

Horror in a Haunted Castle

How did the fire in the Haunted Castle start? Why were eight teenagers unable to reach safety? How could fire protection and early warning systems have helped to avert this disaster?

Presented here is the incident itself, the strategy and tactics used to fight this fire, what the preliminary investigations uncovered, and recommendations to prevent a recurrence of such an event.

The Fire

BY WILLIAM J. COMER

Friday, May 11, 1984, was the day of the tragic holocaust that claimed the lives of eight teenagers and injured a dozen others at the Six Flags' Great Adventure amusement park in Jackson Township, NJ. This was also a day of disgrace for fire protection code enforcement officials everywhere.

The Haunted Castle, a ghastly spook house filled with flammable exhibits and actors dressed as ghouls, was constructed of seventeen 8 × 40-foot linked truck trailers with a false facade made to look like a castle with archways and a moat.

The complex of truck trailers was ar-

ranged in an "H" pattern, eight trailers on each side and a control trailer in the center. Only one eight-trailer section was in use at the time due to a light attendance at the park. The floors, walls, and ceilings were lined with plywood. Some of the trailers were partitioned with 2 × 4-inch wood studding covered with plywood paneling to form the maze. Exhibits were constructed of wood and covered with foam rubber. Some of the walls were covered with a foam cellular plastic to add realism to the exhibits and to protect people from injury. Each trailer was air conditioned with an exterior three-ton unit equipped with large circulating air fans.

Fire department operations

The fire was discovered by an employee assigned inside the maze. He smelled smoke, but thought it was from a cigarette. Checking further, he saw smoke coming from the phantom exhibit. He immediately went to the control center trailer where he called in the alarm to the security office. In about four minutes, flame was showing at the top and rear of the trailer.

The Great Adventure fire brigade was dispatched at 6:35 p.m. and responded with two pieces of fire apparatus manned by two men. With the help of other employees, the brigade was able to stretch four 1½-inch handlines. Employees were instrumental in assisting several patrons from the Haunted Castle.

The facility's fire alarm was supervised and automatically transmitted to the local fire department. The Jackson Township Fire Department received the alarm at 6:41 p.m. Jackson Mills and Cassville Fire Departments also responded.

While enroute to the incident, Chief John Kebeck of the Cassville Fire Department tried to get a progress report via radio. However, heavy traffic on the fire radio prevented him from getting through. Being resourceful, he

used his work band radio to call home and had his wife telephone the police dispatcher. Mrs. Kebeck relayed the information that the fire was in the Haunted Castle.

On April 1, 1984, the Cassville Fire Department conducted a drill at the Haunted Castle. Among the many pre-fire plans formulated at this drill, it was determined that if a fire did occur at the Haunted Castle, it would require a four fire department response.

Chief Kebeck ordered this pre-fire plan to be activated, thereby increasing the responding units to eight pumbers and two tankers (one 8,500 gallons and one 5,000 gallons).

