COLLEGE DORMITORY FIRE
Franklin, MA
October 25, 1995
FIRE INVESTIGATION REPORT

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ABSTRACT

On Wednesday, October 25, 1995, at approximately 2:00 am, a fire occurred in an occupied college dormitory. The building was successfully evacuated without loss of life or injury. The building, however, was a total loss.

The building was a three-story, wood frame, unsprinklered structure that housed 30 people. At the time of the fire, there were 28 people in the building. It was equipped with an automatic fire alarm system that had spot-type heat detectors in the residents rooms, some common areas, and the basement; smoke detectors in the common areas; and manual pull stations in the hallways.

There were two interior stairwells between the first and second levels and one interior stairwell between the second and third level. An exterior stairwell was located on the south side of the structure, and two fire escape ladders, one on the east side and one on the west side, provided secondary means of egress to the second and third levels.

Based on an investigation conducted by the Franklin Fire Department and the Massachusetts State Fire Marshal’s Office, the area of origin was in one of the dormitory rooms on the second floor. The cause of the fire was accidental/undetermined.

The room in which the fire originated was occupied by two residents. Prior to the fire, the residents had been using candles and incense, which was against college policy. In addition, there had been a party in the room earlier in the evening, during which several people were smoking, according to investigators from the Franklin Fire Department and the Massachusetts State Fire Marshal’s Office.

Based on the NFPA investigation and analysis of this fire, the following significant factors were considered to have contributed to the loss of property in this incident:

- Lack of early detection of the fire, which allowed for large fire growth to occur
- Lack of an automatic sprinkler system, which would have controlled the fire in the early stages
- Lack of adequate separation between levels, which contributed to the fire spread to the third floor and allowed for the spread of smoke and fire from the area of origin
- Failure to close the door to the room of origin after detection
- Lack of automatic door closures on the individual rooms

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I. INTRODUCTION

The National Fire Protection Association (NFPA) investigated the Franklin dormitory fire in order to document and analyze significant factors that resulted in the loss of property.

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

The NFPA became aware of the Franklin dormitory fire on the day it occurred, October 25, 1995. Ed Comeau, Chief Fire Investigator of the NFPA Fire Investigations Department, and Steven F. Sawyer, Senior Fire Protection Specialist of the NFPA Public Fire Protection Division, visited Franklin, Massachusetts to perform an on-site study of this incident. That three-day, on-site study documentation and subsequent analysis of the event were the basis for this report. Entry to the fire scene and data collection activities were made possible through the cooperation of the Franklin Fire Department and the Massachusetts State Fire Marshal’s Office.

This report is another of the NFPA studies of fires of 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 property resulting from the Franklin dormitory fire. Rather, the purpose of this report is to present the findings of the NFPA data collection and analysis effort and is intended to highlight those factors that contributed to the loss of property.

Current codes and standards were used as the criteria for this analysis so that the conditions at the Franklin dormitory 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 the construction or operation of the Franklin dormitory. The NFPA has not analyzed the building with respect to its compliance with the codes and standards that were in existence when it was built or during its operation.

The cooperation and assistance of Chief Keith Hoyle of the Franklin Fire Department and the Massachusetts State Fire Marshal’s Office is greatly appreciated.

II. BACKGROUND

Occupy Classification

Under the 1994 edition of NFPA 101, Life Safety Code®, this building would be defined as an existing dormitory. A dormitory is defined in the Life Safety Code as follows: “Buildings or spaces in buildings where group sleeping accommodations are provided for more than 16 persons who are not members of the same family in one room or a series of closely associated rooms under joint occupancy and single management, with or without meals, but without individual cooking facilities. Examples are college dormitories, fraternity houses, and military barracks.”

The Building

The building was a three-story, wood frame structure constructed in approximately 1882 as a single family dwelling. There were three stories above grade and a basement. A number of additions had been made to the building over the years, creating a floor plan that was discontinuous. The area of each floor was approximately 4,300 square feet, and the building’s total square footage (excluding the basement) was 12,900 square feet.

The building was of Type V (000) wood frame construction in accordance with NFPA 220, Standard on Types of Building Construction.

