

**BEAUMONT NURSING HOME**

Little Rock, AR

January 12, 1984



# **FIRE INVESTIGATIONS**

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NATIONAL  
FIRE PROTECTION  
ASSOCIATION  
INTERNATIONAL

Investigation Report

**Beaumont Nursing Home**  
Little Rock, Arkansas  
January 12, 1984

**Prepared by**

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In Cooperation with

**Federal Emergency Management Agency/  
United States Fire Administration**

and

**National Bureau of Standards/  
Center for Fire Research**

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## ABSTRACT

Shortly after 9:25 p.m., on January 12, 1984, a private patient attendant discovered a fire involving furnishings in an exit access corridor at the Beaumont Nursing Home in Little Rock, Arkansas and notified nursing staff. After being notified by the attendant, the staff initiated emergency procedures which included evacuating those patients closest to the fire and closing remaining patient room doors. Fire department units arrived at the Beaumont Nursing Home at approximately 9:38 p.m. and found fire showing in the northeast corner of the building. Fire fighters observed the nursing staff and civilians in the process of evacuating some of the 57 patients from the home. The fire caused severe damage to a section of the building, and resulted in the death of two patients and injury to 12 others.

The one-story Beaumont Nursing Home was built in two separate sections separated by a four-hour fire wall. The section of the building in which the fire occurred was built in 1954, and was of ordinary construction. Fire protection features in this section of the building included automatic sprinkler protection and automatic smoke detector protection connected to a building fire alarm system.

Fire department investigators have determined the cause of the fire to be an electrical short in an extension cord which ignited furnishings in an exit access corridor. Investigators also determined that the water supply to the automatic sprinkler system had been shut off; the automatic smoke detection system was not functioning properly; and there was a delay in the notification of the fire department. As a result, the fire was able to develop undetected by automatic systems and was well established at the time of discovery. This allowed heat and smoke to spread throughout this section of the nursing home.

Five significant factors were identified during the investigation as contributing factors to the loss of life and injuries from this fire. These factors were:

- A closed valve due to a ruptured underground supply line preventing water flow from the public main into the building's sprinkler system;
- The lack of a properly functioning building fire alarm system;
- The location of the "T.V. room" in the exit access corridor;
- A delay by the nursing staff in the notification of the fire department;
- The failure of established inspection and testing programs to identify deficiencies in various components of the fire protection systems provided at the nursing home.

## INTRODUCTION

The National Fire Protection Association (NFPA), with assistance from the Southern Building Code Congress International, Inc. (SBCCI), investigated the Beaumont Nursing Home, Little Rock, Arkansas fire in order to document and analyze significant factors that resulted in the loss of life and property.

This study was conducted under a Major Fire Investigation agreement among the Federal Emergency Management Agency/United States Fire Administration (FEMA/USFA), the National Bureau of Standards/Center for Fire Research (NBS/CFR), and the NFPA. The agreement, funded by FEMA/USFA, NBS/CFR, and NFPA, provides for the investigation of technically significant fires by the NFPA's Fire Investigation and Applied Research Division to document and analyze incident details and report lessons learned for loss prevention purposes.

The NFPA was assisted in data collection and analysis by the Southern Building Code Congress International, Inc. (SBCCI) under an agreement among NFPA and the three model building code organizations to investigate significant structural fires throughout the United States. In addition to SBCCI, the other cooperating building code groups are the Building Code Officials and Code Administrators International (BOCA) and the International Conference of Building Code Officials (ICBO). The three model building code groups are supporting NFPA by lending technical staff support for on-site field work and building code analysis.