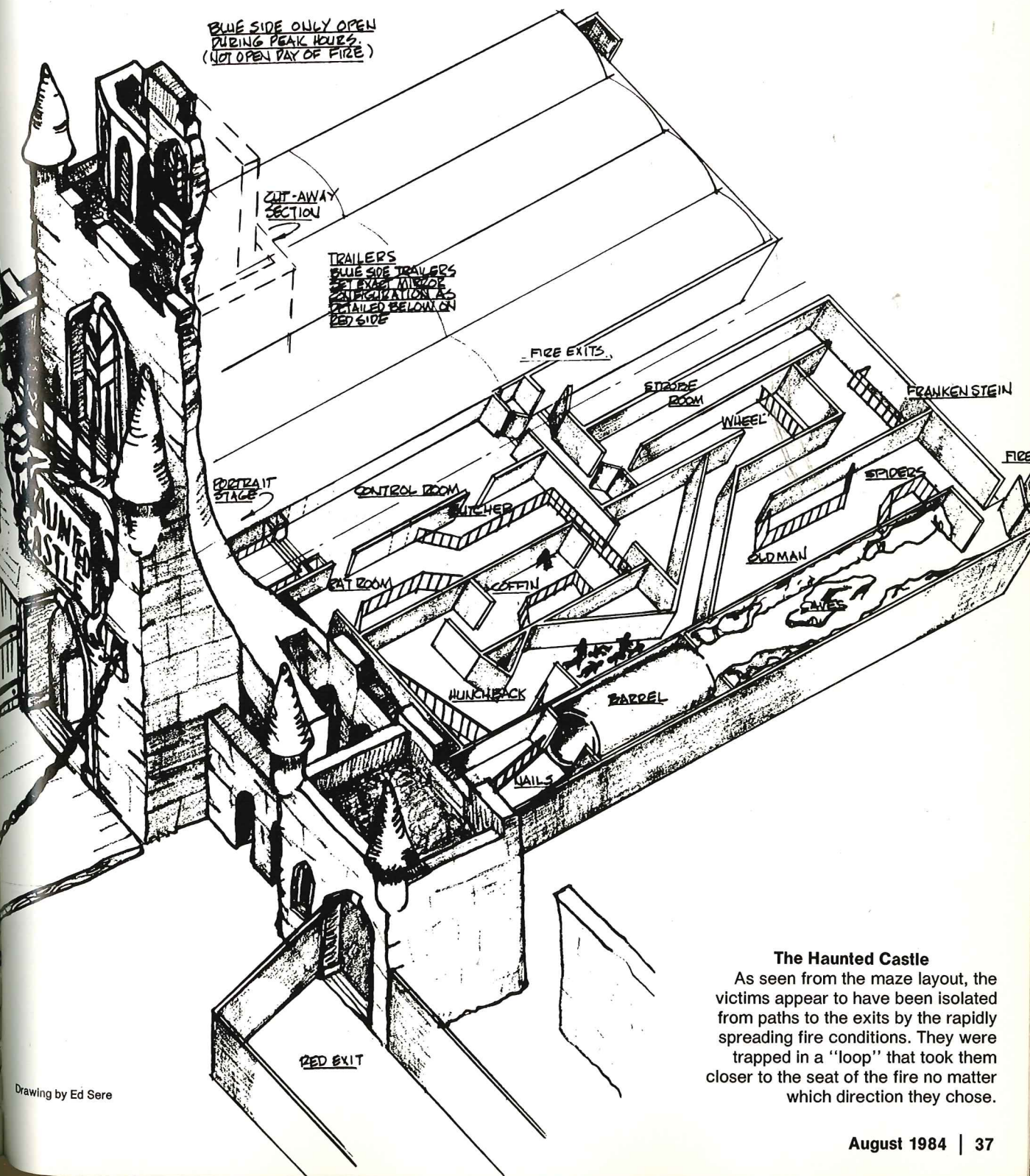
The Free Wood Acre Fire Department responded with a tanker and was assigned the responsibility of water control and supply. There were no water problems on the fire-ground. Two hydrants were used, and ample tankers were available.

On his arrival at the fire, Chief Kebeck received a report that all occupants had been evacuated. Disregarding this, search operations were continued. Initial size up indicated that the fire was being force fed from the rear of the row of trailers. It was later reported that four of the attraction's air circulating fans were operating at the rear of the trailers and contributing to the velocity of the fire.

An interior offensive attack was the initial strategy, but the amount of fire combined with the collapse of flooring near the entrance forced all units to an outside defensive operation. Eight 2½-inch and eight 1½-inch lines were employed. A fence to the rear of the

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Castle: *The Tragedy/The Investigation*



The Haunted Castle

As seen from the maze layout, the victims appear to have been isolated from paths to the exits by the rapidly spreading fire conditions. They were trapped in a "loop" that took them closer to the seat of the fire no matter which direction they chose.

trailers was removed, allowing for a four-sided attack.

