A Minnesota Department of Public Safety
State Fire Marshal Division Report

October 2020

LESSONS LEARNED:

The November 2019 Minneapolis High-Rise Fire

Narrative Report

The Minneapolis Fire Department (MFD) was dispatched to a high-rise building at 630 Cedar Ave. S. for an "alarms sounding" call at 3:56 a.m. on Wednesday, Nov. 27, 2019. Upon arrival, firefighters discovered an interior building fire on the 14th floor. Five people died in this fire, and multiple people were injured.

Deputy State Fire Marshal (DSFM) Ron Rahman is a fire investigator and was contacted soon after the fire. He worked with Minneapolis police and fire investigators to review the fire's origin and cause. A few weeks after the fire, the Minnesota State Fire Marshal Division (SFMD) undertook an additional review of the incident. This report outlines the findings of that review. This report is separate from and does not address the issues of fire origin and cause conducted by DSFM Rahman and Minneapolis authorities.

The purpose of this review is to identify factors present in the building that led to multiple deaths and injuries, and to determine strategies that could prevent future such tragic fires.

Building Description

The building at 630 Cedar Ave. S. was a 25-story high-rise with an additional upper-level penthouse located just east of downtown Minneapolis (see Figure 1).

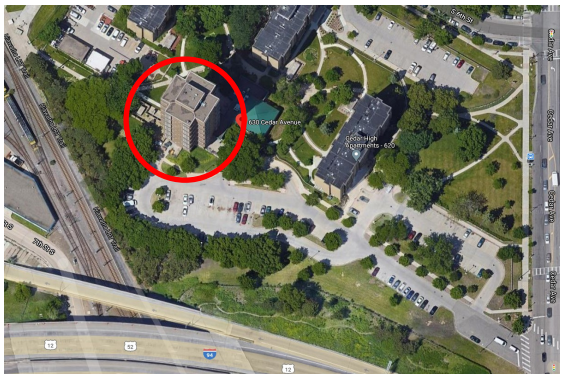


Figure 1: Location of 630 Cedar Ave. S. (Google Maps)

The building construction would most likely be classified as Type I-A (fire-resistive, non-combustible) by the state building code. The building's structural frame appeared to be concrete (also known as concrete pan construction). The building was in a modified Swiss cross pattern (wide "arms" of shorter length).

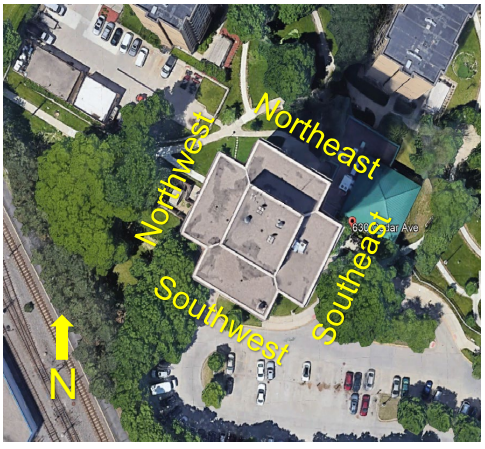


Figure 2: Orientation of 630 Cedar Ave. S. (Google Earth)

The building was oriented or rotated several degrees off center from cardinal compass points. For purposes of this report, directions of walls will be identified as northeast, southeast, southwest or northwest, and corners of the building will be identified as north, east, south or west (see Figure 2).

The building was used as an apartment building and housed approximately 192 apartment units. It was likely constructed between 1969 and1970 (based on architectural drawing dates and type of construction). It appears a newer section was added to the common spaces on the main level. This section contained a community dining room, kitchen, offices and similar spaces.

The center core of the building contained the two elevators, a stair enclosure, and interior building shafts for mechanical equipment. Interior walls were of non-combustible construction consisting of metal studs covered with gypsum wallboard.

The building's heating system was natural gas-fueled. Hot water heat was supplied by a 1.5 million BTU boiler system.

Typical Firefighting Operations in High-Rise Buildings
Firefighting operations in high-rise buildings are challenging. Firefighting equipment must be transported to the story of origin. This involves firefighters carrying equipment up the stairs or using the building's elevators to get close to the story of origin.

In multi-story buildings, the elevators have Phase I and Phase II fire safety features. Phase I safety features require the elevators to return to a designated story when a signal is received from a smoke detector in an elevator "lobby" or the elevator's mechanical room. Once the elevators return to the designated story, the doors open, and the elevator is "locked out" (will not respond to call buttons on upper stories or in the elevator car).

Phase II safety features allow firefighters to override the Phase I recall and lockout. Firefighters can operate the elevator via a keyed switch inside the elevator car. Most high-rise firefighting practices encourage firefighters to use the elevator to get within one or two stories of the story of origin. From there, firefighters will take the stairs to the story of origin.

Taller buildings will typically have fire department standpipes in the stairwells. Firefighters will use the stair enclosure as the staging area from which to fight the fire. They will then connect firefighting hoses to the standpipe system outlets and perform manual firefighting activities.

One of the life safety concerns is that opening the stairway door on the story of origin for firefighting purposes or having firefighting hoses through the open stairway door potentially contaminates the stair enclosure and can pose a risk to occupants in the stairway. The presence of "scissor stairs" (discussed later in the section on egress) exacerbates this issue.

Fire Protection Systems and Equipment
The building contained an automatic fire alarm system with automatic smoke detection through the corridor egress system. The fire alarm system appeared to incorporate typical "high-rise" provisions where initiation of detection devices activated notification appliances on the story of origin and the stories immediately above and below the story of origin.

