UNION BANK BUILDING

Los Angeles, CA

July 18, 1988

NFPA INTERNATIONAL

FIRE INVESTIGATIONS

NATIONAL FIRE PROTECTION ASSOCIATION

1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101 USA
Telephone: 1-617-984-7263 E-mail: investigations@nfpa.org

UNION BANK BUILDING FIRE

LOS ANGELES, CALIFORNIA

July 18, 1988

At approximately 8:20 p.m. on Monday, July 18, 1988, a fire originated in an office on the 34th story of the Union Bank Building in Los Angeles. The fire was confined to the northern end of that story and was extinguished by the Los Angeles Fire Department with standpipe hose lines. Three offices and a secretarial area were severely damaged by the fire while heat and smoke damaged a larger area. The loss has been estimated at $500,000.

Introduction

The National Fire Protection Association (NFPA), with the assistance of the International Conference of Building Officials (ICBO), investigated the Union Bank Building fire in order to document and analyze the significant factors of the fire.

This study is part of NFPA's ongoing program to document and analyze incident details so that it may report lessons learned to improve life safety, prevent property loss, and improve public fire protection.

The NFPA was assisted in data collection and analysis by ICBO under an agreement between NFPA and the three model building code organizations to

investigate significant structural fires throughout the United States. In addition to ICBO, the other cooperating building groups are the Building Officials and Code Administrators International (BOCA) and the Southern Building Code Congress International (SBCCI). The three model building code groups assist NFPA by providing technical staff support for on-site fieldwork and building code analysis.

Carl E. Peterson, Senior Fire Service Specialist with the Public Fire Protection Division of NFPA, and Dennis J. McCreary, Staff Engineer with ICBO, visited Los Angeles to document the facts related to this incident. Entry to the fire scene and data collection activities were made possible through the cooperation of the Los Angeles City Fire Department. This report presents the findings of the data collection and analysis effort.

The cooperation and assistance of the Los Angeles City Fire Department are acknowledged and appreciated. Particular thanks go to Deputy Chief Donald Anthony, Chief of Fire Suppression and Rescue; Captain Gary Seidel and Thomas Derby of the Arson Investigation Unit; Battalion Chief Kenneth L. Johnson, Fire Prevention Engineer; and to the officers and fire fighters who responded to the incident.

Special thanks are also given to Dennis McCreary of ICBO for his on-site assistance and his input to the report.

Background

The Union Bank Building, located at 455 Figueroa Street in downtown Los Angeles, is a 39-story building constructed in the mid 1960s and first occupied in 1966. The building is 198 ft X 100 ft except at the first story, which is 485 ft X 302 ft and forms a plaza area. The first story and a single-story basement are parking areas. The building is a ductile, moment resisting steel space frame design with 4 in. poured concrete floors over

1 1/2-in. steel corrugation. Columns that encircle the exterior of the building at the outside edge of the floor slab are concrete encased and covered with a metal skin. The remaining structural steel and the underside of the floor slabs are protected with a sprayed-on cementatious material.

The exterior panel walls are located 3 1/2-ft from the edge of the building on the floor slabs. The lower 2 ft of the exterior wall are part of a metal cabinetlike enclosure for air conditioning equipment. (Air is drawn in from the room space through heating/cooling coils and then exhausted back into the room). Above the air conditioning cabinetry, glass in aluminum mullions extends to the 8 ft 10 in. ceiling level. A soffit then extends horizontally from the plane of the window glass to the outside edge of the floor slab and vertically 3 ft 3 in. to meet the outside edge of the floor slab above. The soffit is of matching metal to the skin on the exterior columns except for part of the bottom of the soffit, which is cement plaster on gypsum wallboard.

Interior partitioning on the story of origin consisted of 5/8-in. gypsum wallboard on each side of 4-in. metal studs and went from the floor to the ceiling. The ceiling was a noncombustible tile suspended in metal framing. The doors to individual offices were 1 3/4-in. thick, solid core doors in metal frames. The door openings extended to the ceiling.