The NFPA became aware of the Beaumont Nursing Home fire on the day it occurred. Tom Timoney, Fire Protection Specialist in the Fire Investigations and Applied Research Division, and Gary L. Fisher, Associate Engineer, Southern Building Code Congress International, traveled to Little Rock, Arkansas to document the facts related to the fire. A two-day, on-site study

**and subsequent analysis of the incident are the basis of this report.**

**Detailed data collection activities were made possible by the cooperation of the Little Rock Fire Department. This report presents the findings of the data collection and subsequent analysis efforts.**

**This report is another of NFPA's studies of fires having particular educational or technical interest. The information presented is based on the best data available during the on-site data collection phase and further data acquired through subsequent follow-up. It is not the NFPA's intention that this report pass judgment on, or fix liability for, the loss of life and property at the Beaumont Nursing Home. This report describes fire safety conditions at the Beaumont Nursing Home and presents findings on contributing factors to the loss of life and property based on NFPA's analysis of collected data and observations during the investigation.**

**The cooperation and assistance of Jim Wroten, Little Rock Fire Marshal, is greatly appreciated. A special thanks to Mr. Gary L. Fisher, Associate Engineer, Southern Building Code Congress International, for his on-site assistance in the data collection phase and for his input into the code analysis and the report writing process.**

## BACKGROUND

The Beaumont Nursing Home, located in Little Rock, Arkansas, was a 1-story, 61-bed, rectangular facility with an interior courtyard (see Figure 1). The approximate overall dimensions of the facility were 151 feet by 108 feet. A 4-hour fire wall with two corridor openings protected by 2-hour fire-rated doors separated the two "U" shaped sections of the building. A total of six exits were provided at the nursing home. Four of the exits opened directly to the outside and were located at each corner of the building on the north and south sides. The remaining exits were provided by the two fire-rated doors protecting the corridor openings in the 4-hour fire wall creating two horizontal exits from each section of the building.

A set of smoke stop doors were located in both the east and west corridors to separate the building into four smoke zones. Both the fire doors protecting the north and south corridor openings in the 4-hour fire wall and the smoke doors in the east and west corridors were held open by magnetic devices which would release upon activation of the building's fire alarm system. Doorways to offices, patient rooms, and treatment areas opening onto the centrally located 7-foot wide corridors were separated by a 1 3/4-inch solid-bonded, wood-core doors without self-closing devices.

The section of the Beaumont Nursing Home in which the fire occurred was built in 1954. At that time, the nursing home was located in the jurisdiction of Pulaski County, Arkansas. This section of building had exterior walls constructed of 8-inch concrete masonry units and interior walls constructed of painted 4-inch concrete masonry units. The principal roof construction in this section of the building was 1-inch by 4-inch, tongue-in-groove wood decking on 2-inch by 6-inch wood trusses with asphalt shingle roofing. This section of the building also had several office and storage areas built

, sometime after original construction, which consisted of 2-inch by 4-inch wood framing with 1/2-inch gypsum wallboard. The ceiling throughout this section of the building was constructed of plaster on wire lath.

Fire protection features in this original section of the building included complete automatic sprinkler protection, automatic smoke detector protection connected to a building's fire alarm system, and portable fire extinguishers.

In September, 1959, land area which included the Beaumont Nursing Home was incorporated into the city of Little Rock. Construction of the second section of the nursing home took place in 1969. The second section had exterior walls constructed on 8-inch concrete masonry units and interior walls of painted 4-inch masonry units. The roof assembly in this section of the building consisted of steel bar joists attached to corrugated metal decking on which a built-up roof was placed. The ceiling, which was suspended approximately 18 inches below the metal roof deck, was constructed of plaster on wire lath.

Fire protection features in this section of the building included automatic smoke detector protection connected to a building fire alarm system and portable fire extinguishers. There was no automatic sprinkler protection in this section of the building.

A "T.V. room" was located in the exit access corridor in the northeast corner of the building. This section of the east corridor widened from 7 feet to a width of 12 feet. An upholstered recliner, a couch, and two end tables with lamps were arranged along the east wall of the corridor facing a television on the west wall. Fire department investigators identified the cushioning material in the recliner and the couch to be urethane foam. From the main nurse's station, 88 feet away, full view of the "T.V. room" was obstructed.

The building's heating, ventilating, and air conditioning (HVAC) system was designed using the exit access corridors as return air plenums. Since this design did not meet the requirements of the state enforced standard and NFPA 90A, a waiver was granted which permitted the nursing home to remain in operation without redesigning the HVAC system. The waiver stipulated that smoke detectors in the corridor smoke detection system would be placed on 30-foot centers and that the activation of the building's fire alarm system would automatically shut down all HVAC equipment.

