worsen.

- **0444–0446 Hours**

Dispatch states, “Building collapse”; provides address of incident location and sets off tones for fire department notification.

The following units are dispatched for a “Delta response building collapse”: Snuzzle 1(SZ1), Quint 3 (Q3), Engine 2 (E2), Ladder 1 (L1), Squad 3 (SQ3), Medic 211 (M211), Chief 6 (C6), Battalion 3 (B3), Air truck (AT), Rescue Trailer (RT).

The address of the incident scene is provided along with the apartment number and cross streets.

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M211 en route.

- **0447 Hours**

SZ1 en route with three (lieutenant, FF1, and FF2).

B3 en route.

Dispatch states, “Snuzzle 1, units responding. We are getting reports of a roof collapse in apartment 707. The two residents of the apartment are trapped in the apartment...stated the apartment is on the second floor”; SZ1 acknowledges.

C6 advises he and Station 1 are responding to the incident with seven; dispatch acknowledges.

Dispatch states, “Chief 6, the residents in apartment 707, it’s on the second floor, they stated that their roof has caved in and they are trapped in the apartment; no injuries.”

- **0448 Hours**

C6 acknowledges dispatch’s traffic, requests the public information officer to respond, and asks dispatch to advise Chief 1 and Chief 2 of the situation; dispatch acknowledges.

Station 3 units are responding.

- **0449 Hours**

Dispatch states, “Received Quint 3, responding for a roof collapse at _____, apartment 707 on the second floor. Roof has caved in, two occupants trapped, no injuries.”

SQ3 en route; dispatch acknowledges.

E2 en route and copies additional information; dispatch acknowledges.

- **0450 Hours**

SZ1 requests the apartment number but locates the building.

- **0451 Hours**

M211 on scene.

SZ1 on scene with nothing showing; requests apartment number.

Dispatch states, “Snuzzle 1, the caller advised apartment 707; standby, we’ll check.”

Station 3 and Station 1 (responding units) in the area and staging; dispatch acknowledges.

- **0452 Hours**

C6 and B3 on scene.

AT and RT en route and copies additional information; dispatch acknowledges.

SZ1 lieutenant advises C6, “There’s nothing wrong with building 707.”

C6 attempts to confirm location of incident with dispatch and requests the call back number for the occupants.

- **0453 Hours**

E2 on scene and staging; dispatch acknowledges.

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- **0454 Hours**
Walkway collapse occurs.
C6 advises dispatch to move all units to the brown channel and that they had located the building; dispatch acknowledges.
Unknown unit requests all units to go to brown channel and check in.
Units confirm they are on brown channel.
C6 requests the medic unit down to the scene.

- **0455 Hours**
C6 requests L1 crew to come up to the scene and start evacuating the building.
C6 requests dispatch to send two additional medic units to the scene.

- **0456 Hours**
C6 requests dispatch to advise Chief 1 and Chief 2 to come to the scene.
C6 requests location of RT on the scene.

- **0458 Hours**
C6 confirms one entrapment with rescue personnel at collapse.
C6 asks rescue personnel if this area (collapse) is the same location of the occupants.

- **0459 Hours**
Over the radio, C6 advises his personnel to be cautious around the building and to stay out from under the canopy.

- **0500 Hours**
AT and RT on the scene.

- **0508 Hours**
SZ1 lieutenant extricated from the collapse.

- **0512 Hours**
M211 transports SZ1 lieutenant to the hospital. No arrival time at the hospital is provided.

Personal Protective Equipment

Fire department personnel stated to NIOSH that the lieutenant was wearing his station uniform, work boots, fire department ball cap, and turnout coat. He was also carrying a hand-held radio. NIOSH did not inspect the lieutenant's personal protective equipment as it was not considered to be a contributing factor in the lieutenant's death.

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Investigation

On February 22, 2014, the fire department was dispatched to a “building collapse” at a local university student housing complex. Units from the fire department as well as units from the university’s police department and university ambulance service responded to the location where nothing out of the ordinary was observed. The PSJC radioed C6 to verify that he had correctly copied the dispatch information. C6 advised PSJC that he had not copied the additional information. The PSJC then advised C6 that the caller was reporting the roof above apartment 707 had collapsed and that the caller and his wife were trapped in the apartment but not injured. SZ1 (lieutenant, FF1, and FF2) arrived on scene and positioned the apparatus in front of Building 707, in the middle of Side A (Diagram 1). The lieutenant established command for the incident and then asked PSJC to confirm the address. The crew of SZ1 spoke briefly about whether they were at the correct address. They could see no visible signs of a collapse but could see a window on the second floor that had a light on and occupants looking out of it. These occupants did not appear to be in any distress, and they did not try to get the attention of SZ1’s crew or arriving university police units. Police units then began checking nearby buildings within the complex to see if the incident was located at a different building. The lieutenant and FF1 grabbed tools and hand lights and began a size-up of Building 707. The lieutenant conducted a walk around of Side A, B, and D, and then observed Side C while looking from the B/C corner. FF2 stayed with SZ1 and set up flood lights from the unit toward the building and began organizing equipment and tools that might be necessary. After the lieutenant’s size-up, he advised FF1 that he could see no signs of a collapse. A university police sergeant met up with the lieutenant and FF1 on Side A. The three of them then walked toward Side D of the building and ascended the exterior stairs on Side D to the second-story walkway. C6 arrived on scene and initially parked at the driveway entrance to the building but backed his vehicle up the complex road beside building 707 to get a better view. Part of his view was blocked by SZ1, but C6 determined it was a two-story building with a flat roof that appeared to have no indication of a collapse. The lieutenant did contact C6 to advise him that there was nothing wrong with Building 707. C6 then contacted the PSJC to obtain the call back number for the complainant. C6 attempted to call them but had received no answer before the walkway collapse occurred.