The interior walls of the building were predominantly 2-inch x4-inch studs with plaster and lathe, with an estimated fire resistive rating of 30 minutes (as determined by NFPA 914, Recommended Practice for Fire
The interior walls were 2"x4" wood studs covered with plaster and lathe. Combustible interior finish, as can be seen on the lower part of the wall in this picture, existed throughout the building.

Protection in Historic Structures, Appendix D, “Guideline on Fire Ratings of Archaic Materials and Assemblies”). A mixture of interior finishes, including wood wainscoting on the lower half of a number of walls, were used. In addition, one of the rooms on the first floor had a decorative heavy fabric wall covering, similar to upholstery. The floors were of wood over wood joists.

Fire Protection Systems

The building was not equipped with any automatic or manual fire suppression systems.

The building had a fire alarm system installed with the following components:
- heat detectors
- manual pull stations
- smoke detectors

According to information provided by the college, each room was equipped with a fixed-temperature heat detector that was connected to the alarm system. Due to the extensive damage to the second and third floors, NFPA investigators were not able to verify that all of these rooms were equipped with heat detectors. However, system heat detectors were seen in other portions of the building. There were no single station smoke detectors located in individual sleeping rooms.

System smoke detectors were located in the common areas on the first floor and in the corridors on the second floor. Due to the extent of damage, investigators could not verify the location of smoke detectors in the individual sleeping rooms on the second and third floors.

The fire alarm system was controlled by a five zone fire alarm control panel located in the basement of the building. An annunciator panel was located on the first floor adjacent to the east exit. The zones were as follows: basement, first floor, second floor, third floor and attic. The fire alarm system was connected to a Franklin Fire Department master box, which transmitted a signal to the Franklin Fire Department. When an alarm
was received by Franklin Fire Department, they would initiate a response and also contact the college’s Office of Public Safety and inform them of the alarm condition. Occupant notification was achieved by horn/light devices located on each floor. The exact number of devices on the second and third floors could not be determined.

Means of Egress

Third Story- The third story was totally destroyed, and NFPA investigators were not able to determine the capacity of the interior means of egress from this level. However, using drawings provided by the college, and after inspection of the debris, it was determined that there was one interior stairwell from the third level to the second level. Other means of egress were provided by an exterior stairwell on the south side and a fire escape ladder on the west side. It was noted that the effective width of the exterior stairway on the south side was reduced to 14 inches where it passed by the overhanging eaves of the building. In addition, a support member was located approximately less than 6 feet above the stairway, directly in the travel path. The width of the stairway was 31 inches, with a riser height of 8 inches and a tread depth of 9 1/2 inches. A handrail was provided on both sides at 32 inches with spacing guard protection of 8 1/4 inches. Access to the fire escape ladders was by windows to a landing, with the exception of the east fire escape ladder, where access was by a window directly to the ladder. Due to the extensive fire damage, neither corridor widths nor door widths could be determined for the third floor.

Second Story- There were two interior stairwells from the second level to the first level. In addition, there was an exterior stairway on the south side and fire escape ladders on the west and east sides. There was a non-rated door at the top of the north interior stairwell, and there was no door at the bottom. The north interior stair was 35 inches wide with a riser height of 7 inches and a tread depth of 11 inches; the handrail was 3 1 inches high. There were no doors on the central interior stairwell providing fire separation between the two levels. The central interior stair was 28 inches in width.
There were two rooms in the west wing of this structure that depended on the fire escape ladder as a second means of egress in the event that the primary escape route was compromised. On the south side, an exterior stair was provided that connected the first floor through third floors (see information on the third story for the dimensions of these stairs). Corridor widths were 39 inches. Room door widths varied from 29 inches to 32 inches in clear width.

A door on the second floor of the east stairwell was equipped with wired glass that measured 729 square inches, which exceeded the maximum allowable area of 100 square inches for a door with 1-hour fire protection. In addition, there was a window in the wall adjacent to this door that was equipped with wired glass that measured in excess of 100 square inches.

