A tragic fire at the University of North Carolina killed five students.

A number of significant factors contributed to the deaths, including a lack of sprinklers, open central stairwells and a lack of an alarm system.
On Sunday, May 12, 1996, an accidental fire occurred at the Phi Gamma Delta fraternity house at the University of North Carolina. Five occupants were killed and three others were injured. The fire and smoke caused heavy damage throughout the building. The fire damage to the building and its contents was estimated at $475,000.

The 70-year-old, three-story-plus-basement fraternity house was designed to be a fraternity house. It had masonry exterior walls and wood frame interior structural components. Nineteen of the building’s bedrooms were located on the second and third floors. The first floor had several rooms and the president’s suite, and the basement had an open area that contained a bar area, sitting area, and dining room. In addition, a chapter room, a kitchen, mechanical rooms, rest rooms and several storage rooms were in the basement. The basement’s open area and chapter room as well as a small reading room on the first floor had combustible interior finishes. All other rooms in the building had noncombustible interior finishes. An open stairway in the center of the building connected the basement with the floors above.

Single-station, battery powered smoke detectors were installed near the central stairway in the basement and in the corridors on the second and third floors. Portable fire extinguishers were provided throughout the building. Doors to the sleeping rooms were solid, consisting of wood-based composite material. These doors did not have self-closing devices.

On the night of Saturday May 11, 1996, approximately 250-300 people were attending a large graduation party in the backyard of the Phi Gamma Delta fraternity house. The party was moved into the basement of the house when the rain started to fall. Most of the tables in the basement dining rooms and all of the couches in the basement sitting area were placed outside to provide more space for the party attendees.

Most of the parents in attendance left the party between 10:00 p.m. – 10:30 p.m. The band left at about 1:00 a.m., and a disk jockey continued to play music until about 5:00 a.m. Reportedly he broke down his equipment and left sometime between 5:45 a.m. and 6:00 a.m. He did not note anything unusual before he left.

One of the Phi Gamma members and a companion, who were sleeping in Room 206, were awakened by the sound of an operating smoke detector. The member left the room to investigate. He went down the central stairwell, but before getting to the first floor, he saw smoke and fire on the first floor. He went back to Room 206 and told his companion about the fire. The fraternity member left the room again, went to the window leading to the west end fire escape ladder, and opened the window. When his companion did not join him at the window, he attempted to return to Room 206, but was unable to do so because the floor in the corridor had become hot by that time, and the heat coming up the central stairway prevented him from reaching his companion. He was forced to leave the building by using the west end fire escape ladder. The companion did not escape.

Another Phi Gamma member was sleeping with a companion in a third floor bedroom at the front of the building. The member was awakened by an unspecified means, and he left his room. Once in the third-floor corridor, he saw fire coming up the central stairway. He and his companion exited out the bedroom window and attempted to move along the roof’s edge. Both fell or jumped off, landing in the front yard.

Shortly after 6:00 a.m. on Sunday, May 12, 1996, a member of the Delta Kappa Epsilon fraternity located on the east side of the Phi Gamma Delta house awoke to noise, screams and yelling coming from the Phi Gamma Delta house. He looked out his window and saw flames coming from the first floor windows of the house. He called 911, reached the PSAP for Chapel Hill at
6:06 a.m., and reported a large fire at the Phi Gamma Delta house. This individual was the first person to report the fire. Seconds later, the PSAP operator received a call from employees at the Carolina Inn, which was across the street from the fire building, and they too reported a serious fire at the Phi Gamma Delta house. They also reported that people may have been trapped inside. These were the first of many back-to-back calls made reporting the fire.

Local and state fire investigators determined that smoking materials most likely ignited combustible materials underneath an alcohol bar in the basement. The fire then spread to the combustible interior finishes and the furnishings in the basements open area and chapter room. Fire and unburned products of combustion spread up the interior stairway and ignited fires on all levels above the basement.

The total number of occupants in the building before the fire was not determined. Five occupants died during this fire. Four of these victims were found in bedrooms, and one victim was found in the doorway to the bedroom in which she was sleeping. Three occupants were also injured while they evacuated the building.

Based on its investigation of this fire, the NFPA has determined that the following factors significantly contributed to the loss of life:

- The presence of combustible interior finish materials.
- The presence of an open stairway.
- The lack of fire-rated construction separating the assembly areas from the residential areas of the building.
- The lack of automatic fire detection and fire alarm systems throughout the building.
- The lack of automatic sprinkler protection.
- The improper use or disposal of smoking materials.

In the wake of the tragedy in Chapel Hill, the Town Council voted unanimously to work toward a plan that would require sprinklers in fraternity and sorority houses. On June 19, 1996, the state legislature granted the town authorization to enact a retroactive sprinkler law, requiring fraternity and sorority houses in Chapel Hill to comply within five years. The Chapel Hill Fire Department is working with the fraternity and sorority community on retrofit plans. As of April 2000, 17 of Chapel Hill’s 36 fraternity and sorority houses have been retrofitted with sprinkler protection. The vast majority of the remaining chapters have plans underway to complete the installation of sprinkler protection.

There is no question in the mind of the Chapel Hill fire chief that sprinklers would have made a difference in the Phi Gamma Delta fire. The fire would have been confined to the basement, and the sprinkler’s alarm system would have notified the occupants and the fire department had the sprinkler system been connected to a building fire alarm system and had a provision for automatic fire department notification been installed.

On June 8, 1996, less than a month after the fire at Phi Gamma Delta, another blaze struck the Chapel Hill fraternity Sigma Chi. The Chapel Hill fire chief said there was no connection between the two fires. The second was an arson fire with no fatalities. Recent renovation that included noncombustible interior finish, smoke and fire doors on stairways, a full alarm system, fire escape stairs and an escape plan contributed to a much different outcome.

Based on his experience on May 12, 1996, the Chapel Hill fire chief hopes that other fire professionals, university officials, national fraternal organizations and college communities will pursue sprinkler ordinances before the next fraternity fire results in another tragedy.
Fire Investigation Summary

Fraternity House Fire

Chapel Hill, NC
May 12, 1996

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FIRE INVESTIGATION
REPORT

Fraternity House Fire
Chapel Hill, North Carolina
May 12, 1996

Prepared by
Michael S. Isner
Senior Fire Investigator
National Fire Protection Association
ABSTRACT

On Sunday, May 12, 1996, an accidental fire occurred at the Phi Gamma Delta fraternity house at the University of North Carolina. Five occupants were killed and three others were injured. The fire and smoke caused heavy damage throughout the building. The fire damage to the building and its contents was estimated at $475,000.

The 70-year-old, three-story-plus-basement fraternity house was designed to be a fraternity house. It had masonry exterior walls and wood frame interior structural components. Nineteen of the building’s bedrooms were located on the second and third floors. The first floor had several rooms and the president’s suite, and the basement had an open area that contained a bar area, sitting area, and dining room. In addition, a chapter room, a kitchen, mechanical rooms, rest rooms and several storage rooms were in the basement. The basement’s open area and chapter room as well as a small reading room on the first floor had combustible interior finishes. All other rooms in the building had noncombustible interior finishes. An open stairway in the center of the building connected the basement with all three floors above.

Single-station, battery-powered smoke detectors were installed near the central stairway in the basement and in the corridors on the second and third floors. Portable fire extinguishers were provided throughout the building. Doors to the sleeping rooms were solid, consisting of wood-based composite material. These doors did not have self-closing devices.

Local and state fire investigators determined that smoking materials most likely ignited combustible materials underneath an alcohol bar in the basement. The fire then spread to the combustible interior finishes and the furnishings in the basement’s open area and chapter room. Fire and unburned products of combustion spread up the interior stairway and ignited fires on all levels above the basement.

The total number of occupants in the building before the fire was not determined. Five occupants died during this fire. Four of these victims were found in bedrooms, and one victim was found in the doorway to the bedroom in which she had been sleeping. Three occupants were also injured while they evacuated the building.

Based upon its investigation of this fire, the NFPA has determined that the following factors significantly contributed to the loss of life:

- The presence of combustible interior finish materials.
- The presence of an open central stairway.
- The lack of fire-rated construction separating the assembly areas from the residential areas of the building.
- The lack of building-wide fire detection and fire alarm systems.
- The lack of automatic sprinkler protection.
- The improper use or disposal of smoking materials.
I. Introduction

The National Fire Protection Association (NFPA) investigated the Chapel Hill Fraternity House fire in order to document and analyze significant factors that resulted in the loss of life and property.

The investigation was conducted by the NFPA as part of its ongoing program to investigate technically significant incidents. The NFPA’s Fire Investigations Department documents and analyzes incident details so that it may report lessons learned for life safety and property loss prevention purposes.

The NFPA became aware of the fire on the day it occurred, and Michael S. Isner, Senior Fire Investigator in the NFPA Fire Investigations Department, traveled to Chapel Hill, North Carolina to perform an on-site study of this incident. That three-day, on-site study and subsequent analysis of the data gathered were the basis for this report. Entry to the fire scene and data collection activities were made possible through the cooperation of the Chapel Hill Fire Department and the Phi Gamma Delta fraternity.

This report is another of the NFPA’s studies of fires having particular important educational or technical interest. All information and details regarding fire safety conditions are based on the best available data and observations made during the on-site data collection phase and on any additional information provided during the report development process. It is not the NFPA’s intention that this report pass judgment on, or fix liability for, the loss of life or property resulting from this fraternity house fire. Rather, the NFPA intends that its report present the findings of the NFPA data collection and analysis effort and highlight factors that contributed to the loss of life or property.

Current codes and standards were used as criteria for this analysis so that conditions at the Chapel Hill fraternity house on the day of the fire could be compared with state-of-the-art fire protection practices. It is recognized, however, that these codes and standards may not have been in effect during construction or operation of this fraternity house. The NFPA has not analyzed the facility regarding its compliance with the codes and standards that were in existence when it was built or during its operation.

The cooperation and assistance of the Chapel Hill Fire Department, North Carolina Bureau of Investigation, Phi Gamma Delta and University of North Carolina Campus Police is greatly appreciated.
II. BACKGROUND

Occupancy Classification

The Phi Gamma Delta fraternity house in Chapel Hill had dormitory spaces on the top two occupied floors and spaces that could be used as assembly areas on the first floor and the basement. All four levels were connected by an open, central stairway. Because of the lack of well-defined separations between the dormitory spaces and the first floor assembly area, the building will be classified as a “mixed occupancy,” with part an existing dormitory and part an existing assembly occupancy, per the 1994 edition of NFPA 101®, Life Safety Code®. Such mixed occupancies are required to comply with the most restrictive life safety requirements on the occupancies involved.