Notification appliances consisted of visual and audible appliances installed in common spaces and the egress corridors. It appears that manual pull stations had originally been located near the doors to the exit stair enclosure on each story, but were removed at some point. The 2015 Minnesota State Fire Code (MSFC) was the fire code in effect at the time of the fire. The 2015 MSFC Section 1103.7.5 requires a fire alarm system in existing apartment buildings. The system is required to have automatic detection in hazardous areas, such as boiler and furnace rooms, laundry areas, mechanical and electrical rooms, storage rooms, and similar areas. It also requires automatic smoke detection in all common areas and interior corridors serving as the means of egress. The 2015 MSFC did not require manual fire alarm pull stations throughout existing apartment buildings, although a means of manual fire alarm system activation is required at the fire alarm control panel (FACP).

Automatic smoke detection was present in the common corridor areas on examined stories. Smoke detectors were located at the corners of the corridors, and an additional smoke detector was located adjacent to the elevators on each story.

Single station smoke alarms were present in each apartment. These devices were not connected to the fire alarm system. The MSFC does not require interconnection of apartment unit smoke alarms with the fire alarm system.

The fire alarm system was replaced or upgraded in the summer of 2019 (a few months prior to the fire). It appeared that the fire alarm system met the requirements of the MSFC and, based on witness statements and the fire alarm system log, functioned as intended during this fire.

There was partial fire sprinkler protection in the building, but that is limited to the below-grade (basement) area and some common spaces on the first floor.

There was a Class I (fire department use) standpipe system in the stair enclosure. The standpipe connection is only accessible from the southwestern side of the stair enclosure (see section on the stair enclosure in the means of egress section). There was also a Class II (occupant-use) standpipe hose station on the 14th story located in the southwestern corridor. Two portable fire extinguishers were located in recessed cabinets near the stairway doors on the 14th story (one in the standpipe hose cabinet). This arrangement was seen on other stories and presumed to be present on all stories.

The standpipe and sprinkler systems were supplied with municipal water. The municipal water supply entered the building in a basement mechanical room and connects to a 500 gallon-per-minute fire pump (Peerless Model 3ABF-9). The fire pump feeds the standpipe system but not the sprinkler system. Municipal water pressure (static pressure) into the building appeared to be in the 85-95 psi range based on gauge readings and prior fire pump and sprinkler maintenance records.

A fire department connection (FDC) for the sprinkler and standpipe systems was located on the southwest wall adjacent to the fire pump test header. The FDC provides a means for fire departments to pump water into the sprinkler and standpipe systems to increase pressure to assist in fire suppression efforts.

No high-rise smoke removal system was identified during this post-fire review. A smoke removal system is required for modern high-rise buildings (see 2015 Minnesota Building Code, Section 403.4.7), but was probably not required at the time of construction. It is possible that there was some form of limited stair pressurization system, but its functionality could not be determined.

Figure 3 shows the approximate location of the fire protection features on the 14th story.