The lieutenant went ahead of FF1 and the university police sergeant and began knocking on doors as they walked along the concrete walkway toward Side B. FF2 grabbed his turnout coat and radio from the front seat of SZ1 and observed out the corner of his eye something falling. He then turned toward what he thought he had seen fall and observed what appeared to be gravel or rock type material close to the corner of Side A-B, accumulating in a line below the walkway on the ground level sidewalk and grass. The university police sergeant and FF1 observed two occupants standing at a window in the middle apartment on the second floor. They stopped to ask them if they had heard anything related to the incident. The male occupant of this apartment advised them he had called 9-1-1 and the university police sergeant asked if they were trapped in their bedroom. They said they were but were not injured, so the lieutenant proceeded to walk further down the walkway to their apartment door to see if he could open it.

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Diagram 1. Shows unit placement at time of the collapse.
(Adapted from Google Earth® satellite image.)

About this time, the FF2 realized that it wasn't the roof that was the issue but the second-floor walkway. He immediately jumped out of the front seat of SZ1 and turned in front of SZ1 when he observed the lieutenant walking toward him on the walkway. More debris began to fall, and FF2 yelled to the lieutenant. The lieutenant looked right at FF2 as he began telling the lieutenant that the walkway was collapsing. At the same time, FF1 and the university police sergeant heard a loud bang or cracking, looked to their left, and saw the concrete walkway collapsing toward them and the brick façade being pulled off. They lost sight of the lieutenant after he fell. As this was occurring, FF2 observed the lieutenant fall straight down as the walkway gave way from the outer edge and swung toward the building. The lieutenant landed on his back as the walkway struck the building then overturned onto the lieutenant. Following the loud bang, FF1 and the university police sergeant ran toward the exterior stairs on Side D, descended them, and then hurried toward Side B, running parallel to Side A until they got to the collapse area. In a statement provided to the NIOSH investigators, the university police sergeant believed that the concrete walkway began to fall from the south (Side B) end of the building after it had separated from the outside support railing. The concrete walkway had

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separated in one complete section from the railing and swung against the building's brick façade before falling flat and upside down onto the ground floor sidewalk below (see Figure 1).

B3 had arrived on scene and had parked his vehicle behind C6 and was preparing to move down to C6 and assist him when he observed a large portion of the second-floor walkway collapse. C6 heard a loud noise also, pulled his vehicle up a few feet, and observed that a large section of the walkway had collapsed. C6 contacted PSJC by radio and advised them they were at the right location and to move units to the brown channel; he then took command. B3 then assisted C6.

FF2 immediately retrieved his radio and began pressing the Mayday button before running over to where C6 and B3 had staged. Additional university police officers and fire fighters who were in staging either heard the collapse or saw a cloud of debris and quickly made their way to the collapse area, arriving at the same time as FF1 and the university police sergeant. It was quickly determined that the lieutenant was trapped underneath the concrete walkway near a void that had been created after the walkway landed on a bicycle. The fire department worked diligently to remove the lieutenant by using cribbing and airbags. After his extrication from under the walkway (approximately 11 minutes), he was determined to be without a pulse and not breathing. CPR and medical care was immediately begun while he was transported to a local hospital, but he was later pronounced dead at the hospital. The building occupants never received any injuries, but they did have to be removed from windows on Side C with assistance from fire department personnel on scene.

Units in Staging

The investigation section focused on the actions of SZ1 and the university police department. Additional units on the initial dispatch were placed into a staging mode and did not come into the scene until after the collapse. One reason for this was the uncertainty of knowing if they were at the right address, because they could not find a building that exhibited any signs of a collapse. Another reason units did not come closer into the scene was because of limited space. The complex had tight roads and limited spacing for parking large vehicles, such as fire department vehicles, especially in front of Building 707. Most of the units in staging had no direct line of sight of Building 707 or could only see the roof line.

L1 and crew staged in the apparatus below Building 707 at the corner of Side A-D and used their remote spot light to scan other buildings within the complex because they were not sure if this was the correct building. They could see Building 707 and did not observe any apparent structural damage on the flat roof. They did not know something had happened until they observed dust in front of SZ1's headlights. SQ3 arrived on the scene and staged on top of a hill on a complex roadway that overlooked the incident scene about 100–150 feet away. They could see the roof line of Building 707 and personnel walking around the building and on the walkway just before it collapsed. SQ3 used their spot light to scan the roof of Building 707 and no collapse area or structural deformation was observed. Q3 staged with SQ3 and could see personnel walking around Building 707 before seeing a section of the brick façade come off the building. The air truck with rescue trailer arrived after the collapse. E2

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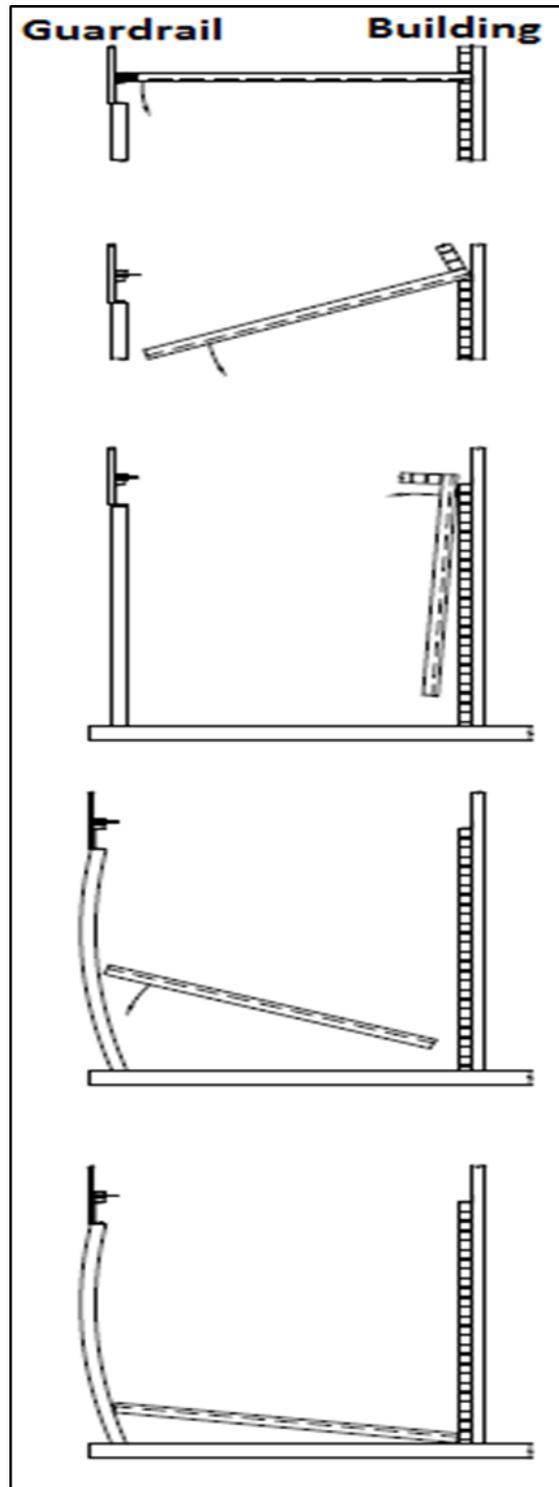