**First Story** - There were three doors that led directly to the exterior of the building, one each on the north, east, and west sides of the structure. In addition, there were a number of full-length windows in the dining area. The north door was 40 inches wide and equipped with panic hardware. The west door was 36 inches in width and equipped with an alarm bar release device. The east door was 28 inches wide with a releasing device. The south exterior stair exited onto a landing with a gate leading to a small porch for exiting to grade. The porch was also used for exiting from the resident director’s room. Corridor widths ranged from 34 inches to 87 inches. Room doors ranged from 28 inches to 32 inches in clear width.

**Utilities**

The building was provided with a 200-amp electrical service entering at the southeast corner of the building. Some wiring was of the knob and tube type.

Heat was provided by a steam boiler located in the basement. The oil tank was located underground on the east side. Electric baseboard heat was used to supplement heat in some areas.

Telephone service was provided.
It appears that at some time the building was supplied with gas service. A number of pipes in the wall resembled gas lights. No gas service was provided in the building at the time of the fire.

**Building Occupants**

The building housed 30 occupants. All of them were college students, with the exception of the resident director (RD) who was a college employee and was responsible for the overall management of the house. At the time of the fire, there were 28 people in the building.

**The Franklin Fire Department**

The Franklin Fire Department operates out of a single station located 400 yards from the location of the fire. However, due to the layout of the roadways, they were required to travel approximately 1/2 mile to reach the building. There is an on duty staff of five firefighters. There are 26 paid members of the fire department, and an 11-person call force. Standard response to an alarm sounding, without any additional information, is a single engine with three members. Two fire department members remain behind to staff the ambulance. Any report of a working fire results in the transmission of a box alarm, which notifies all off duty personnel and the call force.

**III. THE FIRE**

**Discovery and Occupant Activities**

At approximately 2:06 am on Wednesday, October 25, 1995, the fire alarm system was activated in the building. A resident from the third floor came down the interior stairwell and approached the closed door to the room of origin, which was Room 8. Upon opening the door, he was confronted with a well developed fire located in the vicinity of a bed in the southwest corner of the room. He could not make entry and could not close the door due to the extreme heat.
When the alarm system was activated, it automatically transmitted a signal to the Franklin Fire Department. The dispatcher, after dispatching the apparatus, notified the college’s Department of Public Safety regarding the alarm. Two college security personnel were dispatched to the building by radio from a building immediately adjacent to the fire building. When they exited this adjacent building, they immediately observed a working fire on the second floor that had vented out of the south windows and was extending up the side of the building. They did not transmit a radio report to their dispatcher with regard to the fire at this time.

The two security personnel entered the building and went up the stairs to the second floor where they met the student who had come down from the third floor outside of the room of origin, Room 8. They ordered him to leave the building, and then attempted to extinguish the fire. However, the fire had grown too large, and they both then exited the building via the interior stairs, leaving the room door open. At this time they radioed a report to their dispatcher of a working fire.

The student from the third floor, upon leaving the building, climbed up the fire escape ladder on the west side in order to look inside the window. It was his belief at this time that there were still occupants in the room. However, he was not able to see anything through the window other than the glow of the fire.

**Fire Department Notification and Response**

The Franklin Fire Department was automatically notified of the incident when the fire alarm system was activated. They immediately dispatched a standard response of one engine with three Franklin Fire Department members on board. Enroute to the incident, the dispatcher received additional information of a working fire, and a box alarm was sounded based on additional information from the college security personnel. The remaining two members at the fire station immediately responded with a second engine. When the box alarm was sounded, it notified all of the off-duty paid personnel, the call force personnel, and the fire chief.
Upon arrival, Engine 1 reported a working tire on the second floor of the building. Bystanders and residents reported that there were people still inside the structure, and the crew immediately entered the building in order to initiate search and rescue operations. However, conditions by this time had become so severe that they were not able to search all areas due to the extreme heat.

Personnel from Engine 4 and Ladder 1 then advanced a hose line from their engine up the east stair of the building in order to initiate a fire attack. At the same time, additional Franklin Fire Department personnel advanced another 1 3/4-inch line up the fire escape on the south side to the second floor. However, they were only able to enter about 10 feet into the building. Even with two handlines in operation the fire continued to grow on the second and third floors.