#### Building Fire Alarm System

A fire alarm system protecting both sections of the building was installed in three phases beginning in July of 1973. Phase one of the installation provided a corridor smoke detection system with HVAC and furnace fuel supply shutdown, manual pull stations, and automatic notification of the fire department through a 24-hour central station alarm monitoring service. Phase two provided supervision using a tamper switch, on the OS&Y valve located below the alarm valve on the sprinkler riser. The third phase of the installation, completed in August, 1980, expanded the smoke detector protection to include patient rooms and also provided a red indicating light in the corridor above each patient room door to further assist staff in identifying the location of an activated detector.

All the components in the fire alarm system were connected to a three-zone fire alarm annunciator panel located at the main nurses' station (see Figure 1). Zone one included all the smoke detectors and pull stations in the south half of the building, while zone two included all the smoke detectors and pull stations in the north half of the building. Zone three monitored water flow in the automatic sprinkler system.

Activation of any smoke detector or pull station in zone one or two, or the activation of the water flow device in zone three, immediately sounded

fire alarm bells throughout the building and released magnetic hold opening devices on the fire and smoke doors.\* The zone of alarm would then be indicated by an illuminated red light on the fire alarm annunciator panel.

#### Automatic Sprinkler System

A wet-pipe sprinkler system provided complete coverage of the original section of the building (east of the 4-hour fire wall) both above and below the suspended ceiling. Documentation indicates a 4-inch underground fire line was installed in November, 1966, to supply water to the sprinkler system. The line ran from the public water main to a valve pit located in a vacant lot adjacent to the nursing home where the fire department connection tied into the system. From this point, the underground entered the building in the northeast corner, where a valve closet enclosed the sprinkler riser.

In August, 1980, City of Little Rock water company personnel investigating a report of a water main break discovered that the 4-inch underground fire line was broken at a point below the paved surface of the street. They isolated the line by closing a valve immediately downstream of the connection to the public water main and informed facility staff of the problem.

In December, 1982, water company personnel installing a new domestic water line to the facility found the 4-inch underground fire line dry and again informed facility staff of their discovery.

Sometime between December, 1982, and the fire, the vacant lot north of the nursing home was cleared. Reportedly, during the clearing operation, equipment struck the fire department connection fracturing an elbow at the base of the stem.

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\*At the time of the fire, the capability of the fire alarm system to automatically notify the fire department and shut down the HVAC and furnace fuel supply had been eliminated.

Apparently, the damage to the underground fire line and the fire department connection was never repaired. During their investigation, fire department investigators uncovered the 4-inch line and found the break described by water company personnel. They concluded a water supply impairment existed at the time of the fire and that the automatic sprinkler system was inoperable.

#### Fire Safety Planning

At the time of the fire, the regular evening shift consisting of four staff members was on duty. Staff training sessions and fire drills were reportedly held once each month. The fire drills stressed the importance of staff closing doors to patient rooms and the evacuation of patients closest to the fire through the nearest accessible exit. Apparently, the drills did not include stressing the importance of the immediate notification of the fire department and did not assign this task to any of the staff. During interviews of the four staff members working at the time of the fire, two described attending one meeting where the topic was fire safety and the third stated she had never attended the structured fire safety meeting.

An administrator at the Beaumont Nursing Home held two fire drills in October, 1983. These drills included asking nurses to familiarize themselves with the posted operating instructions for the fire alarm system. She described being concerned that the staff did not fully understand what each member was to do in case of a fire. As a result, she developed a fire safety training program to instruct each staff member on the actions to take in the event of a fire. This fire safety training program was scheduled for January 20, 1984.