Figure 1. Schematic of how the walkway collapsed.
(Figure courtesy of university contracted structural engineering firm.)

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arrived on scene and staged at the entrance of the complex and did not have a view of the incident scene.

Structure and Walkway

All student housing complexes were owned and maintained by the university's residential life services. This particular student housing complex had been built in 1956 and at the time of the incident housed married students, students with children, single graduate students, and students over the age of 21. It contained 140 apartments within 14 buildings with a total of 95,507 ground square footage. Building 707 was a two-story brick veneer structure with a flat roof (see Diagram 1). Building 707 had 6 apartments on the second floor and 6 apartments on the first floor, which were all accessible from the outside. Stairwells were located on Side B and Side D, and both led to a concrete walkway that provided access to the apartments on the second floor. The second-floor walkway provided overhead coverage to the first-floor apartment doors. There was no roof above the second-floor walkway.

Residential life services had on-call maintenance staff to respond to occupant complaints such as leaky sinks and faucets, clogged drains, and heating and cooling problems and would consult the university's construction services for issues they could not handle. The complex received yearly safety inspections from residential life services that included the inspection and as-needed repairs or patching of the concrete walkways. Fire safety inspections were conducted yearly, and NIOSH reviewed these records from 2008–2013. These inspections focused on life safety issues among common areas such as laundry rooms. The fire safety inspections were conducted by an appointed fire department member whose salary was split 50/50 between the university and the fire department. He acted as the liaison between the fire department and university; held a position within the environmental, health, and safety office; and provided public education. The university did not have an established program to inspect buildings for structural safety hazards or concerns. Additionally, the fire department and city building officials have no authority over the construction or maintaining of university buildings. The university was, and is responsible for their construction plan approval, project management, and sign-offs. The fire department had not conducted any pre-incident planning or inspections of the complex.

In 2008, the university commissioned two firms to develop a master plan for graduate and family housing at four aging residential complexes. The goal was to determine a plan that best met the long-term needs of the university in a financially viable manner. One of the student housing complexes contained Building 707. The university does not receive state funding for university buildings and relies solely on monies generated from rent.

This master plan determined this complex to be in poor condition and renovation was not a reasonable alternative. This complex was only considered for new construction, but it was also located within a floodway. Based on financial modeling of costs necessary for redevelopment at the same site, new construction was deemed not desirable. Of note, the deteriorating metal decks of 12 of the 14 buildings (2 buildings had already been renovated or remodeled) were deemed a public safety hazard under the plan. The undersides of these decks were uncovered and exposed to the environment during all seasons. The master plan for improvements to the graduate and family student housing was to leave the

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complex that contained Building 707 open until renovation projects on two other complexes could be completed, after which the complex containing Building 707 would be vacated and demolished. NIOSH investigators reviewed the following work orders and memos associated for this complex, especially for Building 707.

- Building 708: Temporarily closed for repair and preventative maintenance on porch and balcony in October 2006.
- Building 705: Closed due to structural integrity safety concerns in August 2011.
- Building 707: Concrete deck repair in July 2013.

Following the collapse of the walkway at Building 707 and the death of the lieutenant, the university decided to demolish the complex in June 2014. The university will also be conducting regular visual building inspections for this campus and satellite campuses.

Walkway and Collapse Inspection

The university contracted with a private structural engineering firm to evaluate the condition and mode of which the concrete walkway had collapsed. Information below describes the physical conditions that resulted in the walkway collapse as well as activities contributing to those conditions. The report focused solely on the conditions observed by the engineering firm on February 22, 2014. The conclusions were derived from these observations along with engineering judgment gained from previous experience with similar conditions. NIOSH has summarized the report findings below.

Walkway Framing

The elevated walkway framing consisted of a 1½-inch painted metal deck with 2½ inches of concrete (4 inches total), supported on a steel ledger angle attached to the building and a 9-inch painted steel channel beam along the outer edge (see Photo 1). The exact method of attachment of the steel deck had not been verified at the time of the report. Although the ledger angle was bolted to the building's wood framing, the walkway gravity loads were actually supported by the veneer brick below because the brick had been mortared tight to the underside of the horizontal leg of the ledger (see Photo 2). The outer 9-inch channel was supported by steel pipe columns spaced 12 feet on center. The edge of the walkway was protected by a steel guardrail with vertical posts that were attached to the face of the 9-inch channel and an angle that was embedded into the top edge of the concrete slab (see Photo 3). The top angle had ½-inch smooth "J" dowels spaced on approximately 2-foot centers that were cast into the 4-inch walkway slab (see Photo 4).