A number of NFPA documents were used in evaluating this incident. One of the predominant documents was NFPA 1, Fire Protection Code, 1992 Edition, which provides a linkage between relevant NFPA codes and standards. Chapter 16 of NFPA 1 contains requirements for hotels and dormitories and provides specific references to NFPA 101, Life Safety Code which were used in the code analysis.

Applicable Codes and Enforcement

The fraternity house involved in this fire was not located on University of North Carolina property; therefore, the authority having jurisdiction was the Chapel Hill Fire Department. At the time of the fire, the city of Chapel Hill enforced the 1996 edition of the North Carolina State Building Code, Volume I, “General Construction.” This code was based on the 1994 edition of the Standard Building Code published by the Southern Building Code Congress International (SBCCI). They also enforced the 1996 edition of the North Carolina State Building Code, Volume V, “Fire Prevention Code,” which was based on the 1994 edition of the SBCCI’s Standard Fire Prevention Code.

One fire marshal and one assistant fire marshal were assigned to the Chapel Hill Fire Department’s fire prevention division. The fire marshals were responsible for building inspections throughout the community. The fire department’s standard inspection schedule required that each of the city’s 25 fraternity and 11 sorority off-campus houses be inspected in August or September of each year. During such inspections, a fire marshal visited each house and inspected items such as fire extinguishers, fire detection and alarm equipment, automatic fire suppression equipment (when provided), exits, general housekeeping, maintenance, storage of combustible materials, etc. If violations were noted, town policy required that a fire marshal re-inspect according to a pre-established schedule until the violations were resolved.

The fire department’s standard inspection schedule also required fire companies to perform a second inspection in February of each year. This inspection was usually less rigorous than the inspection performed in August or September. When fire...
companies noted violations, they performed up to two follow up inspections to ensure that the corrections had been made. After the third inspection, the fire companies reported any facility that had not corrected the violations to the fire marshals. The fire marshals would perform scheduled follow-up inspections until the violations were resolved.

A fire marshal performed an inspection of the Phi Gamma Delta house in December 1995. This was actually the inspection that should have been performed in August or September, but due to a high work load, the inspection was delayed until December. During that inspection, a fire marshal noted that fire escape windows needed to be unlocked while the building was occupied, that debris on a fire escape, in a third floor closet, and in hallways needed to be removed, and that the lock on the kitchen door needed to be changed to a thumb-turn type. The fire marshal revisited the fraternity house in the middle of January 1996 and found that some of the violations had not been corrected. Again, he cited the violations on a fire inspection report. The fire marshal returned one week later, his third visit, and he noted that all corrections had been made. According to the Chapel Hill fire marshals, the Phi Gamma Delta house historically had an average number of violations for a fraternity house in their community. They also indicated that this fraternity usually corrected the noted problems in a timely manner.

**The Building**

The building was constructed in 1927. It had an unfinished attic, three occupied stories, and full basement with two exits at the rear and another at the west end. The building was approximately 88 feet (26.8 m) long by 34 feet (10.4 m) wide (see Figure 1).
The attic was used for storage of materials such as metal bed frames. After the fire, the attic space could not be entered, and much of the debris had fallen into the third-floor bedrooms. For this reason, confirmation of the exact amount of materials being stored in the attic was not possible. The debris remaining in the attic suggested that there was, in fact, only a small amount of storage and that much of the material being stored were noncombustible. However, the remnants of at least one mattress were observed in the attic.

The third and second floors (see Figure 2) contained the building’s 19 bedrooms. Each of the bedrooms had at least one bed, an upholstered couch, a desk, and miscellaneous other furnishings.

The first floor (see Figure 3 on next page) had a large parlor, a TV room, a reading room, a front alcove, and a suite for the chapter president. The large parlor extended across the full width of the building and had at least two upholstered couches and an upholstered chair. The TV room also had two upholstered couches and an upholstered chair, as well as a TV/entertainment center. The reading room had an upholstered chair, a small upholstered couch, wood lamp tables, and several “built-in” bookcases filled with books. The president’s suite was sparsely furnished with a bed, an upholstered couch, and other furnishings.

The basement (see Figure 4 on next page) contained a large open area with a built-in bar for serving drinks, a sitting area next to the bar, and a dining room. At the time of the fire, the bar area was being used as a storage area for alcohol in bottles and combustible materials such as paper plates, paper cups, and napkins, rather than as a serving area for alcoholic beverages. The sitting area next to the bar normally contained several couches. However, the couches had been brought outside the night before the fire because additional space was needed for a party. The din-
The living room had several wood tables and many wood chairs, but these also had been brought outside to make more space for the party.

The basement also contained a chapter room, a kitchen, several storage rooms, a rest room, and a mechanical room. The chapter room had built-in upholstered benches along three walls, several wood tables and miscellaneous other furnishings. The storage rooms, which had many combustible materials such as padded chairs, opened onto a corridor that led to the kitchen. The kitchen, rest room, and mechanical room contained minimal amounts of combustible materials.
The building had masonry exterior bearing walls, wood-frame interior walls, and wood-frame floor assemblies. The walls were covered with gypsum wall board and plaster with a combined thickness of 1 inch (25 mm). The basement floor was covered with 12-inch by 12-inch (300 mm by 300 mm) linoleum-type tiles; the first-story, second-story, and third-story floors were covered with 1-inch by 3-inch (25 mm by 75 mm) tongue and groove oak flooring. In some areas, the hardwood floors were covered with carpet. This type of building construction is commonly referred to as “ordinary construction” and most closely resembles Type III (211) construction, according to NFPA 220, Standard on Types of Building Construction. The Arabic numerals in parentheses indicate the fire resistance ratings for various components of the building: The first number indicates the exterior bearing walls have at least a 2-hour fire resistance rating, the second number indicates the interior bearing walls and interior structural elements have at least a 1-hour fire resistance rating, and the third number means that the floor assemblies have at least a 1-hour fire resistance rating.

The basement’s open area and chapter room had combustible interior finishes covering the gypsum wall board and plaster finish. The combustible interior finish was identical in the bar room, sitting area, and dining room. This finish was 1-inch by 8-inch (25 mm by 200 mm) rough sawn, heart pine boards nailed to 1-inch by 4-inch (25 mm by 100 mm) wood furring strips. The pine boards were installed vertically and the furring strips were installed horizontally. The interior finish in the chapter room was nominal 1-inch by 6-inch (25 mm by 150 mm) milled boards that appeared to be a clear pine. Similar to the boards in the basement’s open area, these boards were installed vertically over horizontal nominal 1-inch by 4-inch (25 mm by 100 mm) wood furring strips. The chapter room also had a combustible ceiling assembly constructed of nominal 2-inch by 4-inch (50 mm by 100 mm) joists, nominal 1-inch by 4-inch (25 mm by 100 mm) wood furring strips, and 12-inch by 12-inch (300 mm by 300 mm) combustible ceiling tiles. Based upon charred remnants that were observed, the ceiling tiles appeared to be a composite material made of small, combustible particles.

The only other room in the building that had a combustible interior finish was the small reading room in the southwest corner of the first floor. The wood covering the walls in this room appeared to be similar to that covering the walls in the basement’s open area, i.e., vertical 1-inch by 8-inch (25 mm by 200 mm) rough sawn, heart pine boards nailed to horizontal nominal 1-inch by 4-inch (25 mm by 100 mm) wood furring strips. All other rooms and corridors had painted plaster interior wall finish. However, wood trim was installed in the first floor front alcove, parlor, and TV room, and within the stairway to the second and third floors. The trim, which included ceiling-level corner molding, a chair rail, baseboards, and handrails in the stairways, appeared to cover less than 10 percent of the aggregate wall surface, the limit for trim area cited by Paragraph 6-5.5 of the Life Safety Code.
Fire Protection Systems

According to a report prepared following the fire department’s December 1995 inspection, the building was equipped with six single-station, battery-powered smoke detectors. Following the fire, two smoke detectors were noted. One was heavily damaged and lying in the debris in the corridor outside room 207. The second was mounted to the corridor ceiling outside room 308. Fire department investigators reported that a third smoke detector was mounted to the basement ceiling near the base of the building’s central stairway. No trace of this smoke detector was found due to the extensive fire damage in this area. In addition to the smoke detectors, one single-station heat detector was installed in the mechanical room.

Four portable 3-A:40-B:C dry-chemical fire extinguishers were in the building. An extinguisher was kept in a wall cabinet near the central stairway on each of the second and third floors. A third fire extinguisher was in the kitchen, and the location of the fourth fire extinguisher was not identified. The only other fire suppression equipment in the building was a fixed dry-chemical extinguishing system that protected the cooking equipment in the kitchen.

The sleeping rooms had wooden solid core doors with metal frames. The metal doors frames were retrofitted into the existing wood frames. It was not known when this installation occurred. The doors did not have self-closing devices.

Means of Egress

An open stairway in the center of the building, the only stairway in the structure, connected the basement with all three floors above. This was the primary means of egress for all occupants of the second and third floors. The only access to the attic was by a set of wooden fold-down stairs installed in the ceiling of the third floor corridor. This stair was located approximately 15 feet (4.6 meters) west of the open central stairway.

Metal fire escape ladders were installed at the east and west ends of the building (see Photo 1 on next page). Occupants of both the second and third floors could access the fire escape ladders through windows at both ends of the corridors. Metal platforms were mounted directly outside each access window to help evacuating occupants get on the ladder. The ladder’s bottom rung was approximately 5 feet (1.5 meters) above the ground. Lighted exit signs near each end of the second and third floor corridors marked the locations of the fire escape ladders. No emergency lighting equipment was observed in the facility.

Organizational Fire Protection Programs

Phi Gamma Delta’s national organization had an informal fire safety program that provided guidance to their local chapter houses. As part of this program, the national organization provided each chapter with a risk management manual which contained a fire prevention and fire safety section. They also encouraged each chapter to use local fire departments as a fire safety resource because the fire depart-
The national organization also recommended that each chapter have one in-house fire safety meeting every year. During this meeting, the fire safety features, e.g., fire extinguishers and fire exits, could be pointed out to all members, and other fire safety-related topics could be discussed.

The Chapel Hill Fire Department was aware that individual fraternities and sororities, including the Phi Gamma Delta, would occasionally hold fire evacuation drills. Fire department personnel did not participate in these drills, and they did not keep any records regarding them.