Room 3456, the office where the fire originated, had a wooden credenza/bookcase which covered most of the east wall, an L shaped wooden desk and a desk chair in front of the credenza, and a sofa with two side chairs against the west wall. The office was 18 1/2 ft X 11 1/2 ft (about 210 sq ft in area) and had a 9-ft high ceiling.

Room 3455 was a small office (104 sq ft) and Room 3457 was similar in size to Room 3455 and was being used for storage of files and office material in cardboard cartons rather than as an office. Across the 4-ft wide corridor

were semi-enclosed secretarial work stations. These work stations were 7 1/2 ft X 16 ft and contained built-in desks and metal file cabinets. The secretarial work stations were separated by the standard partition construction, but the wall along the corridor from the 3-ft level to the ceiling was a clear plastic material with a single thickness hardboard below. Framing for this assembly was aluminum, and there were no doors on the openings to the secretarial areas.

Fire protection for the upper stories consisted of a standpipe riser in each of the two stairways. A 750-gpm electric driven fire pump in the basement took suction directly from the street water main. A second 750-gpm electric driven fire pump was located on the 39th story and took suction from a 15,000-gallon water tank on that story. The standpipe system was valved so the fire pump and water stored on the 39th story supplied stories 28 through 39 only, although the lower pump could supply all stories.

On each story, each standpipe riser was arranged with a 2 1/2-in. outlet and hose cabinet with 100 feet of unlined 2 1/2-in. hose in the stairway and a 1 1/2-in. outlet with 100 feet of 1 1/2-in. hose in the tenant space. Water pressure on standpipe lines is controlled through the use of orifice plates at the valve. A 2 1/2-gallon pressurized water fire extinguisher is in each 1 1/2-in. hose cabinet. Automatic sprinklers were being installed in the building; however, no work had been started on the 34th story, and sprinklers were not in service on any of the floors.

The detection and alarm system was arranged with evacuation bells activated by a manual pull station in the tenant space near the door to each stairway and smoke detectors in the elevator lobby to recall the elevators in the event of activation. The activation devices transmitted signals to the building's security guard and annunciated at the fire control station off the lobby. There was no automatic transmission of the alarm to the fire department.

The building is serviced by two stairways, which are pressurized. The building is also serviced by three banks of elevators, a low-rise, mid-rise and high-rise bank. The low-rise bank services stories 2 through 17, the mid-rise services stories 17 through 28, and the high-rise services stories 28 through 38. All elevators originate at the second-story level, which is the lobby level in this building.

Fire Initiation and Growth

The fire originated in Room 3456, a lawyer's office of a law firm occupying the 34th and 35th stories of the Union Bank Building. Three workers from a furniture refinishing company were working in the office refinishing a piece of furniture, which was a combination credenza/bookcase. Two electrical wall receptacles were cut into the back wood panel between the lower credenza and the upper book shelves. The refinishing process consisted of stripping the furniture with a paint and varnish remover, cleaning the wood with a lacquer thinner, and then applying the new finish material. The stripper being used was a Class II combustible liquid, and the lacquer thinner being used for cleaning was a Class IB flammable liquid.[1] A 5-gallon open-top pail was in the immediate area and was used for the disposal of used wiping rags. There were numerous cans of stripper, lacquer thinner, and refinishing oils in the room.

The fire initiated at one of the electrical receptacles at approximately 8:20 p.m. One of the workers had removed the plate around the receptacle and had reportedly taped over the face of the receptacle but not the

---

[1] A Class II combustible liquid has a flashpoint at or above 100 °F (37.8 °C) and below 140 °F (60 °C). A Class IB flammable liquid has a flashpoint below 73 °F (22.8 °C) and a boiling point at or above 100 °F (37.8 °C).

electrical box. The worker was reportedly using a paintbrush and the stripper to remove the remaining finish on the wood around the electrical box. An arc occurred, igniting the vapors in the area. The worker received first-and second-degree burns to his hands, and his face and hair were singed. The other two workers in the room were not injured.