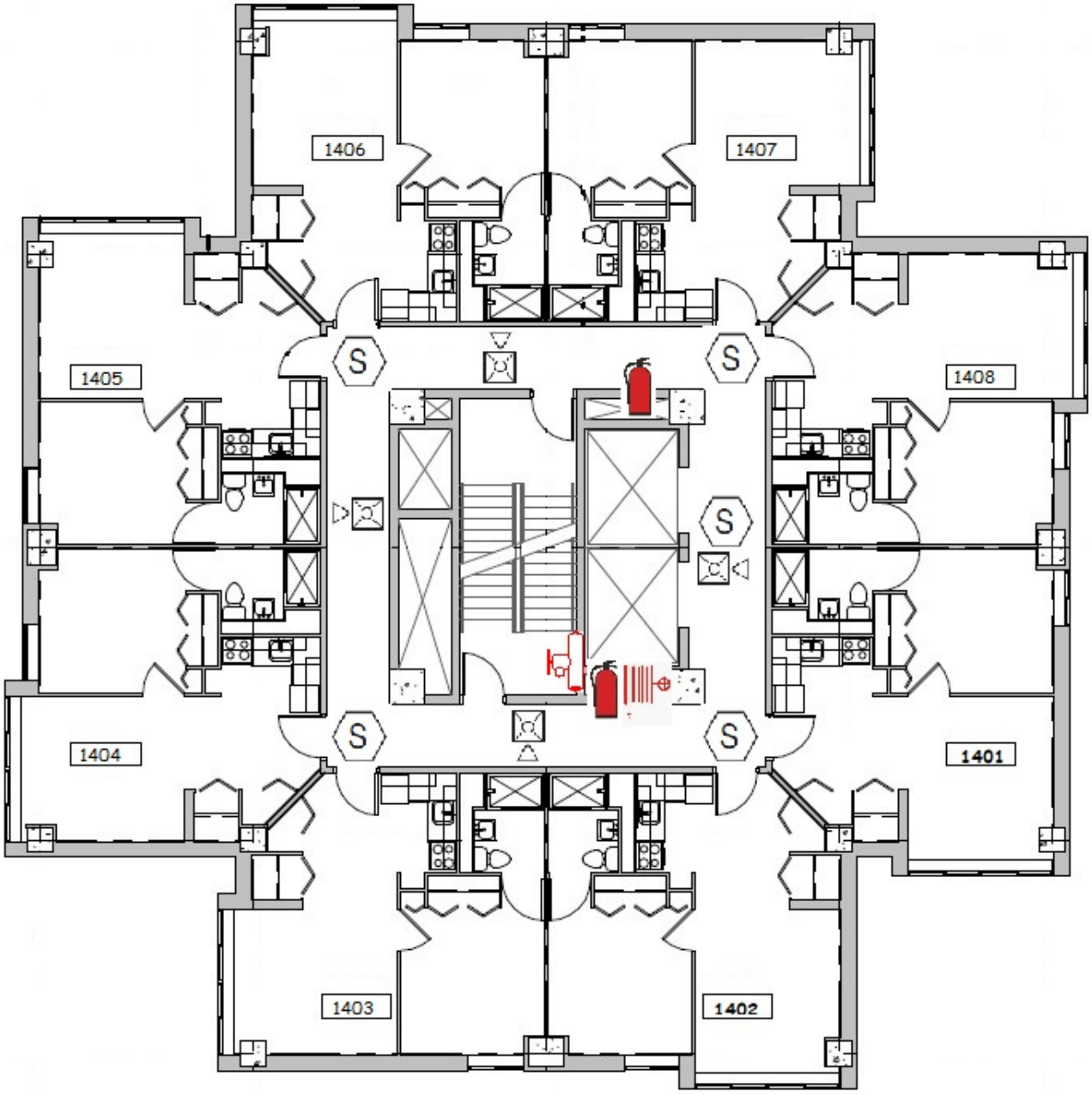


Figure 3: 14th story - Location of fire protection equipment and devices (approximate / not to scale)

Legend:

Fire extinguisher

Standpipe for FD

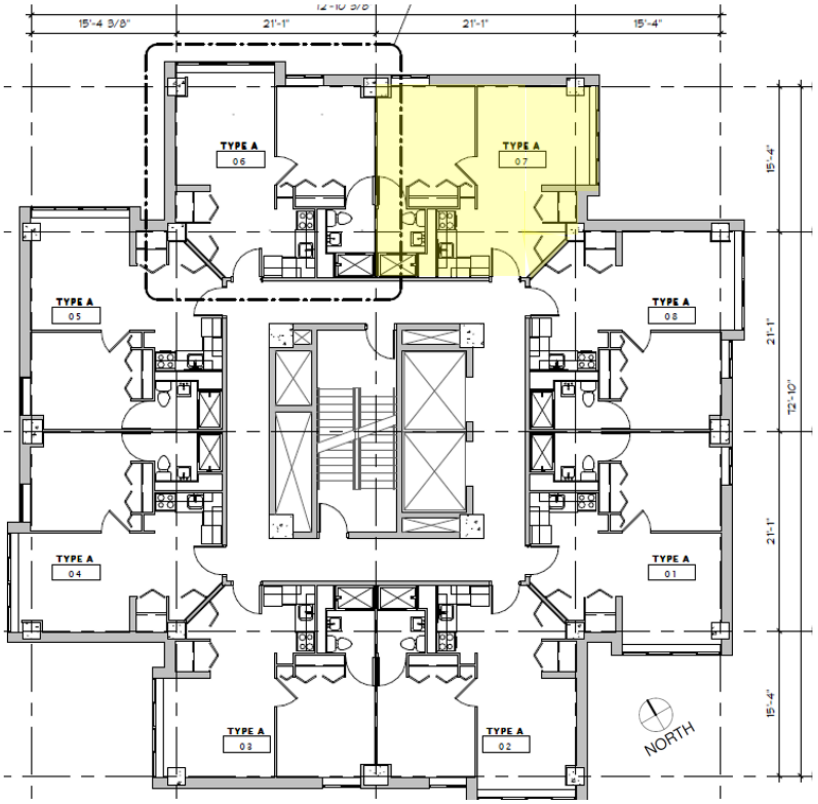
Alarm horn/strobe

Standpipe hose

Smoke Detector

Description of Residential Stories

Stories 2-25 of 630 Cedar Ave. S. contained one-bedroom apartments. Each story had eight apartments around the perimeter of the building core; two on each of the four exterior walls (northeast, southeast, southwest, and northwest). Each apartment was approximately 480 square feet in size and consisted of a kitchen, living area, bedroom and bathroom. Figure 4 shows the layout of the 14th story (story of fire origin).



The fire started in apartment 1407, located near the east corner of the northeast wall (highlighted in yellow in Figure 4). State and local fire investigators determined that the fire's origin was in the bedroom of apartment 1407.

The building core walls were concrete blocks covered with gypsum wallboard. The corridor wrapped around the building core. The other side of the corridor walls was constructed of metal studs covered with gypsum wallboard.

Apartment of Origin

All apartments appeared to be similar in size and shape. Some were mirror images of the others, depending on their location around the building's perimeter. Every fourth story had slightly different configurations than the previous three (the 14th story was one of those). On these stories, the windows were located in slightly different locations due to out-croppings or cantilevered areas on the building's exterior walls. Apartment 1407's configuration was similar to Figure 5. All dimensions are approximate.