#### Licensing and Inspection

The licensing and inspection of nursing home facilities in the state of Arkansas is the responsibility of the Office of Long Term Care - Department of Human Services. Annual inspections evaluate a wide spectrum of nursing

home operations including fire protection features. The most recent inspection of the Beaumont Nursing Home was completed on June 28, 1983. The inspection report identified key areas of concern which included improperly documented fire drills, the lack of posted smoking regulations, and distances from the nursing station to residents' rooms exceeding the maximum allowed. The building's fire alarm system and the automatic sprinkler system were reportedly tested during this inspection. Interviews revealed that the fire alarm testing done at this time did not include the verification of operable HVAC duct smoke detectors, fan shutdown relays, or properly maintained fire dampers. Details regarding automatic sprinkler system testing were incomplete and unclear, however, interviews conducted by state investigators of the personnel responsible for the testing of the system reveals that they were not completely familiar with proper test methods. Apparently, no formal training had been given to familiarize them with automatic sprinkler systems, their operation or maintenance.

#### Little Rock Fire Department

The city of Little Rock covers an area of approximately 85 square miles with a population of 183,000. The Little Rock Fire Department is a fully paid department with 325 career fire fighters operating 18 stations with 19 engine companies and 6 truck companies.

In October, 1983, the fire department developed a program which requires all buildings equipped with automatic sprinkler systems, standpipe systems, and/or fire alarm systems to be tested annually by a competent commercial contractor and the results of these tests reported to the fire marshal's office. At the time of the fire, the fire marshal had no record of this testing having been completed at the Beaumont Nursing Home.

## Weather Conditions

Weather conditions at the time of the fire were reported as:

Skies	overcast
Temperature	40 <sup>0</sup> F
Wind	5 mph from the west
Relative humidity -	70 percent
Barometric pressure -	30.18

## THE INCIDENT

Sometime between 9:15 p.m and 9:20 p.m on January 12, 1984, a private patient attendant working at the Beaumont Nursing Home took the last resident from the "T.V. room" to his sleeping quarters. At approximately 9:25 p.m, she was walking from the nurses' station to room 1 when she discovered a fire in the "T.V. room". She yelled "Fire" which alerted the three staff members and the head nurse. The staff began to evacuate patients from their rooms, starting with those patients closest to the fire in the north corridor. These patients were moved through the fire doors in the north corridor and outside the building. A staff member stated that five residents had been evacuated before the fire alarm sounded and the fire doors closed., She attempted to notify the fire department through a telephone operator but was disconnected.

At this time, the head nurse responding from the nurses' station observed that the couch and drapes in the "T.V. room" were involved in flames. She travelled through the fire door as far as room 3 before she was halted by thick black smoke. She instructed the staff to close all patients' doors and assisted them in doing so. A staff member was then instructed to get a portable fire extinguisher, while the head nurse returned to the nurses' station to call the fire department. She had difficulty locating the fire

, department phone number and ultimately notified the fire department with the assistance of a telephone operator. Fire department records show this call was received at 9:32:55 p.m

At around 9:30 p.m, passers-by driving on Rodney Purham Road noticed fire in the northeast corner of the Beaumont Nursing Home. They then drove a short distance to a gas station where the attendant telephoned the fire department at their request. The fire department logged the receipt of a telephone call from the service station attendant at 9:33:16 p.m The passers-by then returned to the facility and, along with other volunteers, assisted the staff in evacuating patients.

#### Fire Department Operations

First-in fire department units arrived at the Beaumont Nursing Home at approximately 9:38 p.m and found fire showing in the northeast corner of the building. Fire fighters also observed nursing staff being assisted by civilians in evacuating patients from the building. Two fire fighters advanced a 1 1/2-inch handline through the exit door in the northeast corner to extinguish the fire involving the furnishings in the "T.V. room" Simultaneously, fire fighters from a truck company discovered extension of the fire into the attic area above the northeast corner of the building and extinguished the attic fire with a handline. Fire fighters equipped with self-contained breathing apparatus (SCBA) described entering the building on the north side and finding the north corridor charged with thick black smoke. These fire fighters began entering patients' rooms and handing occupants through windows to volunteer persons on the outside. Later arriving fire fighters, also equipped with SCBA, entered the building on the south side, and found the south corridor charged with thick black smoke. These fire fighters removed patients on beds to the west end of the building where staff and volunteers completed the evacuation.