**The Fire Department**

The Chapel Hill Fire Department provides fire protection for both the city of Chapel Hill and the University of North Carolina facilities. This department has 54 career personnel and four fire stations. The 48 personnel in the Operations Division are divided into three 24-hour shifts of 16 with a minimum staffing of 13. Each shift is commanded by an assistant chief. The department’s Fire Prevention Division has two fire marshals, and four personnel are assigned to the department’s Administrative Division. The fire department provides fire suppression, medical first responder treatment, fire code inspections, public fire safety education, and fire investigation services. The department has three primary engine companies each with
a minimum staffing of a fire officer and two fire fighters, one ladder company with a minimum staffing of a fire officer and two fire fighters and two reserve units without assigned personnel. Fire department personnel respond to an average of 3000 calls annually. Approximately 60 percent of these calls are fire related; the remaining 40 percent are medical related.

Advanced life support medical services are provided by Orange County personnel and supplemented by two volunteer rescue squads. Police services for the city are provided by the Chapel Hill Police Department, and police services for the University of North Carolina campus are provided by the University of North Carolina Campus Police Department. Both of these departments assisted the Chapel Hill Fire Department during the Phi Gamma Delta fire. With the exception of the campus police, emergency services dispatching is provided by the Orange County Central Communications Center, an E-911 public safety answering point (PSAP) managed by Orange County.

III. THE FIRE

Occupant Activities and Fire Discovery

On the night of Saturday, May 11, 1996, approximately 250 to 300 people were attending a large graduation party in the backyard of the Phi Gamma Delta fraternity house. The party was moved into the basement of the house when rain started to fall. Most of tables in the basement dining room and all of the couches in the basement sitting area were placed outside to provide more space for the party attendees.

Most of the parents in attendance left the party between 10:00 p.m. and 10:30 p.m. The band left at about 1:00 a.m., and a disc jockey continued to play music until about 5:00 a.m. Reportedly, he broke down his equipment and left sometime between 5:45 a.m. and 6:00 a.m. He did not note anything unusual before he left.

One of the Phi Gamma Delta members and a friend who were sleeping in room 206 were awakened by the sound of an operating smoke detector. The member left the room to investigate and he went down the central stairway. Before getting to the first floor, he saw smoke and fire on the first floor. He went back to room 206 and told his friend about the fire. The fraternity member left the room again, went to the window leading to the west end fire escape ladder and opened that window. When his friend did not join him at the window, he attempted to return to room 206 but was unable to do so. The floor in the corridor had become hot by that time, and the heat coming up the central stairway prevented him from reaching his friend. He was forced to leave building by using the west-end fire escape ladder. The friend did not escape.

Another Phi Gamma Delta member was sleeping with a friend in a third floor bedroom at the front of the building. The member was awaken by an unspecified means,
and he left his room. Once in the third-floor corridor, he saw fire coming up the central stairway. He and his friend exited out the bedroom window and attempted to move along the roof’s edge. Both fell or jumped off, landing in the front yard.

Shortly after 6:00 a.m., a member of the Delta Kappa Epsilon fraternity located on the east side of the Phi Gamma Delta house awoke to noise, screams, and yells coming from the Phi Gamma Delta house. He looked out his window and saw flames coming from the first floor windows. He called 911, reached the PSAP for Chapel Hill at 6:06:33 a.m., and reported a large fire at the Phi Gamma Delta house. This individual was the first person to report the fire. Seconds later, the PSAP operator received a call from employees at the Carolina Inn, which was across the street from the fire building, and they too reported a serious fire at the Phi Gamma Delta house. They also reported that people may have been trapped inside. These were the first of many back-to-back calls made reporting the fire.

**Fire Department Notification and Response**

The PSAP operator started the structure fire dispatch with a pre-alert at 6:06:58 a.m. while still receiving telephone calls. Engine 31 from Station 1, Engine 32 from Station 2, Tower 71 from Station 3, and the on-duty assistant chief were dispatched to this call, bringing 10 fire fighters to the scene. The fire chief and deputy chief of operations, who were off duty, were also dispatched. This is a standard practice for structure fires.

Engine 31, located approximately five blocks away, left the station and checked in as responding at 6:09:22 a.m. The engine officer immediately reported that heavy smoke was visible from Station One. A Chapel Hill police officer arrived on the scene at 6:09:48 a.m. and reported that the structure was fully involved with people possibly inside. At 6:10:25 a.m., Engine 31 arrived on the scene and positioned just east of the front center of the house (see Figure 5 on next page) and reported that he had full involvement on the first floor with reports of persons still on the second floor. The engine officer also reported that they were going to attempt to rescue the people still inside the building.

The occupant who had come down the west fire escape ladder and the two that had fallen or jumped from the roof and were in the front yard near the street when Engine 31 arrived. Bystanders had pulled two of these occupants away from the building and were already taking care of them when the first engine arrived.

While Engine 31’s crew was stretching a 1 3/4-inch (44.5-mm) pre-connected hose line with a variable stream nozzle to the front door to begin fire attack, they were alerted by a male that a female was trapped on the second floor. The crew’s initial action was to begin a fire attack through the front door to gain access to the interior stairway directly in line with the front door (see Photo 2 on page 13). Heavy fire involvement at the stairway and across the entire first floor, with flames pushing out the front door and windows, prevented successful entry at this point.

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1 This section is an excerpt, with editorial changes, of a Chapel Hill Fire Department report regarding the May 12, 1996 fire at the Phi Gamma Delta house. The report was prepared by the Chapel Hill Fire Department’s deputy chief of operations and is being used with fire department’s permission.
Engine 32 arrived on the scene at approximately 6:11 a.m. with three members and laid out a 5-inch (127.0-mm) supply line from Engine 31 to the hydrant at the intersection of West Cameron Avenue and Pittsboro Street approximately 125 feet (38.1 m). Engine 32’s crew then began advancing a second 1 3/4-inch (44.5-mm) pre-connected hose line with a variable stream nozzle from Engine 31 to the east end of the first floor where there was heavy fire and smoke.

The on-duty shift commander, an assistant chief, arrived on scene and made an assessment of conditions. He positioned his vehicle at the intersection near the front of the structure and established command at 6:11:27 a.m. Command immediately directed Tower 71 to set up in front of Engine 31 upon arrival.

The Engine 31 officer went to the west end of the structure where he located an exterior fire escape ladder. He called for a roof ladder to access the bottom ladder section of the fire escape, which was several feet above the ground. He also requested assistance to reposition the pre-connected hose line to the west end. The
officer then went to the rear of the structure to check conditions there, and at 6:13:03 a.m., he reported heavy fire involvement in the basement and the first and second floors.

Recognizing the need for additional resources, Command notified Central Communications to dispatch a second alarm at 6:11:27 a.m. Engine 34 was sent to the scene, and a company from Carrboro Fire Department was moved into the Chapel Hill fire station to provide coverage in the event of another fire somewhere else in the city. At 6:13:50 a.m., Communications was notified to activate an “All Call,” which is a third alarm, to page off-duty Chapel Hill fire fighters to the scene.

At 6:14:14 a.m., the Engine 31 officer advised that his crew would not be able to make entry at the fire escape at the west end of the building and would have to attack the fire from the front. Tower 71 arrived on scene at 6:15:00 a.m. with three personnel and immediately set up. West Cameron Avenue, the street directly in front of the fire building, was the tower-ladder’s only workable access to the structure. The building’s setback on the property and surrounding terrain negated using the tower for anything other than master streams. The acting officer on Engine 32 advised that his crew was attempting entry inside the east end doorway at 6:16:51 a.m. to try to control the fire before it got too heavy on the second floor. Extreme fire conditions at this location with heavy smoke and heat originating from below the crew prevented penetration of more than several feet. Engine 32’s crew added an additional section of hose and repositioned its attack line to the rear of the structure to attack the seat of the fire in the fully involved basement. They were only able to operate a few feet into the basement due to fire and weakening structural con-
ditions. At this point, the first floor on the east end had already burned out and was sagging into the basement.

The Chapel Hill fire chief and deputy chief of operations arrived on scene at 6:18:20 a.m. The chief directed the deputy chief to take command of operations. The fire chief proceeded to the command vehicle where he began to coordinate the command functions with the assistant chief who was the incident commander at that time. The operations chief ordered that a pre-connected 2 1/2-inch (64-mm) hose line with a smooth-bore nozzle be advanced to work with the 1 3/4-inch (44.5-mm) hose line at the front door and windows.

During his size-up, the operations chief saw that conditions were quickly deteriorating and the fire was already in full free burn in several sections of the structure. At the front there was heavy fire involvement on the first floor with fire extending forcefully out the front door and showing at many of the windows on the first and second floors. There were rapidly developing fire conditions with large volumes of smoke pushing out along the eaves at the second floor and from the third floor dormer and roof areas. The interior stairway appeared to be burned out, and there was evidence of floor collapse at the east end of the first floor. Flames and smoke were visible at the second floor fire escape on the west end, and the slate shingles were beginning to break away from the rafters and slide off the roof. This created a concern for the safety of fire fighters. At the rear of the structure (see Photo 3), fire was showing the entire length of the basement and flames were visible at most of the second floor windows. It was evident that the fire was already in the third floor rooms and attic area. Exposures were not a serious concern due to the distance to surrounding structures and wind direction, which was variable out of the northwest at approximately 3 to 6 mph.

At 6:24:19 a.m., Command notified the operations chief that there were still reports of people inside the structure. Even though crews were attempting to make entry, they were not able to make significant progress and the operations chief reported that fire fighters were not committed to interior operations at that time.

An off-duty assistant chief arrived at 6:24:44 a.m. and was assigned to take charge of Sector 3 at the rear of the structure. Upon evaluating conditions, Sector 3 advised the operations chief that a large diameter hand line would be needed at the rear. The driver of Engine 32 was directed to lay a 5-inch (127-mm) supply line to the hydrant at a street approximately 400 feet (121.9 meters) away to supply Tower 71. Engine 34 arrived on scene and assisted with the second supply line. The captain from Tower 71 reported to the operations chief at 6:27:31 a.m. that they were prepared for full operation. Fire fighters in the elevated tower observed the fire beginning to break through the roof near the west end of the building. Engine 34 was directed to reposition to the south side parking area of Granville Towers at 6:28:03 a.m., which put them at a hydrant and allowed them to access to the rear of the fraternity house. A second off-duty assistant chief arrived and was initially assigned by Command to coordinate water supply operations and then to stage backup crews from additional arriving personnel.
Command advised the operations chief at 6:28:17 a.m. that fire was through the roof at the west end of the structure. Sector 3 advised that from the rear of the building he had fire through the roof at the west end, middle and out the dormers at 6:29:09 a.m. Fire quickly broke through long sections of the roof at its ridge line. Large sections of slate shingles began to slide off the roof as the rafter support system burned away and collapsed inward. Fire conditions throughout the structure intensified when the roof burned through, which improved vertical ventilation.