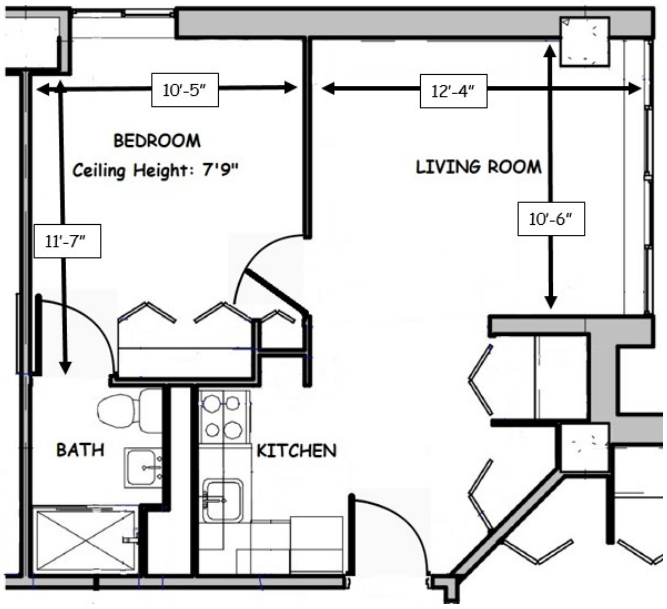


Figure 5: Typical apartment layout (apartment 1407 resembled this)

Description of Building's Egress System

The building was constructed around a "core." This type of configuration is somewhat common in high-rise buildings. The core contains the elevators, egress stairways, and shafts for mechanical and utility equipment that serve each story.

The stairways have doors on each story that open into fire-rated corridors. MSFC 1103.4 requires that interior vertical shafts be enclosed or protected as specified in MSFC Table 1103.4.

One-hour fire-rated protection of vertical openings (such as stairways) is required by the MSFC for non-sprinkler protected buildings three or more stories in height. This includes doors, and the MSFC further requires that doors protecting vertical openings be self-closing or automatic-closing.

The doors separating the stairway and corridor did not appear to have listing tags, but the existing doors were metal-clad and likely provided protection equivalent to one-hour fire-rated doors. The doors were equipped with self-closing devices.

The two stairways were arranged in a "scissor stair" configuration, where both stairways are located within the same enclosure. This was a design practice from decades ago – especially in high-rise buildings – to save space and the cost of building a second enclosure. Unfortunately, this practice was incongruent with the safe egress concept of having two ways out in an emergency. See Figure 6 for an example of a scissor stair.

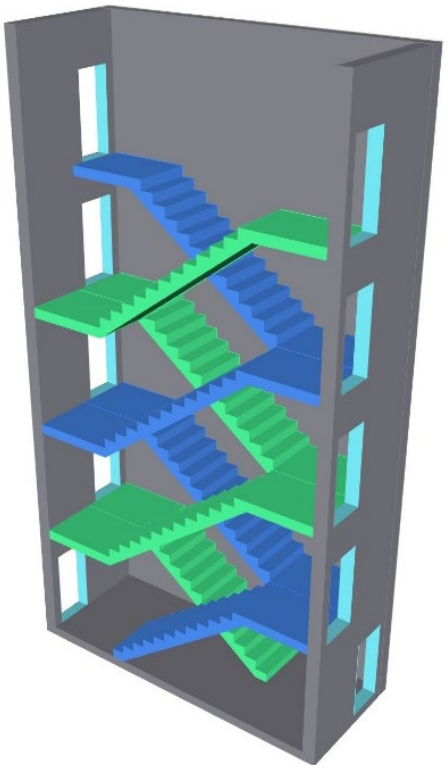


Figure 6: Example of a scissor stair (drawing courtesy of SFMD)

Since both stairways are located within the same enclosure, or "shaft," a single open door can quickly compromise both stairs, which are the only paths of egress from the upper stories of the building. Doors get opened as occupants use the stairway(s) to egress or as firefighting operations take place from within the stair enclosure.

Modern building, fire, and life safety codes have not allowed scissor stairs for new buildings for several years. Since the majority of the heat released in a fire is convective heat, which tends to travel upwards or vertically, the use of scissor stairs is a significant fire and life safety risk to the building's occupants in a multi-story building.

The Fire Protection Handbook[1] is published by the National Fire Protection Association (NFPA). It explains convective heat transfer from a fire in the following manner:

[1] Cote, Arthur; Fire Protection Handbook, 19th Edition; National Fire Protection Association; 2003; page 2-63.

The distinction between radiation and convection can be illustrated by reference to a candle flame. The air that is required for combustion of the fuel vapors is drawn into the flame from the surrounding atmosphere by a process known as entrainment. The hot gases rise vertically upwards as a plume that carries with it most of the heat (70%–90%) released in the combustion process, depending on the fuel. The rest of the heat is lost from the flame by radiation. This can be detected if a hand is held near the side of the flame. The sensation of warmth is caused by radiant heat transfer, that is, radiation. If, instead, the hand is held over the flame, it will sense much more heat.

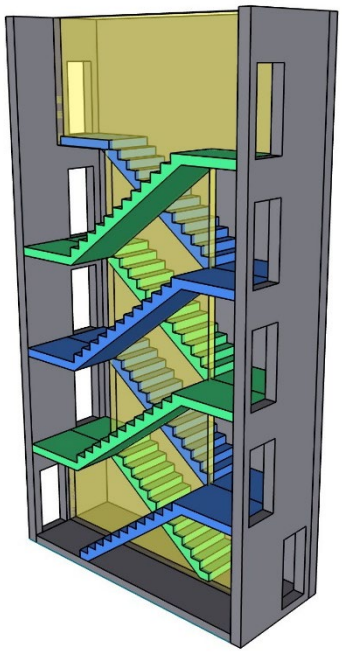


Figure 7: Scissor stairs with fire separation (drawing courtesy of SFMD)

To correct the fire and life safety risks of having scissor stairs and both paths of egress in the same enclosure, a fire separation wall can be constructed to divide the space into separate compartments. Adding this fire separation wall divides the stair enclosure into two separate environments and provides a protected egress path if the other path should become contaminated with smoke or heat. Figure 7 shows one way this could be accomplished. The fire separation wall needs to be one-hour fire-rated in existing buildings (see MSFC 1103.4).