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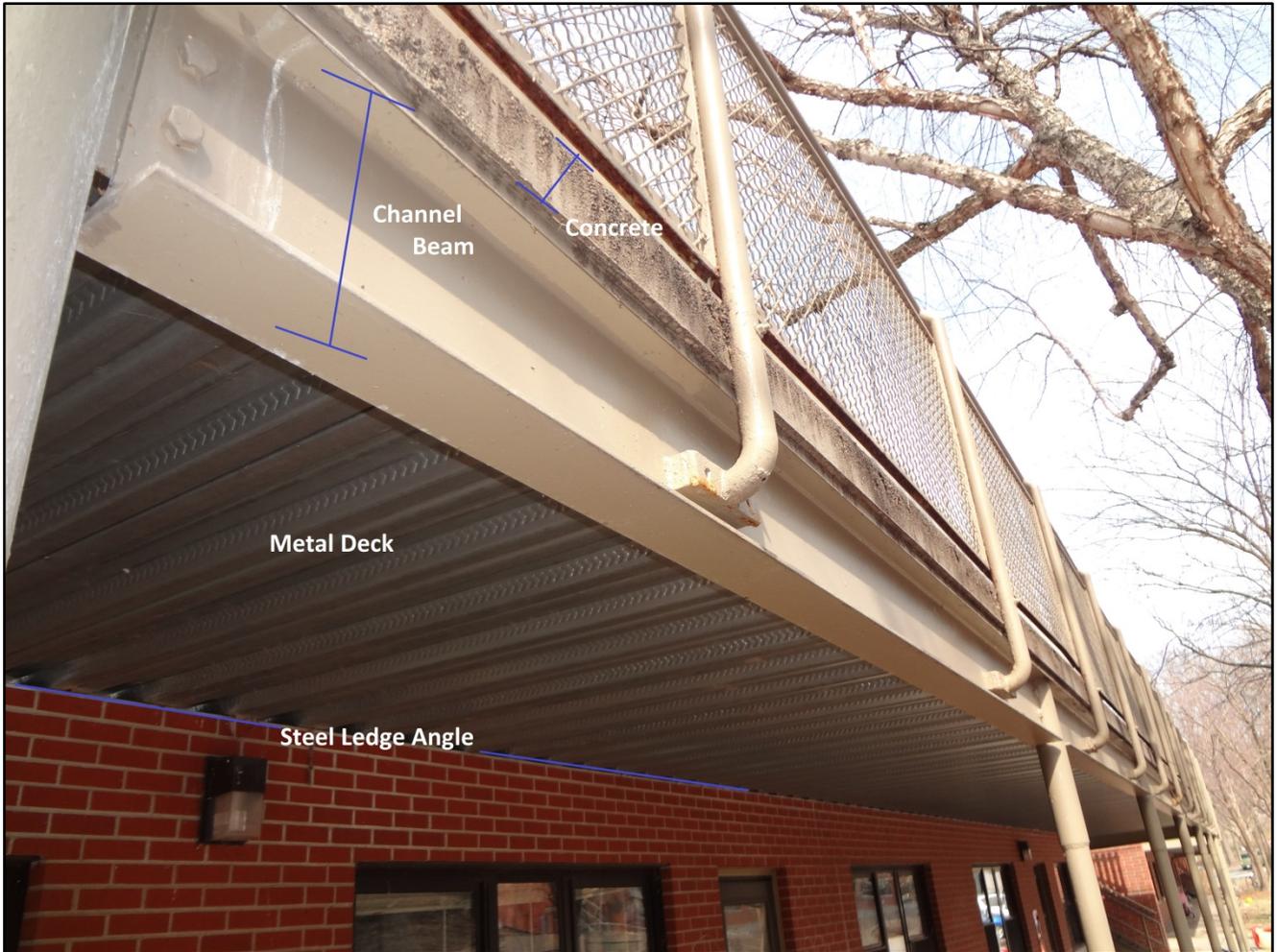


Photo 1. Walkway at another building within the same complex that had been repaired in 2004. (NIOSH photo.)

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Photo 2. Top of brick veneer that supported the steel ledger at the inner edge (building side) of the walkway. Note how the collapse has pulled brick veneer above the walkway from the vertical wall, exposing the wood framing.
(NIOSH photo.)

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**Photo 3. Steel guardrail attached to channel with vertical posts.
(NIOSH photo.)**

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Photo 4. Spacing of dowels within walkway concrete slab.
(Photo courtesy of university contracted structural engineering firm.)

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Observed General Conditions

In general, the walkway support beams, metal deck, and concrete slab were all found to be significantly deteriorated (see Photo 5). The 9-inch channels and metal deck were heavily corroded, and portions of the concrete slab were delaminated and showed signs of severe weathering (see Photo 6). In addition to the deterioration at the outer edge, a few longitudinal cracks in the steel deck were observed that extended nearly the full width of the walkway (see Photo 7).



Photo 5. Deterioration of underside of metal deck with concrete showing.
(Photo courtesy university contracted structural engineering firm.)

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**Photo 6. Delamination of the remaining section of walkway. The concrete walkway was approximately 90 inches wide.
(NIOSH photo.)**

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Photo 7. Longitudinal corrosion of the metal deck.
(Photo courtesy of university contracted structural engineering firm.)

Likely Cause and Mode of Collapse

The structural engineering firm’s report stated the final resting geometry of the walkway deck after the collapse was mostly upside down (see Photo 8). This allowed for a very thorough observation of the steel deck but precluded any meaningful evaluation of the top of the concrete slab. However, although there were some longitudinal discontinuities in the metal deck and concrete, the alignment of the framing seemed to show that the original failure did not occur somewhere in the middle of the span or at one of the ends, but rather at the front or back edge (see Photo 9). The final position, markings, and collateral damage also indicate that the front (or outside) edge was the first section to drop. Therefore, the structural engineer determined that the original failure occurred somewhere near, or within some component of, the outer structural system (see Figure 2).

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**Photo 8. Resting position of the walkway after it collapsed to the patio below (approximately 8 to 9 feet). The collapsed section of walkway measured approximately 42 feet.
(Photo courtesy of university police department.)**

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Photo 9. Potential area of failure.
(Photo courtesy of university contracted structural engineering firm.)