**The initial fire crews reported the fire alarm was not sounding upon their arrival and did not sound at any time during their operations. Post-fire inspection of the fire alarm annunciator panel by a fire ground officer revealed an illuminated trouble light.**

#### **Damage to the Building**

**Fire damage on the first floor of the building was limited to the furnishings and drapes in the "T.V. room" and the combustible components of the sprinkler valve enclosure. The fire was able to spread from the "T.V., room" into the attic space above through an aluminum grille connected to flexible fiberglass HVAC duct work. Once inside the attic, the fire ignited the trusses and roof decking. The fire extension into the attic space resulted in the fire department having to remove a large portion of the plaster ceiling in this area of the building while checking for extension. Varying amounts of smoke damage were evident throughout the building.**

#### **Casualties**

**Of the 57 patients in the Beaumont Nursing Home at the time of the fire, 14 were transported to local hospitals. Forty other residents were transferred to another nursing home and three residents were taken home by family members. Four of the 14 residents transported to local hospitals died within 24 hours.\* The remaining 10 residents were treated for smoke inhalation and other complications resulting from the fire.**

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**\*Several of the remaining 53 patients in the home at the time of the fire died within the weeks that followed the fire. Detailed information on the causes of their deaths which may link them to the fire incident was not available to NFPA at the time of this report.**

**Autopsies were completed on the four residents who died within 24 hours of the fire. The Chief Medical Examiner determined that a 90-year-old female died of complications linked to high carbon monoxide levels. A second victim, a 91-year-old male, died of smoke inhalation. The two remaining residents autopsied showed no distinct signs of fire exposure and, due to limited initial hospital information, were determined to have died of natural causes.**

**Table 1**

**Summary Time Line of Significant Events**  
**Beaumont Nursing Home**

<b><u>Time</u></b>	<b><u>Significant Actions During Incident</u></b>
*9:15 p. m - 9:20 p. m	A private sitter takes the last resident from the "T.V. room" to his sleeping quarters.
*9:25 p. m - 9:30 p. m	The private sitter, walking from the nurses' station to room 1, discovers a fire in the "T.V. room" and alerts the nursing staff.
*9:30 p. m	Passers-by noticed a fire in the northeast corner of the nursing home and continued on to notify the fire department from a service station.
9:32:55 p. m	Fire department receives notification of the fire from staff at the Beaumont Nursing Home.
9:33:16 p. m	Fire department receives second call on the fire from an attendant at a nearby service station.
9:38 p. m	First-in fire department units arrive at the Beaumont Nursing Home. Report fire showing and observe nursing staff and civilians assisting patients in evacuation.
9:44:43 p. m	Additional engine companies dispatched to the Beaumont Nursing Home.
9:48:33 p. m.	An additional truck company is dispatched and the fire ground commander requests ambulances.
10:08 p. m	Fire under control.

\*Estimated times given to Little Rock Fire Department investigators.

## ANALYSIS

Fire department investigators determined the cause of the fire to be an electrical short circuit in an extension cord which ignited an upholstered chair in the "T.V. room". Once ignition occurred, the fire spread rapidly to the urethane foam cushioned couch and drapes in the 'T.V. room'. Early fire development was undetected due to the apparent inoperability of the automatic smoke detector circuit in zone 2 protecting the "T.V. room" and the nursing staff's inability to fully view the "T.V. room" from the nurse's station. Investigators believe the fire alarm system did not activate until smoke had migrated approximately 65 feet south in the east corridor where the closest zone 1 smoke detector was located. Testing of the fire alarm system after the incident identified problems with the zone 2 automatic smoke detector circuit which would have resulted in the smoke detectors protecting the "T.V. room" area being inoperative. Investigators, however, were unable to clearly determine from the testing the operating condition of the fire alarm system at the time of the fire.

Although a sprinkler was located 5 feet from the area of fire origin, the absence of water in the sprinkler system prevented the fire from being extinguished. The fire from this point was then able to fully involve all the combustibles in the 'T.V. room' and extend to ignite the combustible roof assembly above the suspended ceiling.