At approximately 2:35 am, the decision was made to attack the fire defensively. All interior crews were removed and two ladder pipes were used to apply water.

**Casualties**

There were no fatalities. Two security officers from the college were sent to the hospital for evaluation due to smoke inhalation and were released.

**Damage**

The entire third story of the building was totally destroyed. There was significant fire and smoke damage to the second story, and the first story experienced significant smoke and water damage. As a result of the fire, the building was determined to be a total loss and was to be razed.
IV. TIME LINE

October 25, 1995

2:06:43 A.M. Box 1424 received at headquarters.
2:07:03 On-duty crew notified by house bells.
2:07:14 Notified college security of alarm by phone.
2:11:05 Engine 701 on the air.
2:11:34 Received 911 call from college security reporting working fire.
2:11:50 Advised Engine 1, already on the scene, of update.
2:12:00 Struck box alarm tone for Incident 95-1830.
2:12:07 Sounded house bells for Engine 704 to respond.
2:12:40 Received second call from college security confirming working fire.
2:12:58 Engine 701 gives first on-scene report
2:12:55 Requested Franklin police to respond.
2:15:05 Engine 701 reports person trapped.
2:17:10 Chief responding.
2:17:10 Notified water department to confirm all domestic water pumps running.
2:18:00 Engine 701 requests mutual aid-l pumper (Wrentham).
2:18 Ladder 709 responding.
2:20 Ladder 709 requests a set up location from command.
2:21 Engine 701 requests 709 to rear (garbled).
2:21 Chief and ambulance on scene. Chief establishes command.
2:22 709 requests a set up location.
2:22 Command requests 709 to front of building for ventilation.
2:24 Command requests two pumper and a ladder mutual aid. (Wrentham, Bellingham, Bellingham Ladder).
2:27 Command requests two additional pumper and a ladder mutual aid (Medway, Norfolk, one pumper for station coverage).
2:35 (approx.) All units ordered from building. Defensive operation.
2:39 Command requests Massachusetts Electric to the scene.
2:51 Command requests Milford Fire Department Air Supply Unit mutual aid.
2:51 Command requests positive pressure ventilation.
2:55 Command requests additional ladder mutual aid (Norfolk).
2:58 Command advised personnel still on roof. Orders all personnel off of the roof.
3:01 College security advises that all students are accounted for.
3:05 Massachusetts Electric on the scene.
3:11 Norfolk Fire Department pumper in quarters. Responds to supply Norfolk Ladder.
3:13 Command requests additional pumper mutual aid for station coverage (Wrentham).
3:27 Command requests State Fire Marshal’s office to respond.
3:31 Command requests Medway ambulance, mutual aid, to the scene for transport.
3:39 Command requests town administrator notified.
3:42 Massachusetts State Fire Marshal investigator responding.
3:43 Command is notified that all electrical power is cut.
3:50 Command requests Wrentham pumper from station to the scene. Requests an additional pumper for station coverage (Plainville).
3:51 Medway ambulance on the scene.
4:00 Command requests Medway Engine 5 mutual aid to station at Davis Thayer School.
4:03 Massachusetts State Fire Marshal investigator on the scene.
4:14 Command requests building commissioner to the scene.
5:00 (approx.) Master streams shut down. Interior attack and overhaul resumed.
7: 12 A.M. Command declares fire under control.
The main interior stairway between the first and second floors. The door at the top of the stairs was not a fire rated door.

V. ANALYSIS

Cause and Origin

The Massachusetts State Fire Marshal’s Office determined that the fire started in Room 8, which was located on the second floor of the building. At the time of the fire, the room was reportedly unoccupied, which allowed for the fire to develop unchecked. Although the specific cause could not be determined, the residents did tell investigators that they had been using candles and incense in the room prior to the incident, and that there had been a party earlier in the evening during which several people were smoking.