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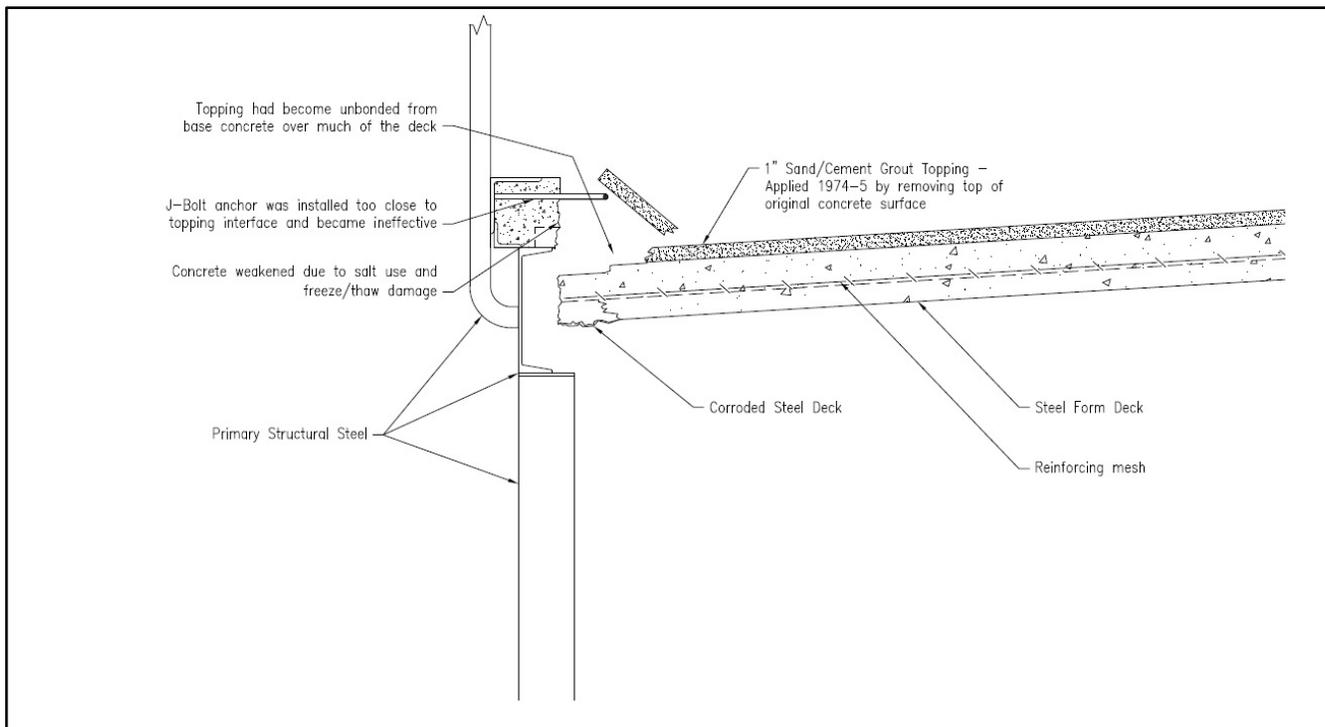


Figure 2. Schematic of walkway failure.
(Figure courtesy of university contracted structural engineering firm.)

The attachment of the metal deck to the channel provided lateral top-flange support of the edge beam, which helps to prevent localized buckling, rolling, and sweep. Evidence that the integrity of the metal deck had been compromised due to corrosion is prominent throughout the length of the remaining walkway. However, the channel remained in place and appeared to be mostly intact. Therefore, it appeared likely that the lack of lateral support of the edge beam was not a major contributing factor.

As described above, all of these components were severely deteriorated, which made it very difficult to precisely determine what happened based solely on the observed debris. Additionally, surveillance video or reliable firsthand reports were not made available. However, the structural engineering firm was confident that the collapse was a result of a concrete shear failure along the outer edge. It was likely that water and chlorides, and expansion from freeze-thaw action, combined to deteriorate the concrete to the point where its shear strength could no longer support even the self-weight of the walkway. According to the structural engineering firm, the loud “bang” reported by the residents (see Investigation section) was probably the sound from the shear failure itself. The walkway then likely sagged but remained suspended due to membrane action of the slab supported at the ends and along the face of the building. Once the load surpassed the bond and tension strength of the mesh reinforcing, the slab broke free from the ends and the front edge dropped (see Figure 1).

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Weather

On the day of the incident, the temperature was approximately 34°F with a south wind of approximately 3.5 miles per hour. Six days of weather preceding the incident included high temperatures ranging from 33°F to 72°F and low temperatures ranging from 27°F to 35°F with days of rain, thunderstorms, and sunshine. NIOSH cannot confirm that the weather leading up to the incident contributed to the walkway collapse the day of the incident, however the concrete walkway was exposed to the elements for many years, and over time the walkway deteriorated to point that it collapsed.

Contributing Factors

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

- Deterioration and collapse of concrete walkway
- Awareness of the building condition not communicated to the fire department
- No site pre-planning
- Inadequate caller information influenced dispatch information provided to responding units
- Situational awareness.

Cause of Death

The medical examiner listed the lieutenant's cause of death as traumatic compression asphyxia.

Recommendations

Recommendation #1: Higher education facilities, sovereign entities, and authorities having jurisdiction should develop strategies for the inspection of student housing complexes and have programs in place to immediately address potential hazards.

Discussion: This university is a sovereign entity and responsible for the construction, maintenance, and inspection of all buildings within their jurisdiction. This meant that the city building inspection or code division did not have the authority to perform their duties within the university. The university had staff, engineers, and professors who would perform such duties as inspecting construction projects at different times and then providing a certificate of occupancy. Adequate and appropriate building codes had been adopted and/or followed by the university. However, the university did not have a formal program for the inspection of structural components as it related to their buildings. The university has maintenance or construction services available to renovate or remediate issues discovered by employees during the course of their daily activities or reported by students or those living on campus. The fire department member assigned to the university as a liaison focused on life safety issues.

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Inspecting delaminating concrete walkways for structural issues was not part of the inspection process. In most cases, if the renovation or remediation project failed to meet a preset dollar amount, then it would only show up as a simple work order request for maintenance to address.