When the staff was alerted to the fire, they were confronted with rapidly deteriorating conditions in the exit access corridors. The time available for the staff to complete their emergency procedures, which did not include the immediate notification of the fire department, was significantly reduced. The staff was, however, able to evacuate several patients in rooms closest to the fire, and close other patient room doors before being driven from the

corridors by the heat and smoke., Unfortunately, the protection afforded many patients in rooms with closed doors was negated when smoke in the corridors was distributed through the HVAC system into patient rooms. The distribution of smoke through the HVAC system was linked directly to the use of the corridors as return air plenums coupled with the elimination of the automatic HVAC system shutdown feature from the building's fire alarm system

Fire fighters found the corridors in the fire area charged with intense heat and smoke, and the remaining corridors throughout the building filling with smoke. Because of this, many patients could not be evacuated through the corridors and were removed through patient room windows. Fortunately, a number of civilians (church youth group, passers-by, etc.) happened to be in the area and volunteered assistance in evacuating patients.

The 1981 Edition of the Life Safety Code®, Chapter 13, Existing Health Care Facilities, requires complete automatic sprinkler protection in both sections of this facility because of the ordinary and unprotected noncombustible construction. In addition, the facility is required to have a manually operated fire alarm system and automatic notification of the fire department. The section of the building where the fire occurred appeared to conform to these requirements. However, careful examination of the facility found that the level of life safety required by the Code was not present at the time of the fire. In addition to the specific hardware requirements, the Code stresses the importance of the careful development of operating and maintenance procedures outlined in Chapter 31 and detailed in other NFPA standards such as 13A and 72E is critical in retaining the required levels of life safety.

NFPA 13A, the Standard for Inspection, Testing and Maintenance of Sprinkler Systems, states "periodic, competent attention is a prime requirement if the system is to serve its purpose effectively." Section

2-7.4.1 requires that underground gate valves with roadway boxes be operated quarterly. In this case, this valve had been closed since August of 1980 due to the ruptured underground supply line. Section 2-8.1 requires the monthly inspection of fire department connections. Had this been done, the individual inspecting the connection would have been alerted to both the damaged fire department connection and the lack of water supply to the system

NFPA 72E, Standard on Automatic Fire Detectors, provides basic minimum requirements for performance of automatic fire detectors to ensure timely warning for the purposes of life safety and property protection. Section 8-3.3 requires all smoke detectors to be tested at least semi-annually. In this case, smoke detector maintenance was limited only to those detectors which inadvertently actuated during routine activities in the areas they protected. There was no structured maintenance and testing program for the building fire alarm system since January, 1983.

In general, the Life Safety Code, in Section 13-3.6.1, does not allow the furnishings comprising the "T.V. room" to be located in an exit access corridor as they were in the Beaumont Nursing Home. Exception 4, however, does allow for such areas if the space is provided with automatic sprinklers, an automatic smoke detection system and the space is located to permit direct supervision by the facility staff.

The delay of notification of the fire department to a fire condition has been identified in many NFPA fire investigations as a critical factor in the loss of life and fire severity. In this case, the emergency procedures in effect at the nursing home did not include the immediate notification of the fire department. This resulted in an approximate 3 to 8 minute delay in the notification of the fire department following discovery of the fire by the private patient attendant.

**Fundamental to retaining the required levels of life safety is the understanding that properly trained, competent individuals knowledgeable in all aspects of the requirements for specific facilities or systems will carry out the required inspection and testing programs. In this case, individuals lacking basic knowledge on the operation of automatic sprinkler systems and building fire alarm systems were responsible for the maintenance, inspection, and testing of these systems. As a result, these established programs failed to identify deficiencies in the fire protection systems at the Beaumont Nursing Home which included a closed valve in the sprinkler system, a fractured underground water main, a fractured fire department connection, and the removal of HVAC duct detectors and shutdown relays from the building fire alarm system**

**Five significant factors were identified during the investigation as contributing to the loss of life and injuries from this fire. These five factors were:**

- ⊙ **A closed valve due to a ruptured underground supply line preventing water flow from the public main into the building's sprinkler system**
- ⊙ **The lack of a properly functioning building fire alarm system**
- ⊙ **The location of the "T.V. room" in the exit access corridor;**
- ⊙ **A delay by the nursing staff in notification of the fire department;**
- ⊙ **The failure of the established inspection and testing programs to identify deficiencies in various components of the fire protection systems provided at the nursing home.**