Fire Growth and Spread

Due to the lack of smoke detection and automatic suppression in the room of origin, the fire was allowed to develop to a point where conditions in the room became untenable. Shortly after alarm activation, the security personnel responding from the adjacent building reported that the fire had vented out of the south windows and was extending up the exterior of the building. Smoke and fire spread by way of unprotected vertical openings such as the stairs from the second floor to the third floor.

Code Analysis

In accordance with NFPA 101, Life Safety Code, the building was classified as an existing dormitory. The exterior stair on the south side of the structure is defined as a Class B stair. The fire escape ladders are not recognized as an acceptable means of egress for this type of occupancy.

Two Exits

It is one of the basic tenets of NFPA 101, Life Safety Code, that every floor of an existing dormitory occupancy shall have access to two independent means of egress.

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.

This is required in the event that if one of the exit routes is compromised, another exit route is available to the occupants.

This building was equipped with a total of three stairwells serving the second floor and two stairwells serving the third floor. However, each stairwell and stair-
well arrangement was deficient in some manner and did not meet the requirements of NFPA 101, Life Safety Code, in providing two separate and adequate means of egress.

**North Interior Stairwell**

The north interior stairwell provided an exit path from the second floor to an unprotected lobby on the first floor, through which the residents were required to travel before exiting the building. This condition is permitted by NFPA 101 only under the following circumstances:

5-7.2 A maximum of 50 percent of the required number of exits, but not exceeding 50 percent of the required egress capacity, shall be permitted to discharge through areas on the level of exit discharge, provided:

(a) Such discharge leads to a free and unobstructed way to the exterior of the building, and such way is readily visible and identifiable from the point of discharge from the exit; and

(b) The level of discharge is protected throughout by an approved, automatic sprinkler system or the portion of the level of discharge used for this purpose is protected by an approved, automatic sprinkler system and separated from the nonsprinklered portion of the floor by fire resistance rated construction meeting the requirements for the enclosure of exits (see 5-1.3.1); and

**Exception to (b):** If the discharge area is a vestibule or foyer meeting all of the following:

1. The depth from the exterior of the building shall be not more than 10 ft (3 m) and the length shall be not more than 30 ft (9.1 m).
2. The foyer shall be separated from the remainder of the level of discharge by construction **provid-**
ing protection at least the equivalent of wired glass in steel frames.

3. The foyer serves only as means of egress and includes an exit directly to the outside.

(c) The entire area on the level of discharge shall be separated from areas below by construction having a fire resistance rating not less than that required for the exit enclosure.

Exception to (c): Levels below the level of discharge shall be permitted to be open to the level of discharge in an atrium in accordance with 6-2.4.6.

The north stairwell did not discharge into a protected area as required by 5-7.2. It discharged into a lobby that was not separated from the remainder of the occupancy by any fire resistive construction. This separation is required in order to ensure that the means of egress are not rendered unusable by exposure to a fire on a lower floor.

It is important that an exit enclosure provide not only an adequate and protected means of egress, but it should not provide an avenue for the spread of smoke and fire from one floor to another.

5-1.3.2 In existing buildings, where a two-story exit enclosure connects the story of exit discharge with the story next above or below only, but not both, the exit shall be required only to be enclosed on the story of exit discharge. At least 50 percent of the number and capacity of exits on the story of exit discharge shall be independent of such enclosures.

The north interior stairwell was not equipped with a door on the first floor. There was a door at the top of the stairwell, but it was equipped with a wired glass window that measured 729 square inches, which exceeded the maximum allowable area of 100 square inches for such a window.

Central Interior Stairwell

The minimum width permissible for an exit stairwell is 36 inches, as specified by the table in 5-2.2.2.1 of NFPA 101, Life Safety Code. The central interior stairwell had a clearance of only 28 inches and, therefore, did not meet the minimum requirements for an exit stairwell.

As with the north interior stairwell, it was important that the exit enclosure for the central interior stairwell provide not only an adequate means of egress, but it should not have provided an avenue for the spread of smoke and fire from one floor to another. The central interior stairwell was not equipped with a door at the level of discharge (the first floor) as required by 5-1.3.2, as previously specified.