The fire separation wall (shown in yellow) needs to separate the two stairs (shown as blue and green in Figure 7) on each story and completely separate the landings on the lowest and uppermost story to create separate compartments.

Figure 8: Door to apartment 1407

The corridors were approximately 4 feet wide and wrap around the core of the building on all four sides. The corridor spaces were all in the same environment; there were no walls or doors separating the corridor into separate smoke or fire compartments to protect against spread. The interior of the corridor walls measure about 22 feet in length (measurement of the core). The exterior of the corridor walls measure about 30 feet in length.

The elevators opened into the southeast corridor. Doors entered onto the stairway enclosure on the northeast and southwest walls of the building core.

Steel doors with self-closing devices separated the apartments from the corridors. Although no listing tags were found on the doors, they likely would have satisfied the requirements of MSFC Section 1104.17.2.1 for fire-rated doors in existing buildings (20-minute fire-rated, 1-3/4 inch thick solid wood doors, or 1-3/8 inch insulated steel doors are allowed by the MSFC). Figure 8 is a photo of the door separating Apartment 1407 from the corridor.

The heaviest burn pattern on the door is shown in the lighter color moving upward from the latch side of the door to the hinge side of the door. This indicates that the door was in the open position and heat traveled from Apartment 1407 into the corridor. Had the door been closed, the smoke and heat spread from the apartment into the corridor and ultimately into the scissor stair enclosure would have been limited.

Figure 9: Seal under door of adjacent apartment

Although the corridor/apartment separation doors were equipped with self-closing devices, the closing feature was rendered ineffective by the placement of seals at the bottom of the doors that prevented the doors from closing. Although the exact reason for the seals is unknown, it is presumed that they were to prevent infestation spread or to prevent loss of heat from the individual apartment (see Figure 9). Other apartment doors on the 14th story were examined; the door bottom seal created friction against rugs or carpeting and prevented the door from closing.

Figure 10 shows the damage to the corridor on the 14th story. Figure 11 shows a typical corridor from another story.

Figure 11: Typical corridor

Figure 10: 14th story corridor (looking west from Apartment 1407)

Weather Conditions

The following weather conditions were reported by Weather Underground (wunderground.com) for Fort Snelling / MSP Airport (within eight miles of 630 Cedar Ave. S.) at 3:53 a.m. (approximate time of the incident):

- Temperature: 30 F
- Dew point: 28 F
- Humidity: 92%
- Wind direction (from): N
- Wind speed: 22 mph
- Wind gusts: 32 mph
- Conditions: Light snow / windy

Figure 12: Exterior view from east side

Weather conditions were snowy; the close temperature and dew point readings formed low-level fog conditions. Responding firefighters reported that they could not see above the first few stories of the building while standing on the ground.

Apartment 1407 was located on the northeast side of the building. At some point in the incident, the windows in the bedroom of Apartment 1407 failed (likely due to the heat of the fire) and the strong winds from the north created a "wind-driven fire." This wind-driven fire, together with the apartment-to-corridor door being unable to close, contributed to the spread of fire throughout the 14th story. The living room windows were ventilated during fire department suppression activities.

Figure 12 is a view of the building from the east side showing the missing windows from the bedroom and living room of Apartment 1407.

Statements of Responding Fire Officers

DSFM Tom Jenson interviewed the two first-in fire officers on Dec. 18, 2019:

- MFD Captain Scott Bosell (assigned to Ladder 3 on the day of the fire).
- MFD Captain Paul Nemes (assigned to Engine 7 on the day of the fire).

Captains Bosell and Nemes were both assigned to Fire Station 7 (approximately 1 mile south of 630 Cedar Ave. S.). They provided the following information:

- Station 7 (Engine 7, Ladder 3) and Battalion Chief 3 were part of the initial assignment of a fire alarm at this address and first to arrive.
- There were no indications of a fire upon arrival and no additional calls from the building.
- A snowstorm with strong winds obstructed view of the building above the sixth floor.
- Both captains commented on a smell of smoke like a car fire or burning rubber tires from a vehicle stuck in the snow probably off in the distance.
- Crews proceeded to the lobby and the fire alarm panel indicated smoke detector activation on the 14th floor.
- The crew of four took the elevator to 12th floor (per standard operating procedures). The crew consisted of:
    - Captain Nemes – Engine 7 (E7).
    - Firefighter Peltier – E7.
    - Captain Bosell – Ladder 3 (L3).