The fire quickly involved the entire complex. Several holes were cut in the sides of the trailers in order to place lines directly on the fire. Most of the fire was through the roof, subsequently consuming the trailers involved.

When conditions permitted, a thorough secondary search was conducted. The bodies of the eight trapped victims were located at that time. They were found in a loop section of the maze. The teenagers didn't have much of a chance to escape the fast toxic buildup of copious amounts of heated black smoke followed by a fast flame spread from both the rear and the front due to the loop in the maze.

This fire should never have happened. In fact, the Haunted Castle should never have been built. It was constructed without a building permit and a certificate of occupancy was never issued. The structure was subject to the state's uniform construction code that, among other things, requires smoke detectors and a review by the state and a professional plan reviewer.

The use of truck trailers linked together to form the Haunted Castle and the placement of large loads of flammable materials in them was a major factor contributing to the fast fire spread. Polyurethane foams, under the proper conditions, are capable of propagating flames at a very high rate because they have a high heat release rate due to having a low thermal inertia. These foamed plastics have the propensity to generate large amounts of black smoke and toxic gases, including carbon monoxide, hydrogen cyanide, phosgene and nitrous oxides.

The small size of the truck trailers, made smaller by the addition of partitions to form a maze, set up conditions for a flashover. The plywood wall, ceiling, and floor covering, along with the sprayed-on foam would reach flashover point rapidly due to the pyrolysis of the combustibles and the sensitivity of the radiate thermal feedback in the confined space.

Another major factor contributing to rapid flame spread was the four large air circulating fans.

At press time, a grand jury investigation, called by Prosecutor Edward J. Turnbach of Ocean City, NJ, was underway. Senator Frank X. Graves, Jr., chairman of the Senate Law, Public Safety and Defense Committee, called for statewide meetings to be conducted by the New Jersey State Fire Safety Commission. These meetings are analyzing all existing state agency requirements pertaining to the uniform construction code, and making needed revisions for new legislation that would prevent the recurrence of the Haunted Castle fire or similar tragedies.



From left to right, the rear of the spider, frankenstein, and strobe room trailers (the latter being the point of fire origin) show the effects of the heat generated. The air circulating units that intensified the fast-moving fire are located in the foreground.

Safety Feature Recommendations

Proper safety code enforcement, especially in an amusement park attraction filled with "phantoms" and optical illusions, is mandatory for preventing a recurrence of New Jersey's Haunted House tragedy.

The Building Official and Code Administration (BOCA) Basic Building Code, the BOCA Basic Fire Prevention Code, and the National Fire Protection Association's Life Safety Code all prescribe construction, protection, and occupancy features to minimize danger to life from fire, smoke, fumes, or panic during a fire incident. The following features, as well as a study of people activities, should be incorporated into a building designed for such an occupancy as the Haunted Castle:

- Smoke detectors.
- Sprinkler system equipped with a central station signaling system.
- Emergency lighting to conform to the national electrical code.
- Exit signs with supplemental directional signs designating the direction of egress.
- Interior finish and furnishings in all means of egress should be Class A (flame spread 0 to 25).
- Employees and attendants should be schooled in their duties in case of fire, smoke, panic, or other emergencies in order to expedite the evacuation of all occupants.
- Fire brigades must be adequately manned. Two or three men do not make a fire company. An improperly manned and ill-trained fire brigade responding first due to an incident will only add to the delay

of the fire attack and cause unnecessary confusion.

- The number of exits must be adequate and maintained in a safe condition at all times for a speedy flow of all occupants to safety.

- Manual shutoff for all air conditioning or ventilating systems. The shutoff must be easily identified and located where it is readily accessible for fire department use, perhaps in the same locations as recommended for smoke detectors.

- Automatic smoke vents in the roof.

- Eliminate loops in corridors that create dead end areas where fire could seal off means of egress at both ends of a loop.