Extreme fire conditions in the structure, burned out interior access, and worsening safety considerations for firefighters prevented any further attempt at offensive operations. At 6:29:27 a.m., with no potential for successful rescues, and 19:02 minutes after the first engine company arrived on scene, the operations chief directed all personnel out of and away from the structure. The operations chief advised Command that the suppression operation would be defensive.

At 6:30:00 a.m., Orange County EMS transported the three people who managed to escape from the house to the UNC Hospital’s Emergency Room and Burn Center. At 6:30:01 a.m., Central Communications notified Command that units had been on scene 20 minutes. Command advised the operations chief of roof collapse at 6:33:08. Tower 71 was directed to begin master stream operations at 6:33:19 a.m., as soon as personnel had time to clear away from the front and rear of the structure. Engine 34 was directed to lay a 5-inch (127-mm) hose line to support a portable master stream operation at the rear of the structure. A 3-inch (75-mm) hose line was also pulled from Engine 34 and wyed off for additional 1 3/4-inch (44.5-mm) attack lines.
Central Communications was notified to contact utility companies at 6:35:21 a.m. and to contact the Red Cross for fire fighter rehabilitation.

The operations chief was called to the Command vehicle at 6:41:26 a.m. where he was advised that 20 to 25 persons were not accounted for and potentially still inside the structure. The sector officers were advised face-to-face of the potential for finding a high number of fatalities once crews were able to get inside the structure.

The Engine 34 crew had to cut through a 12-foot-high (3.66-meter) fence and hand lay two 3-inch (75-mm) hose lines over a rock wall and change out a nozzle before starting the portable master stream operation at 6:52:50 a.m. Sector 3 advised that they were getting good knockdown of the fire from the rear with the master stream and two attack lines at 7:13:29 a.m. The tower, positioned at the front, operated for approximately 58 minutes and flowed 47,000 gallons (177,914 liters) of water. The portable master stream, positioned at the rear, operated for approximately 37 minutes and flowed 30,000 gallons (113,560 liters) of water. During the time period when the master streams were operating, suppression crews continued to concentrate on areas of the structure that they could reach with handlines while operating safely. The tower and portable master streams were shut down so officers could assess conditions at 7:32:14 a.m. As soon as the tower was shut down, ground ladders were placed at two of the second floor windows at the front in preparation for entry teams.

During the time when the master streams were flowing, the initial attack crews were relieved by fresh personnel arriving on scene from off duty and from the on-duty shift. Initial responding crews proceeded to the rehabilitation area set up by the Red Cross. Also, the New Hope Volunteer Fire Department arrived and set up a self-contained breathing apparatus (SCBA) air station on Cameron Avenue.

The incident commander talked with university staff and members of the Phi Gamma Delta with regard to possible locations of the victims. This information was passed onto two assistant chiefs who assembled crews to search the building. The search crews made entry into the basement and second floor of the structure at 7:40:00 a.m. Coordinating their efforts, the crews conducted a primary search for victims and extinguished residual interior fires. Search crews found the first victim, a male, in Room 203 at approximately 7:41 a.m. The second victim, a female, was found lying in the doorway to Room 206. Two male victims were found in their locked second floor bedrooms on the back side of the house, Rooms 208 & 209. Command and the operations chief updated each other regularly regarding the status of potential victims and their possible locations, and the progress of the search effort. The primary search of the second floor was completed at 9:04:00 with three males and one female located at that time. During the secondary search, another female victim was located in Room 209 near where one of the male victims had been found. It appeared, with the exception of the female partially in Room 206, that none of the victims had made any significant effort to escape.
The search and overhaul operations eventually encompassed all areas of the structure with a confirmation of no more than five victims in all areas except for the collapsed area of the basement, that could not be fully examined until the building was structurally reinforced to protect emergency personnel.

Four fire fighters sustained minor injuries during the incident. Two injured their knee, one had a foot punctured by a nail and one cut his arm. None of the fire fighters lost any work time as a result of their injury.

At 9:42 p.m., fire command received an “all clear” report from search and overhaul crews. The fire ground command ended and all fire suppression companies were released at this time. A fresh engine company was assigned to fire watch duty, however. This fire watch was maintained throughout the night and next day, requiring a fire company with its engine to stand by at the scene. The building was released to the owners on the afternoon of Monday, May 13.

**Casualties**

Of the eight people who were confirmed as being in the building at the time of the fire, five died of smoke inhalation. Four of the victims were found in bedrooms (see Figure 6), and all had high blood alcohol levels of 0.14 or higher. One victim was found in the doorway to the bedroom in which she had been sleeping. This victim had no detectable alcohol in her blood. The other three occupants who were confirmed as being in the building were injured while evacuating.

All three occupants who escaped were injured. The male from room 206 received superficial burns before leaving the building. He was hospitalized for observation and was released the next day. The male and female who escaped from a third-

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2 In the state of North Carolina, a person with a blood alcohol level of 0.08 is considered to be legally intoxicated.
floor bedroom were injured when they fell or jumped off the roof of the building. Both were hospitalized. The injuries to the male were described as serious and the injuries to the female were described as critical.

**Damage**

The basement’s open area, chapter room, and the rest room were heavily damaged by the fire (see Figure 7). The majority of the combustible interior finish and combustible furnishings that were left in the basement’s open area were consumed by the fire. The entire ceiling/floor assembly above the bar and a large section of the ceiling/floor assembly above the rest room collapsed. The fire burned many areas of the plaster ceiling above the dining area, allowing the fire to burn through several sections of the first floor assembly. This damage occurred mostly along the north wall of the structure and in an area directly below the first floor parlor.

The chapter room was also heavily damaged by the fire. The room’s entire combustible ceiling was consumed and the top third of the wall finish at the south end of this room was also consumed. The damage to the wall finish became less severe as distance from the door through which the fire entered the room increased. In fact, the interior finish remained in place over the full height of the north wall of the chapter room, though the finish was heavily charred at the top.

The door to the kitchen and storage room area was closed at the time of the fire. As a result, these areas had little or no flame and heat damage. However, they did sustain some smoke damage.

The central stairway between the basement and first floor was heavily damaged by the fire. In this section of the central stairway, most of the wood treads and risers
were consumed or heavily charred by the fire. A section of one stringer was consumed for several feet in one area.

Like the basement, most of the first floor was heavily damaged by the fire (see Figure 8). The furnishings in the parlor and TV room were completely consumed by the fire. The furnishings and interior wall finish in the reading room were heavily charred. In addition to the large area of floor collapse in the southeast corner of the first floor located above the bar and rest room, several holes were burned through the floor of the parlor. Similarly, holes were burned through the floor along the north wall of both the TV room and the living room in the president’s suite. The plaster ceiling above the parlor collapsed, allowing the fire to damage and burn through sections of the second-story floor assembly. The only areas on the first floor that did not sustain fire or heat damage were the bathroom and bedroom in the president’s suite and a large closet near the central stairway. These areas, however, were damaged by smoke.

The damage in the central stairway between the first floor and the second floor was more severe than that in the section directly below. In this section, the fire was able to burn both the underside (the ceiling for the stairway up from the basement) and topside where the tread and risers were located. All of the wood treads and risers in this part of the central stairway were consumed by the fire. The three stringers for this section of stairs were still present but were heavily charred.

The second floor corridor had fire damage in the area of the central stairway and heat damage over its entire length. Rooms 201, 202, 206, 209, and 210 sustained flame and heat damage, and all rooms on the second floor sustained smoke damage.

Figure 8: Plan view of first floor showing fire damage.
The most severe fire damage in the central stairway occurred between the second and third floors. In this section of the central stairway, all of the wood treads, risers, and center stringer were consumed by the fire. The other two stringers were heavily charred.

The third floor corridor area near the central stairway was heavily damaged by the fire on the second floor (see Figure 9). On this floor, the fire damage extended down the corridor all the way to the west end of the building where the bathroom was gutted by the flames. Room 303 was also gutted by the fire. All the other sleeping rooms were damaged by smoke, and the ceilings in these rooms collapsed during the fire suppression operations.

The fire entered the attic above the third floor bathroom and above the main building. The roof above these areas collapsed. The fire did not enter the attic above the bedroom at the east end of the building and the roof remained intact above this area.

Damage to the structure was estimated at $400,000 and damage to contents at $75,000. The building was valued at $588,000 for tax purposes.
## IV. TIME LINE

<table>
<thead>
<tr>
<th>Time Elapsed</th>
<th>Time (Hr:Min:Sec)</th>
<th>Event/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:05 a.m. +</td>
<td>————</td>
<td>Member of Phi Kappa Sigma fraternity located next door awakened by noise coming from Phi Gamma Delta house.</td>
</tr>
<tr>
<td>6:06:33 a.m.</td>
<td>————</td>
<td>Phi Kappa Sigma member calls 911 and reports the fire.</td>
</tr>
<tr>
<td>6:06:58 a.m.</td>
<td>00:00:00</td>
<td>Fire department dispatches Engines 31 and 32, Tower 71, and one assistant chief. The dispatch center also notifies the fire chief and deputy chief of operations who are both at home.</td>
</tr>
<tr>
<td>6:10:25 a.m.</td>
<td>00:03:27</td>
<td>Engine 31 arrives on scene and finds the first floor to be fully involved. The engine officer receives reports of people still in the building.</td>
</tr>
<tr>
<td>6:11 a.m.</td>
<td>00:04:02</td>
<td>Engine 32 arrives on scene.</td>
</tr>
<tr>
<td>6:11:27 a.m.</td>
<td>00:04:29</td>
<td>The on-duty shift commander arrives on scene. He directs Tower 71 to the front of the building and requests a second alarm response. Fire fighters initiate the fire attack at the front door.</td>
</tr>
<tr>
<td>6:13:50 a.m.</td>
<td>00:06:58</td>
<td>An “All Call” was initiated to bring all off-duty Chapel Hill fire fighters to the scene.</td>
</tr>
<tr>
<td>6:14:14 a.m.</td>
<td>00:07:16</td>
<td>Engine 31 officer advises that the fire fighters will not be able to make entry into the building using the fire escape at the west of the building, and he resumes attack at the front entrance.</td>
</tr>
<tr>
<td>6:16:51 a.m.</td>
<td>00:09:53</td>
<td>Engine 32 officer attempts to enter a first floor doorway on the east end of the building. Heavy fire permits entry only a few feet into the building.</td>
</tr>
<tr>
<td>6:18:20 a.m.</td>
<td>00:11:22</td>
<td>Chapel Hill fire chief and deputy chief of operations arrive on scene. The fire chief assumes command of the fire and the deputy chief of operations is assigned to command operations. Interior central stairway appeared to be burned out and there is evidence of floor collapse at the east end of the building.</td>
</tr>
</tbody>
</table>
6:24:19 a.m.  00:17:21 Incident commander informs the operations commander that there were still reports of people in the building. Fire crews are trying to make entry into the building but are unable to do so.