Higher education facilities, sovereign entities, and authorities having jurisdiction should ensure that programs are instituted to evaluate buildings structurally for disrepair and for safety issues not normally part of a life safety inspection and take appropriate measures to abate any issues in a timely manner and/or protect the public from such hazards. In 2008, the university had decided not to renovate the complex that contained Building 707 but rather close buildings where necessary and move occupants to other buildings within the complex. Focus was placed on renovating other student housing projects that were deemed more cost effective.

Additionally, law enforcement, EMS, and fire departments should have access to building information or to the actual buildings. This will enable them to locate building access points and to identify potential hazards related to construction type. This information is critical to the development of standard operating procedures and appropriate incident action plans. Sources of information can include pre-incident plans, code inspections, hazardous material storage, and citation reports. Higher education facilities, sovereign entities, and authorities having jurisdiction should also consider allowing city building or code officials, city safety or risk management departments, fire inspectors and/or fire marshals to participate in the inspection of existing buildings and new construction and the signing-off of permits. This may assist in making sure that hazards are corrected in a timely manner or proper actions are taken to protect civilians or responders.

Recommendation #2: Fire departments should ensure that department members are trained in situational awareness and personal safety.

Discussion: The book *Essentials of Fire Fighting and Fire Department Operations* defines situational awareness as an awareness of the immediate surroundings.¹ Fire department members need to understand the importance of situational awareness and personal safety on an incident scene. All members operating at an incident should maintain situational awareness and conduct a continuous risk assessment throughout the incident, reporting unsafe or changing conditions to the other members and especially to the incident commander.

When a department is dispatched for an emergency for a specific hazard and this hazard is not encountered by arriving units, then responding members need to slow down and re-assess the situation, verifying items such as the physical address, building number, and call-back number. Once the location has been confirmed and the reported hazards are still not observed, then caution should be taken when sizing-up the incident scene and performing a walk around. One of the most critical aspects of coordination between members when looking for a specific hazard is maintaining situational awareness and not developing tunnel vision. Tunnel vision occurs when an individual becomes focused on a specific task or other operational assignments and fails to sense changes in their environment. Members can maintain better situational awareness by looking up, down, and around themselves for other potential hazards as well as listening for new or unusual sounds or movement. Any changes that

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are observed or heard on the incident scene should be immediately communicated to other members as well as to the incident commander.

Fire fighters may encounter a wide variety of surface features that they must walk across while performing fireground tasks. For example, surfaces may be wet, slippery, ice-covered, uneven, and vegetation-covered or may include debris from the burning structure. Uncovered pools, vertical shafts and other openings posed engulfment hazards should the unexpected fire fighter fall into an uncovered opening. Downed power lines, broken or leaking natural gas meters and distribution lines, and unstable structures and other environmental factors are just some of the hazards that may be present on the fireground. An incident scene can change at any moment or an individual can happen upon an unsafe condition, as occurred in this incident. The fire department was dispatched to a structural collapse that was not visible upon their arrival. The fire department was able to confirm the building location and was assessing the building and speaking with occupants when the lieutenant walked onto the deteriorated walkway section that collapsed underneath him. Moments before this, the lieutenant's driver noticed debris falling from the walkway and immediately tried to get the attention of the lieutenant before he continued walking on the walkway, but it was too late.

Recommendation #3: Fire departments should ensure individuals who could act as an incident safety officer at an incident are adequately trained and consider designating an individual to be the department's incident safety officer.

Discussion: The incident safety officer (ISO) serves as a key figure at incident scenes by gathering a broad, overall perspective of the incident and acting as the eyes and ears for the incident commander. While the incident commander can be over-tasked with strategic objectives and may not be able to give full attention to every safety detail, the ISO can assist the incident commander as well as other command level officers.² The National Fire Protection Association (NFPA) 1500 *Standard on Fire Department Occupational Safety and Health Program*, Section 8.3.5 states "At significant incidents and special operations incidents, the incident commander shall assign an incident safety officer who has the expertise to evaluate hazards and provide direction with respect to the overall safety of personnel."³

Fire departments should ensure that an ISO is trained in how to assist the incident commander and other officers at an incident scene (not tactics) and how the role they serve merges with the overall strategic plan of the incident commander. A fire department ISO should have training beyond company-level officers with increased focus on safety issues such as the following:

- Fire department ISO training
- Fire department health and safety officer training (acute and chronic threats to fire fighter health)
- Fire ground risk assessment
- Risk management
- Accountability
- Fire ground hazards and hazard recognition, evaluation, mitigation, and elimination

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- Building construction and collapse
- Fire behavior
- Fire ground tactics and strategy
- Personal protective equipment use, capabilities, and needs (SCBA and personal protective gear)
- Fire fighter rehabilitation.

Chapter 6 of NFPA 1521 *Standard for Fire Department Safety Officer* defines the role of the ISO at various emergency incidents and identifies the necessary duties and responsibilities.⁴ Duties of the ISO include recon of the incident scene and reporting pertinent information back to the incident commander; ensuring the department's accountability system is in place and operational; monitoring radio transmissions and identifying barriers to effective communications; and ensuring established safety zones, collapse zones, hot zones, and other designated hazard areas are communicated to all members on scene.³ Larger fire departments may assign one or more full-time staff officers as safety officers who respond to working fires. In smaller departments, every officer should be prepared to function as the incident safety officer when assigned by the incident commander. The presence of the ISO does not diminish the responsibility of individual fire fighters and fire officers for their own safety and the safety of others. The ISO adds a higher level of attention and expertise to help fire fighters and fire officers. The ISO must have particular expertise in analyzing safety hazards and must know the particular uses and limitations of protective equipment.⁵

Fire departments should recognize the importance of an ISO who can function effectively on an incident scene based upon the necessary knowledge, skills, abilities, and experience. While a fire department may use an appointed officer as the ISO, they may not be as quick to recognize a hazardous situation or operation and cause an unintentional delay in the engagement to correct the hazard. This can be overcome by increased training of all individuals who may be appointed as the ISO, ensuring they have a clear understanding of responsibilities and expectations. Fire departments should establish a training and education program for the ISO. This ensures that officers, who could be appointed on-scene as the ISO, have the necessary knowledge, skills, and abilities to effectively function in this position.