    - Firefighter Hansen – L3.
- Nemes took the high-rise hose bundle from Peltier and Peltier became the elevator car operator.
- Nemes, Bosell, and Hansen walked up to the 14th story; leaving the high-rise hose bundle on the 13th story landing.
- Nemes could observe that the top of the door inside the stairway at the 14th story was smoke-stained and that paint was missing from the upper part of the door and door jamb.
- Once at the landing on the 14th story, Nemes stated that the door was hot and, when they cracked open the door, the crew observed black turbulent smoke from the top to the bottom of the corridor.
- Bosell and Hansen put on self-contained breathing apparatus (SCBA) masks and prepared to initiate a search while Nemes requested a second alarm assignment.
- Nemes connected the high-rise hose bundle to the standpipe connection on the landing of the 13th story and advanced the hose up to the 14th story.
- Bosell and Hansen came back into the stairwell with a victim and took him down to the elevator car where FF Peltier took down to the lobby (where Hennepin County EMS had responded to).
- Nemes stretched the hoseline from the standpipe connection to the 14th story door.
- Nemes started applying water to the fire in an attempt to cool it down; as he was doing this, Bosell and Hansen returned to assist with firefighting efforts but were forced back into the stairway due to the high heat conditions.
- Bosell and Nemes developed a plan as Bosell thought the fire was to the left of the stairway.
- Bosell and Nemes proceeded into the corridor to the left, instructing Hansen to stay at the door to feed hose and turn on her flashing strobe light.
- Captain Nemes then felt the fire had to be in the other direction.
- A second firefighting attack was made with the assistance of crews from Engine 5 and Ladder 11 and the fire was knocked down.
- Nemes and Bosell went down to rehab to change out SCBA air tanks.
- Both captains have been together for 14 years at this station.
- Nemes reported never experiencing these conditions before in an apartment fire.
- Both captains speculated with the apartment door stuck open, windows breached by the fire and strong winds out of the north produced a wind-driven fire forcing flames and heat into corridor.

Fire Alarm System Event Log

Modern fire alarm systems create an event log showing a recent history of the devices connected to the system. The following is the data from the event log. It should be noted that the time stamps appear to be incorrect. The incident was reported to the fire department dispatch center at 3:56 a.m. while the first fire alarm time stamp was at 4:02 a.m. Notwithstanding this time discrepancy, the event log provides some insight into the fire's spread throughout the building.

Time:	Elapsed Time (mm:ss):	Device:	Location:	Comment:
04:02:28	00:00	Smoke detector (photo)	By Apartment 1407	First indication of fire
04:02:28	00:00	Smoke detector (photo)	14th story elevator lobby	Located close to other smoke detector

04:02:31	00:03	Audible & visual notification activated	13th, 14th, & 15th stories	Typical high-rise fire alarm sequence (story of origin, story above, and story below)
04:02:34	00:06	Smoke detector (photo)	By Apartment 1401	Smoke spread throughout corridor
04:02:34	00:06	Smoke detector (photo)	By Apartment 1405	
04:02:58	00:30	Smoke detector (photo)	By Apartment 1403	
04:03:45	01:17	Smoke detector (photo)	15th story elevator lobby	Vertical smoke spread through elevator shaft
04:03:45	01:17	Audible & visual notification activated	16th story	High-rise sequence – additional story activated
04:04:15	01:47	Smoke detector (photo)	17th story elevator lobby	
04:04:15	01:47	Audible & visual notification activated	17th & 18th stories	High-rise sequence – additional stories activated
04:04:32	02:04	Smoke detector (photo)	20th story elevator lobby	Likely vertical smoke spread through elevator shaft or stairway
04:04:32	02:04	Audible & visual notification activated	19th, 20th & 21st stories	High-rise sequence – additional stories activated
04:04:38	02:10	Smoke detector (photo)	22nd & 23rd story elevator lobbies	Likely vertical smoke spread through elevator shaft or stairway
04:04:39	02:11	Audible & visual notification activated	22nd, 23rd, & 24th stories	High-rise sequence – additional stories activated
04:04:44	02:16	Smoke detector (photo)	21st story elevator lobby	Likely vertical smoke spread through elevator shaft or stairway
04:04:50	02:22	Smoke detector (photo)	By Apartment 2401	Likely vertical smoke spread through stairway
04:04:56 to 04:12:15	02:28	Smoke detector (photo)	Numerous stories and locations	All locations were above 14th story indicating vertical heat and smoke spread
04:06:25	03:57	Fire department elevator capture		Corresponds to time of fire department arrival on scene (3 minutes)

Victim Information

Five people died in this fire, and there were additional injuries to residents and firefighters. The MFD incident report indicates that four victims were on the 14th story (two victims were in the corridor and two victims in their apartments) and one additional victim was found in the stairwell on the 17th story. The five deceased victims were reported to be found in the following locations:

- Victim No. 1 – resident of Apartment 1407 – found in corridor at the entry of Apartment 1407.
- Victim No. 2 – resident of Apartment 1403 – found in bedroom of Apartment 1403.
- Victim No. 3 – resident of Apartment 1406 – found in corridor of 14th story.
- Victim No. 4 – resident of Apartment 1408 – found in living room of Apartment 1408.
- Victim No. 5 – resident of Apartment 2407 – found in stairwell of 17th story.

All of the victims had high levels of carbon monoxide (CO) in their blood.

Victim No. 1 was found near the door inside Apartment 1407. The fire extinguisher from the cabinet in the corridor across from Apartment 1407 had been removed and was found on the floor near the victim with the pin removed. The seal holding the safety pin in the extinguisher was no longer there, and the hose had been moved from the holder on the fire extinguisher. It appears that Victim No. 1 removed the fire extinguisher and was attempting to fight the fire when he was overcome.

Building Performance in the Fire

This section explores how the building performed in response to the products of combustion. Fires generally produce the four following products of combustion:

- Flames (visible, luminous component of fire).
- Heat.
- Smoke.
- Toxic fire gases (such as CO, hydrogen cyanide, and sulfur dioxide); these gases are often contained in the smoke given off in a fire.