6:27:31 a.m.  00:20:33 Tower 71 reports that they are in position and ready for operations. Fire fighters in the elevated tower observed the fire beginning to break through the roof near the west end of the building.

6:28:17 a.m.  00:21:19 Incident commander advises the operations commander that the fire is through the roof.

6:29:27 a.m.  00:22:29 The operations chief recognizes there is no chance to rescue anyone still in the building. He directs all members away from the building and initiates defensive fire fighting operations.

6:33:19 a.m.  00:26:21 Tower 71 directed to start master stream operations as soon as all members were away from the building.

6:41:26 a.m.  00:34:28 Incident commander advised that between 20 and 25 people could still be in the building.

7:13:29 a.m.  01:06:31 Sector 3 (rear of building) advises command that they were getting good knockdown using a portable master stream and two attack lines.

7:32:14 a.m.  01:25:16 No significant fire is observed in the building. Tower 71 and the portable master stream are shut down and ground ladders placed against the building so search teams can enter it.

7:40 a.m.  01:33:02 Search teams enter basement and second floor.

7:41 a.m.  01:34:02 First victim, a male, is found in room 203 on the second floor. The second victim, a female, is found lying partially in the doorway to room 206. Two more male victims are found in rooms 208 and 209.

9:04 a.m.  01:58:02 The primary search of the second floor complete. Secondary search is started. Second female victim is found in room 209 near where one of the male victims was found earlier.

9:42 p.m.  02:35:02 Incident command and fire ground operations end. All fire officers and fire companies, except for one engine crew assigned to a fire watch standby, are released.
V. ANALYSIS

Cause and Origin

A team of fire investigators from the North Carolina State Bureau of Investigation, Chapel Hill Fire Department, Chapel Hill Police, University of North Carolina Police, and Orange County Fire Marshal’s Office determined that the fire most likely started in an area underneath the alcohol bar in the basement. The bar involved in the fire was of wood construction and was totally consumed by the fire. The charred base plate for the bar showed the location of the bar and areas of clean burning on the floor and wall revealed the location of the point of fire origin with respect to the bar (see Photo 4).

A consensus of the team members also agreed that the fire was:

“a human hands accidental fire caused by the discarding of live smoking materials into Class A combustibles. This conclusion does not preclude that a carelessly discarded, still lit match could have been tossed into the Class A materials, or that a cigarette lighter could have been held against a Class A material igniting it.”

Excerpt from a report prepared by the fire marshal of the Chapel Hill Fire Department.
Fire Growth and Spread

During its early stages, the fire burned through the bar and ignited the combustible finish on the west wall of the bar room. Investigators also theorized that the growing fire broke many bottles containing alcohol and that the spilled alcohol likely contributed to the fire growth in the area of the bar. The fire burned vertically along the combustible wall finish in the area of the bar and reached the ceiling quickly. The ceiling-level fire spread to other areas of the bar room, the sitting area, and the dining area.

The fire in the basement was intense because of the quantity, type, and installation of interior finish in the basement. The wood boards described as “heart pine” covered all the walls in the bar room sitting area and dining room, providing a large quantity of combustible materials in these spaces (see Photo 5). Heart pine, like all
pine woods, is a soft, low-density wood. High-density materials of the same generic type (woods, plastics) conduct energy away from the area of the ignition source more rapidly than low-density materials, which act as insulators and allow the energy to remain at the surface. For example, given the same ignition source, oak takes longer to ignite than soft pine.\(^4\) A second factor affecting conductive heat transfer was that the interior finish was installed on furring strips rather than directly on non-combustible substrate materials. This installation again reduced the conductive heat transfer through the wood, allowing it to retain even more heat. The combined effect of the reduced heat transfer brought the wood to its ignition temperature more quickly than it would have had it been a dense wood in direct contact with a non-combustible substrate material. The amount of wood finish that was consumed and the damage in the basement’s open area revealed that the heart pine wood covering the walls in this area was the primary fuel source (see Photo 6).

Ventilation was the second factor contributing to the intensity of the fire in the basement. Two exterior doors for that area were open and a large fan was operating at the time the fire started. Both the open doors and the operating fan provided ventilation supporting rapid fire growth in the basement. When the fire reached the north wall, it broke out windows along that wall and increased the ventilation even more. In areas along the north wall where ventilation was greatest, the fire burned through the ceiling/floor assemblies, causing many floor collapses (see Photo 7 on next page) and burn-through holes (see Photo 8 on next page) that were observed after the fire. Local investigators theorized that the operating fan not only contributed to the fire’s initial growth but also probably helped to push the fire up the central stairway. During the suppression operations, fire fighters observed that fire condi-
Photo 7: Burned ceiling/floor joists along the north wall of the basement. These joists support the floor in the president suite’s living room and the first-floor TV room.

Photo 8: The floor in the Parlor was covered with plaster that fell from the ceiling in that room, and the floor had many holes where the fire in the basement had burned through.
tions throughout the building intensified when the roof burned through, changing
ventilation within the structure. This observation supported the theory that venti-
lation strongly affected the dynamics of this fire.

In addition to spreading throughout the basement, fire and smoke funneled up the
central stairway. This was the only means for vertical fire spread until the fire burned
through ceiling/floor assemblies between the basement and first floor and through
ceiling/floor assemblies between the first and second floors. The building’s exter-
or bearing walls were solid masonry so the fire could not spread vertically inside
these walls, and the fire did not spread vertically through pipe chases or any other
utility opening.

Products of combustion from the basement continued to burn on the first floor. This
floor’s open plan allowed the fire to spread into all rooms except for the bedroom
and bathroom in the president’s suite. The suite was in a remote area of the first
floor, and the rooms were protected by interior walls and closed doors. The fire
moving through the first floor ignited combustible furnishings, wood trim, floor-
ing, and any other materials that would burn in the parlor, TV room, and reading
room (which had a combustible interior finish), and alcove.

At some time before fire fighters arrived, the fire in the bar room burned through
the ceiling/floor assembly above that area, providing another avenue for fire spread
to the first floor. As the fire in the basement continued to burn, the entire ceiling/floor
assembly above the bar room collapsed, and that collapse extended over the rest
room in the next room (see Photo 9).
The fire and hot gases continued up the open central stairway to the second floor and filled the corridor on that floor. The doors to bedrooms were closed on the second floor so the fire in the corridor did not initially enter the bedrooms. However, the occupants of room 206 opened the door to their room when they became aware of the fire and attempted to escape. One of these individuals successfully escaped and the other collapsed in the room’s open doorway. This allowed the fire in the corridor to enter that room. Room 206 was the only room on the second floor that the fire in the corridor entered. The doors for the rest of the second floor rooms remained closed preventing the fire in the corridor from entering the bedrooms. Thus showing that a closed solid-core door will serve as an effective barrier against fire spread.

Despite the protection afforded by the closed doors, the fire still entered four other second-floor rooms, rooms 201, 202, 209, and 210, and these rooms were damaged by fire. The four rooms were directly above the first-floor parlor. The parlor’s ceiling had electrical boxes for two ceiling-mounted light fixtures, and holes in the ceiling assembly for those electrical boxes allowed the fire to enter the joist space above the ceiling. Over time, the fire burned through the floor assemblies, allowing fire to enter the four second-floor rooms. This rather unusual means of fire spread serves as even more evidence of the severity of the fire burning in the first floor and basement.

Similar to the second-floor corridor, the third-floor corridor was filled by fire spreading up the open central stairway (see Photo 10). Again, the room doors were closed,
so fire did not enter most rooms on this floor (see Photo 11). However, room 303 was burned out but the means by which the fire entered this room could not be determined due to the extensive damage.

The fire in the third floor corridor burned through the wood fold-down stairs for the attic and allowed the fire to spread into the attic. The fire ignited the wood roof assembly, which eventually collapsed (see Photo 12 on next page). A masonry wall separated the attic above the west end over the bathroom from the attic above the main building. This wall prevented the fire from immediately spreading between the two attic spaces. However, a 2-inch by 8-inch (50-mm by 200-mm) opening for pipes passing through the wall was not sealed. The opening allowed the fire to spread into the attic above the west attic area. The fire did not spread into the attic above the east-end bedroom because there were no unsealed openings in the wall separating that attic space from the main attic.

**Code Analysis**

In the interest of comparing conditions and other details regarding this incident with current national consensus codes, the 1994 edition of the *Life Safety Code* and the 1992 edition of NFPA 1, *Fire Prevention Code*, were used as the basis for this comparison. It was recognized, however, that these code were not part of the legal requirements governing life safety at the Phi Gamma Delta house. The following discussion concerns requirements that have particular relevance to this fire. It is not intended to be a complete description of all parts of the codes that could be applied to this fraternity house.
For the purposes of this report, the open area in the basement that contained the bar room, sitting area, and dining room is considered to be an existing assembly occupancy according to the 1994 edition of the *Life Safety Code*. The basement’s open area had a gross floor area of approximately 1250 square feet (116.13 square meters). Because of the permanent bar installation, this area will be reduced by 10 square feet (0.9 square meters) for an approximate net floor area of 1240 square feet (115.2 square meters). Because this space could have a large number of people in it during functions, the occupant load will be calculated using a factor of one person per 7 square feet (0.65 square meters) of net floor area. This criterion is in Paragraph 9-1.7.1 (a) of the *Life Safety Code*. Thus, the basement’s open area had a calculated occupant load of 177, making this area a Class C Assembly Occupancy according to the *Life Safety Code*.

Similarly, the parlor and TV room on the first floor will be considered to be another assembly area. The combined area of these two rooms was approximately 960 square feet (89.2 square meters). These areas did not have built-in features that reduced the floor space so the entire area was usable giving a net floor area of 960 square feet (89.2 square meters). It appeared that this space would be subject to a less concentrated use than the assembly area in the basement so the occupant load was calculated using a factor of 1 person per 15 square feet (1.4 square meters) of gross floor area, giving an occupant load of 64. Thus, the first floor parlor and TV room were another Class C Assembly Occupancy.