Additionally, instituting a position and designating a fire department member as the ISO would alleviate the potential for the incident commander having to act as the ISO and/or having to appoint an available fire fighter or officer arriving on scene. The designated ISO position within the department allows for an ISO to automatically respond to incidents as defined by the fire department.

Recommendation #4: Dispatch centers should ensure that all information taken by a call taker is clearly understood and provided to or simultaneously viewed by a dispatcher so that all available information is provided to responding emergency personnel.

Discussion: It is important for emergency responders to receive clear, concise, and sufficient information when responding to an emergency so that they can properly prepare for the emergency that they are responding to. In most cases, a CAD and the 9-1-1 center already has a predetermined "run card" that identifies the location and unit complement for an appropriate response or a "dispatch card"

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that could walk a dispatcher through a medical emergency with the caller, such as CPR or child birth. These run/dispatch cards assist with getting apparatus on scene in a timely manner, providing quick care to the sick or injured, or a faster stabilization of an incident. Call takers and dispatchers also have standardized protocols to ensure a call runs smoothly and that the right questions are asked.

In most cases, emergency responders are trained to handle emergencies if limited information is available, but if additional information, no matter how minor, is available it should be communicated during their response and throughout an incident and confirmed by all units. This information will assist emergency responders before their arrival in preparing their size-up and/or stop or slow them down from going into a hazardous situation like an active shooter, a HAZMAT incident, or bombing incident. If additional information becomes available after arriving on scene—such as urgent weather warnings, shots being fired, or additional collapses—it should be immediately provided to all units.

During this incident, the call taker obtained a lot of information from the caller regarding his emergency. There may have been a language barrier or misunderstanding of terminology that prevented the caller from fully describing his emergency. It should be noted that the recorded call between the caller and call taker recorded the initial complaint of the caller as a “roof collapse” but further information during the call included the following:

- “Yes, the sidewalk actually of the second roof fell down on the first roof.”
- “Yeah, actually it’s just in front of our apartment.”

Had this information, although potentially confusing, been provided to responding units, it may have prompted responding fire fighters to conduct further size up of building conditions. The initial dispatch and further communications did not include this information. Initial responding units were looking for a roof collapse and initially thought they were at the wrong address. The radio transcripts for the incident included the following information:

- “Snuzzle 1, units responding. We are getting reports of a roof collapse in apartment 707. The two residents of the apartment are trapped in the apartment...stated the apartment is on the second floor;” SZ1 acknowledges.
- “Chief 6, the residents in apartment 707, it’s on the second floor, they stated that their roof has caved in and they are trapped in the apartment; no injuries.”

Fire departments should always be cautious when approaching an incident scene and be aware of their surroundings after exiting their apparatus and performing a size-up or attending to a patient and dispatch should provide additional information as it becomes available to assist them in their efforts to safely respond to or stabilize an incident.

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Although the following recommendations may not have prevented the incident from occurring, they are being provided as an added safety measure for departments to consider.

Recommendation #5: Higher education facilities, sovereign entities, and authorities having jurisdiction should work with fire departments to develop pre-incident plans for buildings within their jurisdiction and consider making this information available on a mobile data terminal (MDTs) or tablet within all fire department vehicles.

Discussion: Pre-incident planning is the process of gathering and recording information that could be critical for public safety personnel making life-saving decisions at an incident such as a fire, terrorist attack, or natural disaster. Pre-incident plans generally include information that will be used by decision makers at an incident. NFPA 1620 *Standard for Pre-incident Planning* states, “The purpose of this document is to develop pre-incident plans to assist responding personnel in effectively managing emergencies for the protection of occupants, responding personnel, property, and the environment.”⁵ Additionally, NFPA 1500, Section 4.1.4 states “Fire Departments shall develop pre-incident plans as determined by the AHJ.”³

Pre-incident planning is essential, no matter the size of a fire department. Even the smallest towns contain buildings or sites that require pre-incident plans, especially schools, hospitals, nursing homes, medical clinics, hazardous materials manufacturers, housing complexes, or any other businesses that are deemed by the fire department to be a high-risk occupancy or target hazard. A detailed pre-incident plan shows a building’s floor plan, doors and other access points, hydrant locations, roof construction, sprinkler and fire department connections, alarm panel locations, stairwells, utility shut-offs, points of ingress and egress, occupant contact information, and other pertinent information. Also, a pre-incident plan identifies deviations from normal operations and can be complex and formal or simply a notation about a particular problem, such as the presence of flammable liquids, explosive hazards, lack of hydrants, modifications to structural building components, or structural damage from a previous fire.⁶⁻⁸

Building characteristics including type of construction, materials used, occupancy, fuel load, roof and floor design, and unusual or distinguishing characteristics should be recorded, shared with other departments who provide mutual aid, and, if possible, entered into the dispatcher’s computer so that the information is readily available if an incident is reported at the noted address.⁵ Since many fire departments have tens or hundreds of thousands of structures within their jurisdiction, establishing an effective preplanning system is a challenge. Priority should be given to structures that have elevated or unusual fire hazards, have high occupancy loads, represent a high-risk and low-frequency type incident, and have life safety considerations.

Many emergency response agencies use mobile data terminals (MDTs) in fire apparatus and command vehicles. With the advancements in technology information that is stored in an agency’s computer-aided dispatch (CAD) system, information on pre-incident planning and target hazard occupancy can be provided to responding units for a defined occupancy. This information can be a valuable tool for

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first responders. Also, this information assists an incident commander in developing a strategy and incident action plan for an occupancy that has been pre-planned and/or is a target hazard.

Companies and command officers may be coming from different locations and may not be familiar with a specific occupancy. In some cases the jurisdiction's building department or authority having jurisdiction may have information that the fire department does not have. Information such as potential safety or code violations and whether the building has been abandoned or undergoing extensive renovation can provide valuable assistance to fire fighters and officers responding to an incident.