At the time of the ignition there were seven persons on the 34th story. In addition to the three refinishing workers, there were two lawyers, a client, and a cleaning person. The refinishing workers ran to the elevator lobby shouting, "Fire." The cleaning person was in the northwest quadrant of the building and became aware of the fire from the refinishing workers. These four workers exited the story using the elevators.

One of the lawyers and his client were in the conference room on the east side of the building near the elevator lobby. They became aware of the fire from the shouting. The lawyer had his client exit the building using an elevator, while he went to investigate. He traveled through the elevator lobby and into the corridor serving the northwest quadrant of the building. He confirmed that the fire was in Room 3456 and returned to stairway #2, where he activated the interior alarm and obtained a 2 1/2-gallon pressurized water fire extinguisher. He started back toward the fire area and found the area too well involved to effectively fight the fire. He dropped the extinguisher and exited down stairway #2. The other lawyer was in an office at the opposite end of the building. He became aware of the fire when he heard what was described as "an explosion" (probably the first window breaking). He also heard the building evacuation alarm and immediately exited using a stairway.

As the fire developed, it broke out windows in Room 3456. Flames from gases burning at and outside the window quickly reached one to two stories above the fire floor.

Fire Suppression

The alarm to the fire department was received at 8:23 p.m. from a party outside the building who reported visible fire on the upper stories. Telephone calls from the building were also received at about the same time, and fire apparatus was at the scene three minutes later.

The first alarm apparatus consisted of two task force companies and an engine company, together with a squad company and a battalion chief.[2] The first due company was stationed approximately four blocks north of the building. Fire fighters from this station observed flames from two windows of the 34th story as they left their station. The first two companies arrived at the building almost simultaneously. The first due company went to the fire control area for the building, which is located at the lobby level, to obtain keys and to check with security for available information. The second due company immediately began ascending stairway #2, carrying the standard complement of equipment for high-rise fires.[3]

The first due company determined that the low-rise elevators were safe to use (they had not been recalled because of any smoke detector activation on stories 2 through 17, and the shaft showed no sign of smoke).[4] This company took an elevator to the 17th story and entered stairway #2 to climb to the

---

[2] A task force is two pumpers and an aerial ladder truck with eight fire fighters and two officers.

[3] A fire attack team carries breathing apparatus, portable radio(s), a rotary saw or forcible entry tools, and high-rise hose pack(s). Where feasible, they also take a portable spotlight, extra air bottles, and a portable extinguisher.

[4] The high-rise procedures of the Los Angeles Fire Department state:

"Elevators SHALL NOT be used as a means of ascent in a building under investigation for a fire emergency until it is determined, by LAFD personnel, that the entire elevator shaft is not threatened with fire. The exception to this rule is those buildings with split banks of elevators. These elevators may be used if the highest floor served is a minimum of five floors below the reported fire floor."

fire story. They reached the 34th story, where they connected a 2-in. hose line to the standpipe connection in the stairway. They were completing the deployment of their equipment and donning their SCBA when the second due company arrived at that location. As the door to the fire floor from the stairway was opened, the pressurization in the stairway kept the smoke from entering. The first due company advanced the 2-in. hose line onto the fire floor and turned right, toward the north end of the building. They entered Room 3416 and encountered almost zero visibility and moderate-to-high heat. They observed fire at the ceiling level on the north wall. They discharged water toward the observed fire area while trying to find a path that would allow them access to the building's exterior offices and the area of fire origin.

The second due company went to the 35th story to check for fire extension. They deployed their handlines in a configuration that allowed them to cover the offices above the fire at the north end of the building and the exterior wall, with three 1 1/2-in. hose lines. They found the one cracked window but no fire inside the building. They broke out a number of windows to allow for ventilation and exterior discharge of hose lines to dissipate radiant heat from the flames coming from the story below. They encountered some smoke spread around utility poke-throughs, and they reported that the floor over the fire area was moderately hot.

In the meantime, the officer with the second due company had been exploring to determine the extent of the fire. He entered the 34th story and found a route to the north offices along the north wall. He observed heavy fire in three outside offices and flames extending into the corridor.