- Remove rubber tires from trailers that are occupied by people. These tires are difficult to extinguish when on fire, and produce large volumes of smoke.

- Use of cellular plastic foam, even when treated with a fire retardant, should not be used as an interior finish in buildings classified as places of assembly.

- Truck trailers or similar type containers that would set up a vault-like atmosphere when subjected to fire, smoke, or toxic fumes should not be used for public assembly areas.

- Plywood should not be used as interior finishes on walls, floors, and ceilings without an approved thermal barrier such as gypsum wallboard. (Some plywoods are extremely flammable and easily subjected to breaks and tears are exposed surface areas, making for a more readily ignitable material.)

The Cause and Preliminary Investigations

BY JOHN D. GARCIA and H. LAWRENCE WILSON, JR.

The Haunted Castle at Six Flags' Great Adventure amusement park in Jackson Township, NJ, was designed specifically to scare people. It contained gruesome displays that remained darkened until you approached. There were spider webs hanging down that made your skin crawl.

On Friday, May 11, 1984, the amusement park had an average crowd of 15,000 people. There was a line of people waiting to get in the Haunted Castle, and employees were allowing approximately 10 people to enter the castle per minute. The average time to get through this attraction from entrance to exit is approximately three minutes. At any given time, there are between 30 and 45 persons within the castle.

The castle was made up of 17 trailers, each 8 X 40 feet with partitions down the middle. Fifteen of these trailers were box trailers and two were open flatbed trailers. The trailers were of no special make or model. A few contained the side hinged type doors and others had the overhead roll type. The front of the castle was a framed structure with molded polyurethane-type foam sprayed on and then painted. The frame facade stood about 45 feet high.

The castle consisted of two identical sides, each having eight trailers. The seventeenth trailer was used as a control room for the employees, where they put on their makeup and costumes. It contained the electric panels for both sides of the attraction as well as tables and chairs, lockers, a telephone, and two fire extinguishers.

All the trailers were connected together by means of plywood and wood framing. The space between each of the trailers was about eight inches.

On the night of May 11, only one side was open to the public. There were four employees, dressed as ghouls, on duty. At approximately 6:30 p.m., an



Entrance to the Haunted Castle is made even more ghastly by the deadly fire damage.

employee, positioned at the butcher station (see map), thought he smelled smoke. This was a usual occurrence. The employee was accustomed to telling guests to put out their cigarettes. A week before, someone had set off a smoke bomb. He went to check. An employee passageway connected the butcher station and the phantom of the opera station.

As the employee went through the passageway, he observed heavy smoke

A typical exit door used in the trailer complex for emergency egress.



coming from the phantom area. He then proceeded back through the butcher station to the front gate to tell the other employees not to let anyone else enter and that he thought there was a fire in the castle. He then re-entered, went to the control room, dialed the Great Adventure fire brigade, and notified them of the fire (this was five minutes after detecting smoke). He then exited via the control room door. Looking to his right, he saw smoke and flames around the exit door from the strobe room.

Meanwhile, an adult guest discovering the fire ran through the remainder of the castle and told an employee that there was a fire inside. This guest was a major witness in helping to determine the point of fire origin.

The Great Adventure fire brigade is manned by a captain and a firefighter. As the engine left the fire station, the captain saw that they had a working fire. He radioed security to notify the Jackson Police Department to enact the mutual aid plan.

An offensive initial attack was made with a 1½-inch line through the front door. The captain was met with heat, smoke, and flame rolling over his head within 30 feet of entering the castle. He decided to retreat and attack the fire from the rear trailers.

The regular police dispatcher was on dinner break when the alarm was received at 6:41 p.m. The relief dis-

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pattern displayed in the trailer to Great Adventure. The mutual aid plan calls for Stations 54, 55, 56, and 57 to respond.

The first mutual aid company, located four miles from the amusement park, arrived 11 minutes after receiving the alarm. The company was directed to respond through the employees' gate and to come around behind the castle. A second mutual aid company, located 15 miles from Great Adventure, was on the scene at 6:56 p.m.