The second and third floors in this building were clearly residential areas and are therefore classified as an existing dormitory occupancy. The primary exit for this
part of the building was the open central stairway and the stairway discharged through the alcove on the first floor which was part of the assembly occupancy. Because the residential area and the assembly area shared a common exit, the Phi Gamma Delta fraternity house was classified as a mixed occupancy comprised of assembly and dormitory uses according to the 1994 edition of the Life Safety Code. As a result, the following code analysis will include requirements from Chapter 9, Existing Assembly Occupancies, Chapter 17, Existing Hotels and Dormitories, and Chapter 31, Operating Features from the Life Safety Code.

Chapter  9 Existing Assembly Occupancies

The following sections and paragraphs in Chapter 9 of the Life Safety Code have particular relevance to this fire:

101:9-1.2.5 Combined Assembly and Residential Occupancies.

In buildings with both residential and assembly areas, the Life Safety Code intends to protect the residential occupancy from fires originating in the assembly occupancy, as occurred in this fraternity house fire. To accomplish this type of protection, Paragraph 9-1.2.5.1 requires separate exits for residential areas. (See Section IX for the complete NFPA code text.) The only Life Safety Code recognized exit arrangement at the Phi Gamma Sigma house, however, was the central stairway, because the fire escape ladders at each end of the building are not recognized exits for existing dormitories (Paragraph 17-2.2.9). With the central stairway being the sole means of egress for the second and third floors, this facility did not meet the minimum requirements in the Life Safety Code.

Additionally, Paragraph 9-1.2.5.2 prohibits residential areas from being located above assembly areas unless the residential occupancy and its exits are separated from the assembly occupancy by construction having a fire resistance rating of at least 1 hour or the assembly area is protected with a sprinkler system. Neither condition existed in this fraternity house, so the fire in the assembly area was able to spread vertically through the open stairway, affecting occupants on the second and third floors. This was one fire spread mechanism that the Life Safety Code intended to prevent.

101:9-3.1 Protection of Vertical Openings

Vertical openings serve as a ready means for fire spread and are prohibited by the Life Safety Code. However, the code also recognizes that under specific conditions, vertical openings may not pose a significant threat to building occupants, so the Life Safety Code requirement that prohibits vertical openings has several exceptions that specify the conditions under which vertical openings are permissible. However, none of these conditions were present at the Phi Gamma Delta house. Therefore, the Life Safety Code would have required that the central stairway be enclosed.
101:9-3.3.3 Interior Finish

The *Life Safety Code* recognizes that combustible interior finish poses a threat to people in assembly occupancies and attempts to minimize this threat by limiting the interior finish in Class C assembly occupancies to Class A, Class B, or Class C (see Section 6-5.3 for interior finish requirements). The interior finish for the basement’s open area, heart pine boards mounted on furring strips, was not Class A, Class B, or Class C interior finish. Therefore, it would not have been permitted by the *Life Safety Code*.

Chapter 17 Existing Hotel and Dormitories

Chapter 17 of the *Life Safety Code* applies to the portion of this building that was being used for sleeping accommodations. The following sections and paragraphs of that chapter have particular relevance to this fire.

101:17-2.2.9 Fire Escape Stairs

As stated earlier, the *Life Safety Code* does not recognize the use of fire escape ladders within an exit from an existing dormitory (see Section 5-2.9 for fire escape ladder requirements). The *Life Safety Code* does, however, recognize the use of fire escape stairs for existing dormitories (see Section 5-2.8 for fire escape stair requirements). Because the fire escape ladders are not recognized by the *Life Safety Code*, they cannot be considered a compliant means of egress for the Phi Gamma Delta fraternity house. This deviation from the *Life Safety Code* requirements does not appear to have had a direct effect on the outcome of this fire since all of the victims were found in their rooms and one survivor was able escape by using the ladder.

101:17-2.4 Number of Exits

The *Life Safety Code* requires at least two exits from every floor. Since the fire escape ladders are not recognized as a means of egress by the *Life Safety Code*, the only exit from the upper floors was the open central stairway, and this means of egress was impassable due to the fire. As such, the fraternity house did not meet the *Life Safety Code*’s requirement for access to two or more exits from every floor.

101:17-3.1 Protection of Vertical Openings

The protection of vertical openings is a fundamental fire protection principle and such protection contributes a great deal to building fire safety. Recognizing the value of protecting vertical openings, Chapter 17 also requires vertical openings to be enclosed or protected in Paragraph 17-3.1. Like the Chapter 9 requirement for vertical protection, this paragraph has several exceptions. However, none of the exceptions would have applied to the Phi Gamma Delta house, so the central stairway would have been required to be enclosed by the *Life Safety Code*. 
101:17-3.3.1 Interior Wall and Ceiling Finish

Similar to Paragraph 9-3.3.3, Paragraph 17-3.3.1 establishes the interior finish materials that would be allowed in a dormitory building. This paragraph requires Class A or B materials in exit enclosures, corridors, and lobbies. It also requires that the interior finish in all other spaces have, at least, a Class C rating. Since the heart pine boards used in the basement’s open area and the reading room on the first floor would not have met even a Class C rating, this material would have been prohibited anywhere in the building.

101:17-3.4 Detection, Alarm, and Communications Systems

This section requires a fire alarm system that is initiated by manual means and requires that the system provide an automatic internal audible alarm to notify occupants throughout the building. This section also requires provisions for the immediate notification of the fire department by telephone or other means in case of fire. The only detection equipment required by this section is a single-station smoke detector in each sleeping room.

The Phi Gamma Delta house had no fire alarm system, and all the smoke detectors that were provided had been installed in the corridors. As a result, the facility did not satisfy any of the requirements in this section of the Life Safety Code.

101:17-3.6 Minimum Fire Resistance Requirements for Protection of Guest Rooms (Corridors)

Interior corridor walls in dormitories provide the means through which occupants are able to reach exits and safely evacuate the building. For this reason, the Life Safety Code contains the following requirements:

- Fire barriers with a minimum 30-minute fire resistance rating.
- Guest room doors with a minimum 20-minute fire protection rating and are self-closing.
- Unprotected openings in partitions of interior corridors serving as exit access from guest rooms are prohibited.

The fire-resistive construction of the corridor walls and doors met or exceeded the Life Safety Code requirements, and these barriers prevented fire from entering the rooms on the second and third floors.

Doors to sleeping rooms were not equipped with self-closing devices so the building was not compliant with this requirement. However, most sleeping room doors remained closed during the fire so the lack of door self-closing devices did not significantly affect the outcome of this particular fire.
Chapter 31 Operating Features

In addition to the chapters of the Life Safety Code that are specific to each occupancy, Chapter 31 has requirements for operating features. Dormitories are one of the many occupancy groups that have requirements in this chapter.

This chapter’s first requirement for dormitories, Paragraph 31-6.3.1, is for fire exit drills. The Chapel Hill Fire Department reported that fraternities and sororities would occasionally hold fire drills. However, the fire department did not have any further information about those drills. Without records or fire department information, it is not possible to determine whether the fire exit drills, when held, were consistent with Life Safety Code requirements.

Paragraph 31-6.4.1 requires a floor diagram reflecting the actual floor arrangement, exit locations, and room identification in every resident room in dormitories. None of the bedrooms in the fraternity house had a floor diagram as required above so this requirement was not met.

Lastly, Paragraph 31-6.4.2 requires that fire safety information shall be provided to allow guests to decide either to evacuate to the outside, evacuate to an area of refuge, remain in place, or any combination of the three. The Phi Gamma Delta national organization recommended that each fraternity house have one fire safety meeting each year and in that meeting, fire extinguishers and fire exits would be discussed. Representatives of the national organization did not state whether the three evacuation options were discussed in the fraternity houses so it was not possible to determine if this Life Safety Code requirement was met at the Chapel Hill fraternity house.

NFPA 1, Fire Prevention Code

NFPA recognizes that fire drills and emergency instructions for residents are fire safety steps that must be incorporated into fire prevention activities in all dormitories. As a result, Chapter 16 of NFPA 1, Fire Prevention Code, 1992 edition, requires these activities and cites the Life Safety Code requirements for fire drills and emergency instructions for residents.

Based upon its investigation of this fire, the NFPA has determined that the following factors significantly contributed to the loss of life:
• The presence of combustible interior finish materials.
• The presence of an open central stairway.
• The lack of fire-rated construction separating the assembly areas from the residential areas of the building.
• The lack of automatic fire detection and fire alarm systems throughout the building.
• The lack of automatic sprinkler protection.
• The improper use or disposal of smoking materials.

VI. DISCUSSION

The NFPA has investigated several fatal fires in fraternity houses over the years (see Section VIII for investigation references). Prior to the Phi Gamma Delta fire, the last incident NFPA investigated occurred on September 8, 1990 at the Phi Kappa Sigma house in Berkeley, California. Two members and a guest died when a fire that started in a lounge area spread up open stairways and trapped the victims in the dormitory area. The primary fuel was the building’s combustible interior finish. Before this fire, the NFPA investigated three other fraternity house fires in the 1970s.

The first fire occurred on February 2, 1975 at the Chi Phi house in Amherst, Massachusetts. Three people were injured. The fire started in a waste paper basket, spread to a polyurethane couch, and ultimately involved several first-floor rooms. Heavy smoke and fire blocked an open decorative stairway, the primary means of egress, forcing second-floor occupants to jump out windows. The building was heavily damaged by this fire. The second occurred on January 8, 1976, when two Ohio State University students died in a fire at the Alpha Rho Chi house. Rapid fire growth on combustible decorations, an open stairway, and the lack of detection, alarm, and suppression equipment were major factors contributing to this loss. The third fire occurred on August 29, 1976. Five Baker University students died in this fire at the Kappa Sigma house in Baldwin City, Kansas. The factors contributing to the loss were an open stairway, the lack of a second means of egress from the upper stories, and the lack of smoke detection, fire alarm, and suppression systems.

Though the four earlier fires affected different organizations, occurred in different years, and were located in different communities, the following common factors contributed to those losses:

• The presence of combustible interior finish, furnishings, or decorations.
• The presence of open stairways.
• The lack of fire-rated construction between assembly and residential areas.
• The lack of automatic fire detection and fire alarm systems.
• The lack of sprinkler protection.
These are the same factors that contributed to the fire at the Phi Gamma Delta house. The strong connection between the past losses and this fire reveals that lessons from past fires can provide insight into the means of improving current and future fire protection in fraternity and sorority houses. More importantly, lessons of the past have prompted code writers to address recognized threats to the safety of building occupants, and these lessons have been transformed into requirements of current fire safety codes, such as the NFPA Life Safety Code.