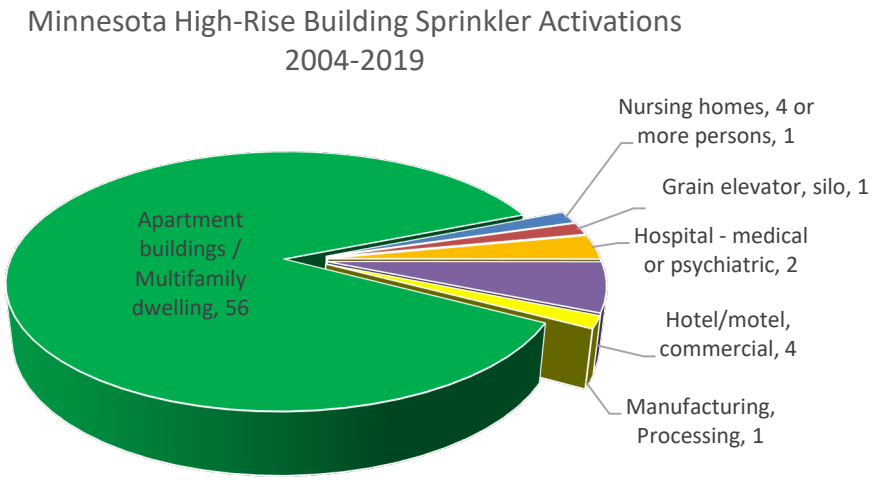
The following observations were made during the site visits to the building. The building, in general, performed fairly well in response to the flames and heat. Had it not been for the impediment to the corridor/room door closer, the fire would likely have been contained to the apartment of origin. The impeded door closer allowed the products of combustion to leave the apartment and compromise the egress corridor and, subsequently, the single stair enclosure and elevator shaft.

The story of origin experienced significant heat and smoke damage; four of the fire's victims were found on this story. Within the first few moments of the fire, conditions were likely untenable. The 14th story corridor system was exposed to extreme heat and smoke conditions once the fire left the apartment of origin. Building occupants on the 14th story trying to use the stairway doors to exit that story would likely have had little time to do so.

Overall, the building behaved poorly in terms of smoke and toxic fire gas spread. The building's upper stories experienced smoke and toxic fire gas spread. This claim is based on numerous smoke detector activations, firefighter observations, witness statements, and the presence of one of the fire victims on an upper story.

Lessons Learned and Recommendations

High-rise fires are difficult and labor intensive from a manual firefighting perspective. They also pose unique life safety risks to building occupants. Fire sprinkler systems significantly reduce the fire and life safety risks in high-rise buildings. From 2004 to 2019, there have been 65 documented fire sprinkler saves in Minnesota high-rise buildings. Most of these high-rise sprinkler activations (56 of 65) have been in apartment buildings.



In the vast majority of the high-rise fire sprinkler activations (63 of 65 fires), the fire was controlled with one or two sprinklers. That would likely have been the case for this fire also.

It is the SFMD's position that all high-rise buildings should be protected with fire sprinkler systems. Had this building been protected with fire sprinklers, it is the opinion of the SFMD that no loss of life would have occurred.

The presence of scissor stairs in non-sprinkler-protected buildings is a significant life safety threat. The practice of building scissor stairs should be discontinued. Scissor stairs should be fire-separated into independent stair enclosures to provide distinct egress paths for occupants and to be congruent with the egress concept of having two separate ways out of a building in a fire emergency. If it is not feasible or possible to fire-separate the stair enclosures, the building should be sprinkler-protected throughout.

The practice of placing objects under the apartment fire doors that prevent the automatic closing features of the door or the practice of propping doors open should be discontinued immediately. These practices have not been allowed by the MSFC for decades. Had the door between the corridor and apartment been able to close, it is the SFMD's opinion that the fire would have been contained to the apartment of origin and the loss of life would have been reduced and possibly only involved the occupant of that apartment.

The SFMD encourages owners of residential buildings to:

- Discontinue the practice of propping fire doors open or placing objects in the path of the door that prevent it from closing in a fire. Not only are these practices violations of the MSFC, they pose life safety risks to occupants using the corridor, which is the only means of egress from the building.
- Install fire sprinklers throughout the building if existing doors to resident rooms from corridors must be held open or prevented from closing.
- Provide fire separations for existing scissor stairs to form independent stair enclosures to provide at least two distinct paths of egress.

- Install fire sprinklers throughout the building if scissor stairs cannot be fire-separated.

Report Preparation

The following State Fire Marshal Division (SFMD) staff participated in the site visits at 630 Cedar Ave. S., interviews with responding firefighters, review of fire protection systems or equipment, and the preparation of this report:

- DSFM Thomas Jenson has been the SFMD's code specialist since June of 2013. Tom joined Edina Fire Department in 1981, was a fire investigator starting in 1999, and the Edina fire marshal from 2000 until his retirement from Edina in August of 2012. He has been involved with development of the MSFC since 2003, including the adoption of the 2003, 2007, 2015 and 2020 editions. This is the second multiple-fatality fire for which he has provided fire code review for the SFMD.
- DSFM Jacob Lindquist has been with the SFMD since 2017 and is the code and training specialist. Prior to coming to work for the SFMD, Jacob spent several years working in the fire alarm, fire extinguisher, and fixed fire-extinguishing industries.
- DSFM Ralph Peterson works in the division's fire protection section. Prior to his employment with the division in 1998, Ralph spent over 20 years working for various fire protection contractors designing, installing and servicing fire sprinkler systems, fire pumps, and fire standpipe systems.
- Jon Nisja is a fire safety supervisor for the SFMD, overseeing the division's fire loss data, fire protection, and training sections. He began his fire service career in 1978 and has been working in the areas of fire prevention and fire investigation since 1983. In addition to working for the SFMD, he has served as fire marshal for two communities and as the president of the Fire Marshals Association of Minnesota from 1997 to 2003. He is also a past president of the International Fire Marshals Association (2006-2008).