BEAUMONT NURSING HOME

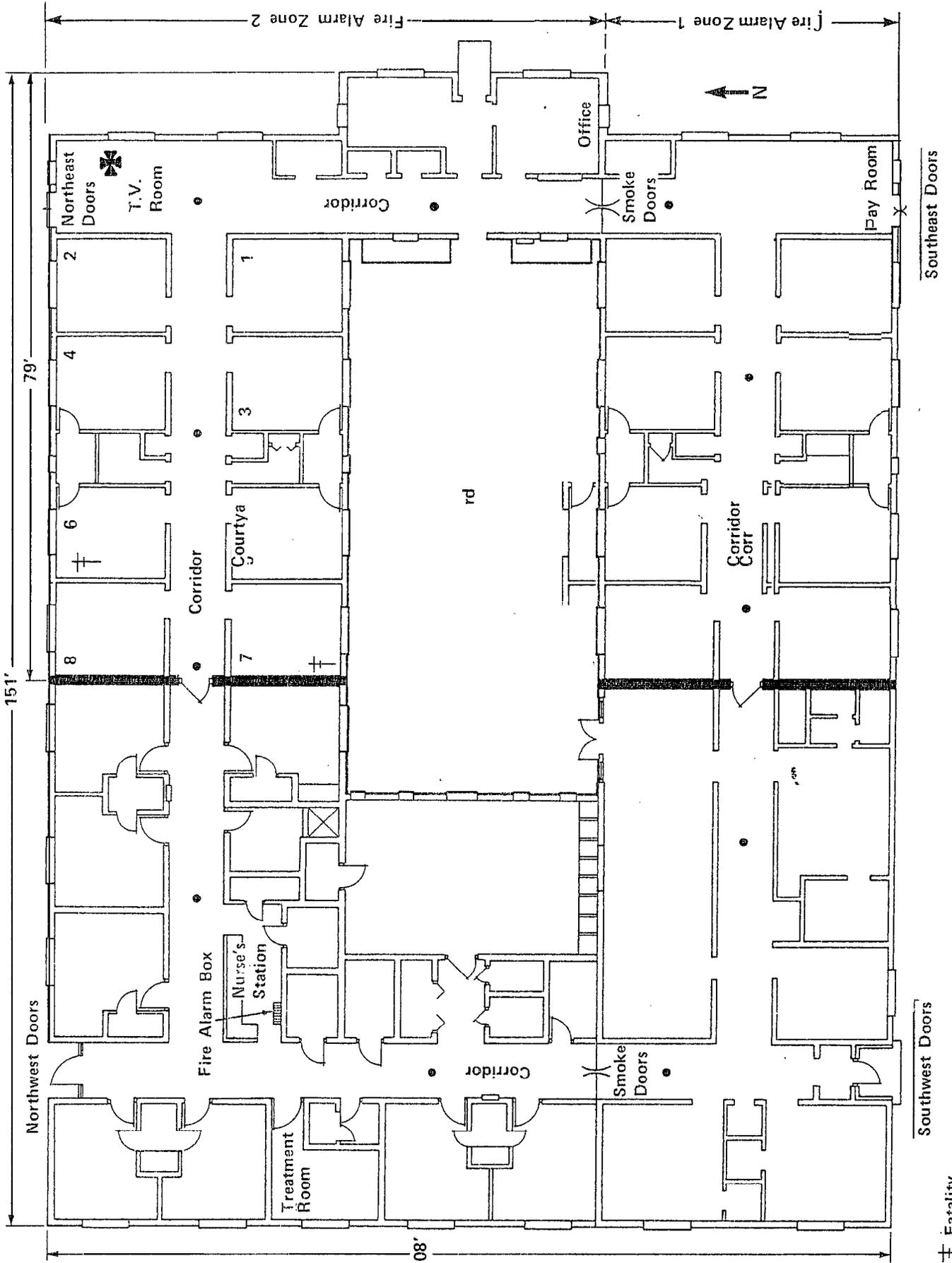


Figure 1