Another similarity between the fires is that they all occurred in fraternity houses rather than sorority houses. In general, males have a greater fire risk than their female counterparts. This trend is evident in NFPA studies of civilian fire deaths in homes which dominate the fires losses in the United States. The NFPA statistics show, when all age groups are considered, males are 1-1/2 times more likely to die in a fire than females. NFPA studies of fire injuries in homes also show that males are more likely to be injured in a fire when compared to females. These NFPA statistics clearly place males at a higher risk than females. Since the NFPA began compiling data on fire losses in the early 1970s, all of the catastrophic life-loss fires (involving five or more deaths) in fraternity or sorority housing have occurred in fraternity houses.

Because of individual experiences with fires in fraternity and sorority housing, some universities have started to single out fraternity houses for enhanced fire protection programs. For example, the University of Maryland at College Park developed a fire inspection program to improve fire safety in fraternity and sorority facilities. This program takes into account that managing fire risk is made more difficult at fraternities because they are often located off campus and are usually privately owned. The University of Maryland’s program acknowledges several other factors that challenge fire protection professionals in college communities nationwide.

According to a University of Maryland fire protection specialist, many fraternity and sorority houses in their area are older buildings of balloon construction with open stairways. Poor building maintenance and housekeeping practices, and failure to perform timely inspections also contribute to higher risk at fraternities. The situation is compounded by occupant behavior at fraternities, which often includes large parties, rough treatment of the building, and frequent guests who may not be familiar with the exits and fire alarm systems. In an attempt to address these deficiencies, the University of Maryland’s program relies on frequent inspections, follow-up inspections, and fire drills.

The University of Maryland at College Park fire safety program for fraternity and sorority facilities serves as an example of cooperative actions between a university, a local fire department and fraternal and sororal organizations. Complete automatic sprinkler systems were installed as part of an ongoing renovation of University-owned fraternity and sorority houses at the University of Maryland, and by working with various fraternal and sororal organizations, similar systems were installed in several privately owned houses.

Fire prevention inspections are key in reducing the fire risk in fraternity and sorority housing. Fire inspectors need to remain diligent with regard to typical inspection items such as fire extinguishers, fire detection and alarm equipment, general housekeeping, building maintenance, and storage of combustible materials. Moreover, fire inspectors need to enforce all requirements of local codes, which are usually based upon model codes such as the *Life Safety Code* because these codes regulate interior finish, protection of vertical openings, detection and alarm systems, egress system components, etc. Given the difficulty of maintaining good housekeeping practices in some fraternity and sorority houses combined with historical occupant behavior, the installation of state-of-the-art fire detection equipment and fire alarm systems is essential, as a minimum, and the installation of automatic sprinklers is strongly recommended. Comprehensive fire inspections, enforcement of applicable code requirements and the installation of fire protection equipment will greatly improve fire safety in fraternity and sorority houses.

Fire departments can use the assistance of other agencies while attempting to address the problems in fraternity and sorority housing. Other agencies that have opportunities to influence the activities and conditions in fraternity houses must work with the local fire departments to ensure that fire safety is a way of life in fraternity and sorority and other housing, whether on or off campus. Many national fraternity and sorority organizations have developed fire safety programs for their fraternity houses. The national organizations should work with their members and with the local fire departments to ensure that the programs are being followed. Fraternity and sorority houses are often not controlled by the universities with which they are affiliated, so the universities have no direct authority over the houses. Such was the case in Chapel Hill. In these instances, fire and university officials might consider working through the university’s Greek councils to ensure that fire safety is observed in all campus housing.

**VII. POSTSCRIPT**

In the wake of the tragedy in Chapel Hill, the Town Council voted unanimously to work toward a plan that would require sprinklers in fraternity and sorority houses. On June 19, 1996, the state legislature granted the town authorization to enact a retroactive sprinkler law, requiring fraternity and sorority houses in Chapel Hill to comply within five years. The Town Council will hear public comments on a proposed sprinkler ordinance on September 16, 1996 and will vote on the ordinance on October 16, 1996. In the meantime, the Chapel Hill Fire Department is working with the fraternity and sorority community on retrofit plans. As of September 1996, eight of Chapel Hill’s 36 fraternity and sorority houses, all located off campus, had contacted architects and contractors regarding the retrofit of sprinklers in their houses.

There was no question in the mind of the Chapel Hill fire chief that sprinklers would have made a difference in the Phi Gamma Delta fire. The fire would have been contained to the basement, and the sprinkler’s alarm system would have alerted the
occupants and the fire department had the sprinkler system been connected to a building fire alarm system and had a provision for automatic fire department notification been installed.

On June 8, 1996, less than a month after the fire at Phi Gamma Delta, another blaze struck the Chapel Hill fraternity Sigma Chi. The Chapel Hill fire chief said there was no connection between the two fires. The second was an arson fire with no fatalities. Recent renovation that included noncombustible interior finish, smoke and fire doors on stairways, a full alarm system, fire escape stairs and an escape plan contributed to a much different outcome.

Based upon his experience on May 12, 1996, the Chapel Hill fire chief hopes that other fire professionals, university officials, national fraternal organizations, and college communities will pursue sprinkler ordinances before the next fraternity fire results in another tragedy.

VIII. ADDITIONAL INFORMATION

Since 1975, NFPA has prepared several reports or journal articles as a result of its investigations of other fraternity house fires. The following is a list of those reports and articles:

NFPA Fire Investigation Reports

• Fraternity House Fire, Berkeley, California, September 8, 1990.

Fire Journal Articles


NFPA Fire Investigations Department
One Batterymarch Park, Quincy, MA 02269-9101
(617) 984-7473, Fax (617) 770-0700
email: investigations @ NFPA.org
IX. NFPA CODE SECTIONS

The following is the complete text of applicable sections and paragraphs of the 1994 edition of NFPA 101, Life Safety Code, that are relevant to this incident:

CHAPTER 1

101:1-2 Purpose.

101:1-2.1 The purpose of this Code is to provide minimum requirements, with due regard to function, for the design, operation, and maintenance of buildings and structures for safety to life from fire and similar emergencies.

101:1-2.2 As related to fire safety, the objective of this Code is to protect the occupants not intimate with the initial fire development from loss of life and to improve the survivability of those who are intimate with the fire development. The protection methods assume a single fire source.

101:1-2.3 The level of safety is achieved by the combination of prevention, protection, egress, and other features enumerated in the individual occupancy chapters with due regard to the capabilities and reliability of the features involved.

101:1-2.4 The Code endeavors to avoid requirements that might involve unreasonable hardships or unnecessary inconvenience or interference with the normal use and occupancy of a building, but provides minimum requirements for fire safety consistent with the public interest.

101:1-3 Scope.

101:1-3.1 This Code addresses life safety from fire and similar emergencies.

101:1-3.2 The Code addresses those construction, protection, and occupancy features necessary to minimize danger to life from fire, smoke, fumes, or panic.

101:1-3.3 The Code identifies the minimum criteria for the design of egress facilities so as to permit prompt escape of occupants from buildings or, where desirable, into safe areas within buildings.

101:1-3.4 The Code recognizes that life safety is more than a matter of egress and, accordingly, deals with other considerations that are essential to life safety.

101:1-3.5 Where in fixed locations and occupied as buildings, vehicles, vessels, or other mobile structures shall be treated as buildings.
101:1-3.6 The Code does not attempt to address those general fire prevention or building construction features that are normally a function of fire prevention and building codes.

101:1-3.7 The prevention of accidental personal injuries during the course of normal occupancy of buildings, personal injuries incurred by an individual’s own negligence, and the preservation of property from loss by fire have not been considered as the basis for any of the provisions of this Code.

CHAPTER 5

101:5-2.8 Fire Escape Stairs.

101:5-2.8.1.1 Fire escape stairs shall comply with the provisions of 5-2.8. Exception: Existing noncomplying fire escape stairs shall be permitted to be continued to be used subject to the approval of the authority having jurisdiction.

101:5-2.8.1.2 Fire escape stairs shall not constitute any of the required means of egress in new buildings.

101:5-2.8.1.3 New fire escape stairs for existing buildings shall be erected only where it has been determined that outside stairs are impractical (see 5-2.2). New fire escape stairs shall not incorporate ladders or access windows, regardless of occupancy classification or occupant load served.

101:5-2.8.1.4 Fire escape stairs shall be permitted in existing buildings as permitted in the applicable existing occupancy chapters but shall not constitute more than 50 percent of the required egress capacity.

101:5-2.8.1.5 Fire escape stairs shall provide a continuous, unobstructed path of travel to the exit discharge or an area of refuge that leads to the exit discharge.

101:5-2.8.1.6 Fire escape stairs of the return platform-type with superimposed runs or the straight run-type with platform that continues in the same direction shall be permitted.

101:5-2.8.1.7 Either type shall be permitted to be parallel to or at right angles to buildings. Either type shall be permitted to be attached to buildings or erected independently of buildings and connected by walkways.

101:5-2.9 Fire Escape Ladders.

101:5-2.9.1 General. Fire escape ladders shall be permitted to be used only under the following conditions:
(a) To provide access to unoccupied roof spaces as permitted by 5-2.8.3.2, or

(b) To provide a second means of egress from storage elevators as permitted by Chapter 29, or

(c) To provide a means of egress from towers and elevated platforms around machinery or similar spaces subject to occupancy only by able-bodied adults, totaling no more than three in number, or

(d) To provide a secondary means of egress from boiler rooms or similar spaces subject to occupancy only by able-bodied adults, totaling no more than three in number, or

(e) To provide access to the ground from the lowest balcony or landing of a fire escape stair for very small buildings as permitted by 5-2.8.4 where approved by the authority having jurisdiction.

CHAPTER 6

101:6-5.3 Interior Wall and Ceiling Finish Classification.

101:6-5.3.1 Interior wall and ceiling finish shall be classified in accordance with 6-5.3.2 based on test results from NFPA 255, Standard on Method of Test of Surface Burning Characteristics of Building Materials.

101:6-5.3.2 Interior wall and ceiling finishes shall be grouped in the following classes in accordance with their flame spread and smoke development:

(a) Class A Interior Wall and Ceiling Finish. Flame spread 0-25, smoke developed 0-450. Includes any material classified at 25 or less on the flame spread test scale and 450 or less on the smoke test scale of the tests described in 6-5.3.1. Any element thereof, when so tested, shall not continue to propagate fire.

(b) Class B Interior Wall and Ceiling Finish. Flame spread 26-75, smoke developed 0-450. Includes any material classified at more than 25 but not more than 75 on the flame spread test scale and 450 or less on the smoke test scale of the tests described in 6-5.3.1.