In accordance with 5-7.2, the exit stairwells should discharge into a protected area. The central interior stairwell discharged into an unprotected corridor, and occupants would have been required to traverse either a common area or through a kitchen in order to reach the exterior of the building.

South Exterior Stairwell

The south exterior stairwell met the minimum requirements for an exterior stairwell for the first and second floors. However, it did not meet the following minimum requirements to serve as an egress from the third floor:

- The eave from the roof projected into the stairway, reducing the width to 14 inches, which was below the minimum requirement of 18 inches [see Table 5-2.8.4(a) NFPA101].

- A horizontal support beam reduced the headroom below the minimum requirement of 6 feet 8 inches [see Table 5-2.8.4(a) NFPA101].

- Only one of the rooms on the third floor had a clear and unobstructed access to the south stairwell. The occupants of the other rooms would have had to pass through one of the resident’s rooms, which could possibly be locked, and
would also have had to pass by the interior stairwell to reach the south exterior stairwell. This was not in compliance with 17-2.4, as follows: “Not less than two exits shall be accessible from every floor, including floors below the level of exit discharge and occupied for public purposes.”

**Interior Stairwell, Third Level to Second Level**

There was one interior stairwell that provided an exit path from the third floor to the second floor corridor and was required to have an enclosure protection of one hour, in accordance with 5-1.3.1.

5-1.3.1 Exits. Where an exit is required by this Code to be protected by separation from other parts of the building, the separating construction shall meet the requirements of Section 6-2 and the following requirements:

(a) The separation shall have at least a 1-hour fire resistance rating where the exit connects three stories or less. This applies whether the stories counted are above or below the story where exit discharge begins.

(b) The separation shall have at least a 2-hour fire resistance rating where the exit connects four or more stories, whether above or below the level of exit discharge. It shall be constructed of an assembly of noncombustible or limited-combustible materials and shall be supported by construction having at least a 2-hour fire resistance rating.

**Exception to (b): Hotels in accordance with 16-2.2.1.2 and 17-2.2.1.2 and apartment buildings in accordance with 18-2.2.1.2 and 19-2.2.1.2.**

(c) Any opening therein shall be protected by a fire door assembly equipped with a door closer complying with 5-2.1.8.

The stairway was totally destroyed by the fire, but according to plans provided by the college, this stairway was not equipped with a door at the top of the stair. The plans did show a door at the bottom, but the type of door is unknown.

**Continuity of Exit Paths**

This continuity of exits is important in order to provide occupants with a safe and protected route that will not become compromised by exposure to smoke or tire on any of the levels.

5-1.3.3 The enclosing walls of exits shall be arranged to provide a continuous protected path of travel, including landings and passageways, to an exit discharge.

The only means of egress that met the requirement for a continuous protected path of travel was the south exterior stairwell from the second floor to ground level. No other exit path within the building met this requirement. Occupants exiting from the third floor via the interior stairwell were required to discharge into a corridor on the second floor and travel approximately 20 feet through an unprotected enclosure before reaching another interior stairwell. Once they reached the first floor, they still were in an unprotected enclosure before reaching the exterior of the building.

**Corridor Doors on Second Floor**

There were 10 rooms on the second floor, which had doors that opened into an interior corridor. A level of protection for the doors to these rooms is specified in NFPA 101, *Life Safety Code*, in order to help limit the spread of smoke and fire either into or out of a room.

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

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.
The doors to the individual rooms were not equipped with self-closing doors, and the doors did not meet the requirements for a **20-minute** fire protection rating since they were constructed of 1-1/2-inch thick wood with 4 3/8-inch thick panels.

**Smoke Detection**

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.

The individual rooms in this building were not equipped with single station smoke detectors.

**VI. DISCUSSION**

This incident could be considered a success in that all of the residents were able to successfully exit the building without injury. However, the building was a total loss.

**Means of Egress**

There were a variety of exit routes from all of three floors of this occupancy, which included interior stairwells, an exterior stairway, and fire escape ladders. In reviewing the minimum requirements for exiting, fire escape ladders are not considered an acceptable means of egress from this type of occupancy by NFPA 101, *Life Safety Code*.