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445 Minnesota Street; Suite 145
St. Paul, MN 55101-5145

Property name: Cedar Ave. High-Rise Fire Occupancy type: Apartment - Residential - Group R-2

Property address: 630 Cedar Avenue S. City: Minneapolis, MN Zip: 55454

Incident Date: 11/27/2019 Contact name: Minneapolis Public Housing

Building status at time of incident?: In use and occupied If other, please explain:

Contact telephone: ( ) Contact E-Mail:

Inspection History:

Previously inspected by State Fire Marshal Division staff?: ☐Yes ☒No If yes, date?:

Inspection file # (if known): Were fire safety violations cited?: ☐Yes ☐No

Violations corrected prior to fire?: ☐Yes ☐No Did violations contribute to fire?: ☐Yes ☐No

Explain:

Investigation Information:

Was incident investigated?: ☒Yes ☐No If yes, by whom: State and local fire investigators

Origin/Cause identified?: ☒Yes ☐No If yes, describe: Apt. 1407 - multiple possible causes identified

Areas/Rooms burned: Apartment 1407

Areas/Rooms damaged by smoke: 14th story (heavy smoke damage); migrated to several stories

Areas/Rooms damaged by water: Mostly limited to 14th story

Description of Construction:

Construction classification of structure: Type IA - Fire Resistive Noncombustible

Ratings for area/room of origin: Walls: 2 hour Ceilings: 2 hour Floors: 2 hour Corridors: 1 hour Doors: 20 minute

Were any of the above features breached?: ☒Yes ☐No If yes, describe: see narrative

Were pipe, duct, & similar penetrations sealed? ☐Yes ☒No Penetrations breached?: ☐Yes ☒No

Has required fire resistive construction been restored following the fire / incident?: ☐Yes ☒No

Fire Protection System Operation:

Sprinkler protection: Partial Date of last inspection?: # of sprinklers activated?: None

Sprinkler operation: Other If other, please explain: No sprinklers in area of origin

Has sprinkler system been restored to full function?: ☒Yes ☐No

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Fire alarm protection: Complete Date of last inspection?:

Initiating devices activated?: ☐ Manual pull station ☒ Smoke detection ☐ Heat detection ☐ Water flow ☐ Flame detection ☐ Other – describe:

List specific detectors that were activated: See narrative

Has fire alarm system been restored to full function?: ☒Yes ☐No

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Smoke alarm protection: Single station, battery-powered (9 volt) If other, please explain:

Did smoke alarms activate?: ☐Yes ☐No If no, please explain: Unknown

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HVAC / duct system involved?: ☐Yes ☒No Duct detection: None If other, please explain:

HVAC / duct fans shut-down?: ☐Yes ☒No If no, please explain:

Smoke control system operation?: None present If other, please explain:

Egress Features:

Did egress systems (doors, corridors, stairs, windows, etc.) assist people in evacuating?: ☐Yes ☒No If no, please explain: Corridor and stairways contaminated with smoke and heat

Describe any egress issues that hindered evacuation (obstructions, locks, improper design, etc.): Single stair enclosure

What building features assisted in occupant egress?:

Has egress system been restored to allow re-occupancy?: ☒Yes ☐No If no, please explain:

Staff / Occupant Actions:

Did staff call 911?: ☐Yes ☒No Did staff activate fire alarm system?: ☐Yes ☒No

Did staff assist in occupant evacuation (guests, students, residents, tenants)?: ☐Yes ☒No

Did staff attempt extinguishment?: ☐Yes ☒No Was it successful?: ☐Yes ☐No

Was there any delay in notifying occupants or fire department?: ☐Yes ☒No If yes, explain:

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Did occupants call 911?: ☐Yes ☒No Did occupants activate fire alarm system?: ☐Yes ☒No

Did occupants assist other occupants with evacuation (guests, students, residents, tenants)?: ☒Yes ☐No

Did occupants attempt extinguishment?: ☒Yes ☐No Was it successful?: ☐Yes ☒No

Was there any delay in notifying occupants or fire department?: ☐Yes ☒No If yes, explain:

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Any occupants or staff injured?: ☒Yes ☐No If yes, explain: 5 deaths and multiple injuries

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Other Information:

Factors contributing to fire spread (open doors, storage, vertical openings, penetrations, unrated construction, interior finish, etc.)?: Corridor / room door closer impeded and allowed flames to exit room of origin

Building protection features inhibited fire spread (construction, fire-rated separations, fire protection systems, etc.)?: Fire-resistive contruction held fire to story of origin

Factors contributing to smoke spread (open doors, storage, vertical openings, penetrations, unrated construction, interior finish, etc.)?: Stairway doors opened for occupant evacuation, vertical openings (stair enclosure and elevator shaft), single exit stair enclosure

Building protection features inhibited smoke spread (construction, fire-rated separations, fire protection systems, etc.)?: n/a

Describe any fire code or fire safety violations or deficiencies identified?: Single exit stair enclosure, under-door seals that prevented corridor doors from closing

Additional lessons learned?: see narrative

Comments: see attached report