(c) Class C Interior Wall and Ceiling Finish. Flame spread 76-200, smoke developed 0-450. Includes any material classified at more than 75 but not more than 200 on the flame spread test scale and 450 or less on the smoke test scale of the tests described in 6-5.3.1.
CHAPTER 9

101:9-1.2.5 Combined Assembly and Residential Occupancies.

101:9-1.2.5.1 No dwelling unit of a residential occupancy shall have its sole means of egress pass through any assembly occupancy in the same building.

101:9-1.2.5.2 No multiple-dwelling unit of a residential occupancy shall be located above an assembly occupancy.

Exception No. 1: Where the dwelling unit of the residential occupancy and exits therefrom are separated from the assembly occupancy by construction having a fire resistance rating of at least 1 hour.

Exception No. 2: Where the assembly occupancy is protected throughout by an approved, automatic sprinkler system in accordance with Section 7-7.

101:9-1.7.1 The occupant load permitted in any assembly building, structure, or portion thereof shall be determined on the basis of the following occupant load factors:

(a) An assembly area of concentrated use without fixed seats, such as an auditorium, place of worship, dance floor, discotheque, or lodge hall: one person per 7 net sq ft (0.65 net sq m).

(b) An assembly area of less concentrated use, such as a conference room, dining room, drinking establishment, exhibit room, gymnasium, or lounge: one person per 15 net sq ft (1.4 net sq m).

101:9-3.3.3 Interior finish in general assembly areas of Class A or Class B assembly occupancies shall be Class A or Class B. In Class C assembly occupancies, interior finish shall be Class A, Class B, or Class C.

Exception: In any assembly occupancy, exposed portions of structural members complying with the requirements for Type IV(2HH) construction shall be permitted.

CHAPTER 17

101:17-2.2.9 Fire Escape Stairs.

Fire escape stairs complying with 5-2.8 shall be permitted. (Paragraph 5-2.8 provides construction requirements and other details pertaining to fire escape stairs.)

101:17-2.4 Number of Exits.
Not less than two exits shall be accessible from every floor, including floors below the level of exit discharge and occupied for public purposes.

*Exception: Any building protected throughout by an approved, supervised automatic sprinkler system.*

### 101:17-3.1 Protection of Vertical Openings.

#### 101:17-3.1.1 Every stairway, elevator shaft, and other vertical opening shall be enclosed or protected in accordance with 6-2.4 or provide means of satisfying the requirements of Section 2-9.

*Exception No. 1: Unprotected vertical openings connecting not more than three floors in accordance with 6-2.4.5 shall be permitted.*

*Exception No. 2: An atrium in accordance with 6-2.4.6 shall be permitted.*

*Exception No. 3: Enclosures shall not be required where a stair connects two levels within a single dwelling unit, guest room, or guest suite.*

*Exception No. 4: In any building protected throughout by an approved, automatic sprinkler system in accordance with 17-3.5, and where exits and required ways of travel thereto are adequately safeguarded against fire and smoke within the building or where every individual room has direct access to an exterior exit without passing through any public corridor, the protection of vertical openings not part of required exits shall be permitted to be waived by the authority having jurisdiction to such extent as such openings do not endanger required means of egress.*

*Exception No. 5: In existing buildings not more than two stories in height, unprotected openings shall be permitted to be permitted by the authority having jurisdiction where the building is protected throughout by an approved, automatic sprinkler system in accordance with 17-3.5.*

### 101:17-3.3.1 Interior Wall and Ceiling Finish.

Interior finish on walls and ceilings, in accordance with Section 6-5, shall be as follows:

(a) Exit enclosures – Class A or Class B.

(b) Corridors and lobbies that are part of an exit access – Class A or Class B.

(c) All other spaces – Class A, Class B, or Class C.

### 101:17-3.4 Detection, Alarm, and Communications Systems.

#### 101:17-3.4.1 General. A fire alarm system in accordance with Section 7-6, except as modified by 17-3.4.2 through 17-3.4.4, shall be provided.
Exception: Buildings where each guest room has exterior exit access in accordance with 5-5.3, and the building is not more than three stories in height.

**101:17-3.4.2 Initiation.** The required fire alarm system shall be initiated by:

(a) Manual means in accordance with 7-6.2, and

*Exception to (a): Manual means as specified in 7-6.2, other than as required by (b) below, shall not be required where there are other effective means (such as complete automatic sprinkler or automatic detection systems) to activate the fire alarm system.*

(b) A manual fire alarm station located at the hotel desk or other convenient central control point under continuous supervision by responsible employees, and

(c) Any required automatic sprinkler system, and

(d) Any required detection system.

*Exception to (d): Sleeping room smoke detectors shall not be required to initiate the building fire alarm system.*

**101:17-3.4.3 Notification.**

**101:17-3.4.3.1** Occupant notification shall be provided automatically, without delay, by internal audible alarm in accordance with 7-6.3.

*Exception No. 1: A presignal system in accordance with Exception No. 1 to 7-6.3.2 shall be permitted.*

*Exception No. 2: A delay for positive alarm sequence in accordance with Exception No. 2 to 7-6.3.2 shall be permitted.*

**101:17-3.4.3.2** Provisions shall be made for the immediate notification of the public fire department by telephone or other means in case of fire. Where there is no public fire department, this notification shall be made to the private fire brigade.

**101:17-3.4.4 Detection.** Each sleeping room shall be provided with an approved, single station smoke detector in accordance with 7-6.2.9.

**101:17-3.6 Minimum Fire Resistance Requirements for Protection of Guest Rooms (Corridors).**

**101:17-3.6.1** Interior corridor walls shall consist of fire barriers in accordance with 6-2.3 having a minimum 30-minute fire resistance rating.

*Exception No. 1: In buildings protected throughout by an approved, automatic sprin-
kler system in accordance with 17-3.5, no fire resistance rating shall be required, but the walls and all openings therein shall resist the passage of smoke.

Exception No. 2: Where interior corridor walls have openings from transfer grilles, see 17-3.6.6.

101:17-3.6.2 Each guest room door that opens onto an interior corridor shall have a minimum 20-minute fire protection rating.

Exception No. 1: Previously approved 1 3/4-in. (4.4-cm) thick solid bonded wood core doors shall be permitted to remain in use.

Exception No. 2: Where automatic sprinkler protection is provided in the corridor in accordance with 19-3.5.2 through 19-3.5.4, doors shall not be required to have a fire protection rating but shall resist the passage of smoke. Doors shall be equipped with latches for keeping doors tightly closed.

101:17-3.6.3 Each guest room door that opens onto an interior corridor shall be self-closing and shall meet the requirements of 17-3.6.2.

101:17-3.6.4 Unprotected openings shall be prohibited in partitions of interior corridors serving as exit access from guest rooms.

31-6.3 Dormitories.

101:31-6.3.1 Drills. Fire exit drills shall be regularly conducted in accordance with 31-1.5. (Section 31-1.5 provides information regarding how and when fire exit drills shall be performed.)

101:31-6.4.1 A floor diagram reflecting the actual floor arrangement, exit locations, and room identification shall be posted in a location and manner acceptable to the authority having jurisdiction on or immediately adjacent to every guest room door in hotels and in every resident room in dormitories.

101:31-6.4.2 Fire safety information shall be provided to allow guests to decide either to evacuate to the outside, evacuate to an area of refuge, remain in place, or any combination of the three.
The following is the complete text of applicable sections and paragraphs of the 1992 edition of NFPA 1, *Fire Prevention Code*, that are relevant to this incident:

**CHAPTER 1**

1:1-2 Purpose.

1:1-2.1 The intent of this Code is to prescribe minimum requirements necessary to establish a reasonable level of fire safety and property protection from the hazards created by fire and explosion. The scope covers the construction, maintenance, and use of property to the extent that such is not covered by existing NFPA codes and standards. When other codes and standards are applicable to the scope of this standard they are reference herein.

1:1-2.2 This code is partially comprised of text extracted from NFPA codes and standards in an effort to bring together information useful during field inspections.

1:1-3 Scope.

1:1-3.1 The provisions of this Code are applicable to:

(a) The inspection of buildings, processes, equipment, systems, and other fire and related life safety situations.

(b) The investigation of fires, explosions, hazardous materials incidents, and other related emergency incidents handled by the fire department.

(c) The review of construction plans, drawings, and specifications for life safety systems, fire protection systems, access, water supplies, processes, and hazardous materials and other fire and life safety issues.

(d) The fire and life safety education of fire brigades, employees, responsible parties, and the general public.

(e) Existing occupancies and conditions, the design and construction of new buildings, remodeling of existing buildings, and additions to existing buildings.

(f) The storage, use, processing, handling, and transportation of hazardous materials.

(g) The design, alteration, modification, construction, maintenance, and testing of fire protection systems and equipment.
(h) Access requirements for fire department operations.

(i) Hazards from outside fires in vegetation, trash, building debris, and other materials.

(j) The regulation and control of special events including but not limited to exhibits, trade shows, amusement parks, haunted houses, and other similar special occupancies.

(k) The interior finish, decorations, furnishings, and other combustibles that contribute to fire spread, fire load, and smoke production.

1:16-2.3 Dormitories.

1:16-2.3.1 Fire exit drills shall be regularly conducted in accordance with 16-2.3.2 through 16-2.3.5. Drills shall be designed in cooperation with the local authorities. (101:31-6.3.1 and 101:31-1.5.1)

1:16-2.3.2 Responsibility for the planning and conduct of drills shall be assigned only to competent persons qualified to exercise leadership. (101:31-1.5.3)

1:16-2.3.3 In the conduct of drills, emphasis shall be placed upon orderly evacuation under proper discipline rather than upon speed. (101:31-1.5.4)

1:16-2.3.4 Drills shall include suitable procedures to ensure that all persons in the building or all persons subject to the drill actually participate. (101:31-1.5.5)

1:16-2.3.5 Drills shall be held at unexpected times and under varying conditions to simulate the unusual conditions that occur in the case of fire. (101:31-1.5.6)

1:16-2.4 Emergency Instructions for Residents or Guests.

16-2.4.1 A floor diagram reflecting the actual floor arrangement, exit locations, and room identification shall be posted in a location and manner acceptable to the authority having jurisdiction on or immediately adjacent to every guest room door in hotels and in every resident room in dormitories. (101:31-6.4.1)

1:16-2.4.2 Fire safety information shall be provided to allow guests to make a decision to either: evacuate to the outside; evacuate to an area of refuge; remain in place; or any combination of the three. (101:31-6.4.2)