Due to a variety of design deficiencies in the three stairways serving the second floor, only one, the south exterior stair, could be considered an acceptable means of egress. This is an inadequate level of egress capacity for this structure.

The third story had only one interior stairwell that did not meet the minimum code requirements for an exit enclosure, and the south exterior stairwell had none. Therefore, the third floor did not have any acceptable means of egress.

In addition, there was insufficient protection provided in the stairwells to limit the fire spread from one floor to another. This could have been critical if the fire had started on the first floor, for there could have been several avenues for vertical fire spread to the second and third floors.

It is important to provide a continuous, protected path for occupants to use when exiting a building. In this structure, there was only one exit path, the south exterior stairwell from the second floor to the ground level, that met this requirement. Using any other route required the residents to move through unprotected areas after leaving a stairwell. This raised the risk of the occupants becoming exposed to smoke or fire **while** attempting to exit the building.

**Automatic Suppression System**

If the building had been equipped with an approved, maintained, automatic sprinkler system, the damage to the structure would probably have been significantly less. While this level of protection is not required for existing dormitories by the 1994 edition of NFPA 101, *Life Safety Code*, it is required for new dormitories. Historically, sprinkler systems have been found to be extremely effective in controlling a fire and significantly reducing the exposure to the occupants.

**Fire Detection System**

A smoke detector in the room of origin, which is required by NFPA 101, *Life Safety Code*, would have detected the fire in its early stages. Action could have been taken to control the fire before it grew to an unmanageable level.

**Residents/Employees Actions**

After the fire had been detected, a student entered the room to ascertain if there was anyone inside. While there, two security officers arrived and ordered the student to leave. The security officers then entered the room in order to attempt to suppress the fire using fire extinguishers. The fire had grown too large to be attacked, and they then exited the room. However, they failed to close the door, which allowed smoke and heat.
to enter the hallway, which compromised one of the egress routes. In addition, it allowed the fire to spread uncontained beyond the room. A closed door would have helped in providing a safer egress route for the residents, limited the damage, and provide a more tenable environment in which to operate for the fire fighters.

In addition, if the door had been equipped with a self-closing device, the door may have closed, limiting the spread of smoke and fire while the residents were exiting and prior to the arrival of the fire department.

According to the Franklin Fire Department, they conducted quarterly fire drills in this building. It has been demonstrated in other fires that such training increases the chances of an occupant reacting properly during an actual fire.

VII. Summary

Considering the type of structure, the time of the evening, and the number of occupants, the outcome from this fire could have been dramatically different. There were certain distinct design features of this building and actions taken by the residents and employees that contributed to the significant fire damage that did occur:

- Insufficient protection from vertical fire spread through interior stairwells
- Lack of automatic sprinkler protection
- Insufficient smoke detection in living spaces
- Lack of self-closing devices on individual room doors
- Improper action by employees upon detection of the fire

There were several factors that contributed to the lack of fatalities or serious injuries in this fire:

- The age and agility of the residents
- Lack of disabled residents, which may have required additional rescue resources or delayed evacuation of the building
- Familiarity with the building and the various means of egress
- Quarterly fire drills conducted by Fire Department

However, there were deficiencies in the means of egress from this building when evaluated with respect to the requirements of NFPA 101, Life Safety Code. These included:

- Insufficient means of egress from the third story
- Inadequate interior stairwells between the second and first stories

Since this fire, the college has taken the following steps:

- Banned all smoking in residential structures
- Conducted additional fire safety training for all resident directors and all residents in conjunction with the Franklin Fire Department.
- Installed single station smoke detectors in all resident rooms.

Conclusion

This fire identifies one of the difficulties in converting existing structures from one type of occupancy to another. This building was an old residence that was converted into a dormitory. As a result, it failed to meet the minimum requirements of NFPA 101, Life Safety Code. Special care must be used where such conversions are made to ensure that all the required measures are taken to meet the necessary level of fire safety protection for the residents. Frequent and ongoing fire prevention education and exit drills are also an important component of an overall fire safety plan.