Additional mutual aid companies were called, bringing a total of 15 fire companies to the incident.

Arriving fire companies encountered some difficulty getting to the fire scene because of civilian congestion. Security directed some of the fire companies to take up positions in areas other than their assigned pre-planned areas. A mutual aid drill had been conducted on the Haunted Castle a month before the incident. Security personnel were not active participants in that drill.

Great Adventure has its own water supply, maintained by the Jackson Municipal Utilities Authority. There is a one-million-gallon storage tank at ground level. This is supplied by water pumps from artesian wells. The water demand was not great enough during the initial attack for the pumps to kick on automatically; security had to turn them on.

After the initial attempt to fight this fire in the offensive mode, the strategy was changed to a defensive mode. Not until the fire was knocked down was there an attempt to re-enter the trailers. It was at this time that the fatalities were discovered. Firefighters were unsure as to whether they were manikins or human remains. The officer in charge ordered that all remains be treated as human, that nothing be touched or removed, that firefighting procedures continue throughout the rest of the castle, and that every firefighter continue to look for signs of other fatalities.

It was at this time that, according to standard operating procedures in the event of a fatality, all necessary agencies were notified to respond to the fire at Great Adventure.

The County Fire Marshal's Office, the County Prosecutor's Office, and the Arson Squad from the New Jersey State Police spearheaded the investigation in the cause and origin of the fire. Teams were set up and assigned the tasks of collecting information. It was through the use of this information that the exact point of origin was established.

Upon first investigation, two low burn patterns, remote from each other, made it appear as two separate points of origin. Further investigation disclosed that the fire had spread from one set of trailers to the other. The heat and

Initially there were two separate burn patterns discovered. Only intense investigation disclosed that there was a single point of fire origin.

damage that occurred from the burning tires was extensive, and hampered locating the point of origin.

It was determined that at the end of the strobe room corridor was a crash pad of polyurethane foam. This was to prevent injuries to guests running through the strobe room and hitting the wall. It was also determined that the strobe light was malfunctioning on the day of the fire. It would go out for periods of three to four minutes, leaving the corridor in total darkness.

A very common practice in the castle was for the guests to light matches or lighters to see where they were going. The employees were constantly instructing the guests to put out the matches. On the night of the fire, a 14-year-old was using a lighter to see. He accidentally walked into the foam on the strobe room wall, setting it on fire. He attempted to beat it out with a canvas bag, was unsuccessful, and apparently continued through the castle.

When ignited, polyurethane foam

burns rapidly. The strobe room corridor was constructed of combustible plywood on the ceiling, floor, and walls. The fire spread rapidly down the corridor and around through the phantom of the opera section of the castle. The course of the fire effectively cut off any avenues of egress for the victims.

Eight teenagers died of smoke inhalation and carbon monoxide poisoning. The victims were going through the castle in two groups. As the first group of five teenagers made their way through, they passed the hunchback display and then a display of a revolving barrel. A little further on, as they were nearing the phantom of the opera station, they encountered smoke and hot gases. It was most likely at this point that they started to run back.

Meanwhile, the second group of four teenagers was still advancing and getting nearer the revolving barrel when both groups met. All nine teenagers tried to reverse their path and go out through the entrance.

Victim number one and his girlfriend were in the front. They were only able to get as far as the coffin display when they were overcome by smoke and fell. A Great Adventure employee was able to get the girl out. The other seven victims were found in a corridor by the hunchback display.

The travel distance through the castle was 458 feet. From the entrance to the first emergency exit was 226 feet. A second emergency exit was another 100 feet, and 118 feet to the final exit. The first victim was discovered approximately 100 feet from the entrance and the remaining seven were found 120 feet into the castle. ■



Looking out toward the rear of the strobe trailer. The dark panel at the left rear is the polyurethane crash pad determined as the point of origin.