Recommendation #6: Fire Departments should ensure that Company Officers regularly drill with their personnel to include frequent site visits to all buildings in their first-due area with a focus on identifying hazards that pose a risk to the responding personnel.

Discussion: One of the most valuable skills a company officer and firefighters who serve with them can have is knowledge of their area. This means getting onto the apparatus and driving around the community, stopping at buildings and walking around them (even exteriorly only) as a primary training tool for enhancing situational awareness. This exercise can identify primary and secondary ingress / egress points, utility connections, water hydrants, and hazardous conditions that may be hidden or not readily apparent to the casual observer. Even if FD personnel are not in a position to change the circumstances they encounter, knowledge of the existing hazard could prove incredibly important and beneficial in the event of an emergency. The information gathered during pre-planning inspections can and should be used for training purposes so that fire fighters are prepared to deal with the variety of hazards identified during pre-planning inspections and site visits. In this incident, deteriorating conditions that had weakened the walkway's structural integrity were present but unknown to the responding companies. This incident highlights the need for first responders to be cognizant of their response area and the unique hazards that may be present.

Recommendation # 7: Fire Department personnel should maintain a higher than normal degree of caution when operating around elevated walkways, fire escapes and exposed structural elements.

Discussion: Elevated walkways, fire escapes and other types of exposed structural elements can present the unexpecting fire fighter with a number of hazards and dangerous situations. Exposed walkways and fire escapes can be deteriorated by weather and lack of proper maintenance, as highlighted by this incident. Retired Chief Vincent Dunn's book *Safety and Survival on the Fireground* contains detailed information on hazards that fire escapes and elevated walkways pose to fire fighters when using them.⁹

External fire escapes are open metal stairways and ladders attached to the side of a building and were once a very important aspect of fire safety in urban areas. However, they have fallen out of common use by current building codes. Most modern building and fire codes require interior stairways with fire-rated enclosures as a means of emergency egress.

However, many cities have existing older structures that still have these external metal fire escapes.

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Often these fire escapes are not maintained or inspected to keep them in a safe condition to utilize. Since they are exposed to the weather at all times and may be decades old, the metal is often rusted and in need of repair. In addition, they are fastened or bolted to masonry construction on the exterior of the structure which degrades over the years. Fire fighters should assume that fire escapes are unsafe for use if they are rusty, have little or no paint, and/or if the masonry wall has missing mortar joints or cracked brick at the fire escape connection points.^{10,11} In these cases, aerial ladders, ground ladders and/or interior staircases with bulk head doors should be utilized as the primary means of ingress and egress to roofs.

Recommendation # 8: Fire departments should ensure that fire fighters wear a full array of turnout clothing and personal protective equipment (i.e. SCBA and PASS device) appropriate for the assigned task while participating in fire suppression and overhaul activities.

Discussion: Although there is no evidence that the following recommendation would have prevented this fatality, it is being provided as a reminder of a good safety practice. The proper selection and use of personal protective equipment (PPE) is required by OSHA regulations, recommended in NFPA standards, and is good safety practice. Chapter 7.1.1 of NFPA 1500, Fire Department Safety and Health Program, 2007 Edition, states “the fire department shall provide each member with protective clothing and protective equipment that is designed to provide protection from the hazards to which the member is likely to be exposed and is suitable for the tasks that the member is expected to perform.” Chapter 7.1.2. states “protective clothing and protective equipment shall be used whenever a member is exposed or potentially exposed to the hazards for which the protective clothing (and equipment) is provided.”¹² The incident commander should establish the level of protective clothing necessary to enter the fire zones (hot, warm, and cold). The OSHA Respirator Standard Title 29, Code of Federal Regulations (CFR) 1910.134 lists requirements for SCBA use in immediately dangerous to life or health (IDLH) atmospheres.¹³

In this incident, the use of SCBA was not warranted, based upon the dispatch. The victim was wearing his turnout coat and a fire department ball cap. The fire department was dispatched to a structural collapse that was not evident upon their arrival. While the lack of personal protective equipment (PPE) and clothing did not contribute to the fatality that occurred at this incident, it is generally recognized that fire fighters should dress for what they might encounter, not necessarily what is showing upon their arrival. At a minimum, head, hand and foot protection would have been warranted.

Recommendation #9: Fire Departments who have sovereign entities and higher education facilities in their jurisdiction should share the information contained in this report as a pre-text to improving the safety of first responders and civilians.

Discussion: In this incident, the university commissioned two firms in 2008 to develop a master plan for graduate and family housing at four aging residential complexes including the complex where this incident occurred. The goal was to determine a plan that best met the long-term needs of the university in a financially viable manner. The university does not receive state funding for university buildings and relies solely on monies generated from rent.

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This master plan determined the complex where this incident occurred to be in poor condition and renovation was not a reasonable alternative. New construction was also deemed not desirable. Of note, the deteriorating metal decks of 12 of the 14 buildings (2 buildings had already been renovated or remodeled) were deemed a public safety hazard. The undersides of these decks were uncovered and exposed to the environment during all seasons. The master plan for improvements to the graduate and family student housing was to leave the complex that contained Building 707 open until renovation projects on two other complexes could be completed, after which the complex containing Building 707 would be vacated and demolished.

The Fire Department had a liaison between itself and the school but was not focused on structural engineering problems that posed a genuine risk for responders. More communication needs to be stressed between agencies who have regulatory authority and those that have an emergency response and hazard mitigation authority. In this case, this report provides an avenue for Fire Chiefs to have a conversation with the leaders of such entities to ensure that joint safety goals are achieved.

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Investigator Information

This incident was investigated by Stacy C. Wertman and Jay Tarley, safety and occupational health specialists with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH, located in Morgantown, West Virginia. An expert technical review was provided by Battalion Chief Matt Tobia, Anne Arundel County Maryland Fire Department and Tobia Training Associates, Inc. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division.

Additional Information

International Academies of Emergency Dispatch

<http://www.emergencydispatch.org/>

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