As the third due company arrived at the fire floor, they connected their 2-in. hose line to the standpipe connection on the 33rd story and stretched it to the 34th story, where they were directed to the corridor serving the

exterior offices. They reported that they were able to advance their line down the corridors standing up and that the heat and smoke were moderate. As they reached the corner where the west corridor meets the north corridor the majority of the fire area became visible and they quickly achieved knockdown. They did have to shut down and extend their hose line to reach into the offices to complete final extinguishment. They reported that four windows were out at that time.

The officer of the first due company reports that as he opened the door to enter the 34th story with his crew it was 8:56 p.m. At 9:19 p.m. he and his crew were back out of the fire area and at that time the fire had been completely extinguished.

The actual area damaged by the flames was confined to Room 3455, 3456, and 3457, as well as two of the secretarial areas immediately outside of those rooms. The fire destroyed the partitions between Room 3455 and 3456 and between Room 3456 and 3457. One of these walls had the credenza/bookcase against it, and the other had the sofa and two side chairs against it. The fire also totally consumed the doors to those three offices, as well as all combustible materials in those offices. The gypsum wallboard between these three offices, and the corridor remained intact. There was burning in the two secretarial areas outside of these offices, but the fire was extinguished before there was complete destruction. The plastic in the enclosure and the aluminum framing were melted, but some materials at floor level showed few signs of direct burning.

Offices on both sides of the burned area had extensive heat and smoke damage, and heat and smoke damage was evident throughout most of the northern half of the 34th story. There was soot damage thoughout the entire story. The 35th floor received minor smoke damage from smoke spreading around utility poke-throughs and received some water damage from fire fighting efforts to

prevent fire extension onto the story. Flames and heat pushing out of the 34th story windows did melt small amounts of the metal skin on three of the exterior columns. However, due to the eyebrow construction and the lack of wind, the heat traveled vertically. One 35th story window was cracked and a small piece near its top was missing, and a window on the 36th story was cracked.

As soon as fire companies were available and the search and rescue efforts were completed, fire fighters initiated salvage efforts below the fire area. These salvage efforts were instrumental in preventing further damage in the building, including damage to electronic work stations and computers. The tenants in the space on the 33rd floor were back in operation the next day. On the fire floor, the damage to computer equipment was not assessed.

Analysis

This fire occurred 2 1/2 months after the First Interstate Bank Building fire, which resulted in heavy fire damage to four stories and extension to a fifth in that nonsprinklered, high-rise office building. The overall Union Bank Building fire scenario had some similarities, but the fire was not as severe. At least three favorable factors limiting fire spread appear to be the office partitioning arrangement, the building's construction, and prompt reporting of the fire to the fire department.

This fire started as a flash fire involving flammable and combustible liquids as well as the combustible office furniture. There appears to have been a fast fire build-up in the room of origin with early failure of exterior windows. The office partitions were instrumental in containing the fire growth even though the fire burned for more than 30 minutes before extinguishment was started.

After an initial rapid fire growth, the fire appears to have become fuel starved as the contents of the three offices were consumed and the heat and burning was being contained by the partitions. The fire had started to burn in the secretarial area but had not become well established when suppression efforts began. By contrast, the First Interstate Building fire had an open office arrangement on the story of origin, which allowed fire development and spread throughout a much larger area.

In this latest fire, the building construction was significant, particularly the 3-ft extension of the floor slab beyond the exterior panel wall. This extension kept flames from impinging on upper story windows. On the evening of the fire, there was very little wind, and the heat and flames were rising vertically after escaping from under the soffit and were not driven back at the windows.

In the Union Bank Building fire, notification to the fire department was immediate, while in the First Interstate Building fire there was considerable delay while security personnel investigated the source of an automatic alarm. The initiation of fire suppression efforts in high-rise buildings is automatically delayed while fire fighters move with their equipment up stairways to the fire area. Effective attack can also be delayed by heat and ventilation problems which make it extremely difficult for fire fighters to actually reach the fire area and to begin extinguishment. Therefore, any delay in the detection and reporting of the fire only compounds the problems that fire fighters will face when they eventually reach the fire area.

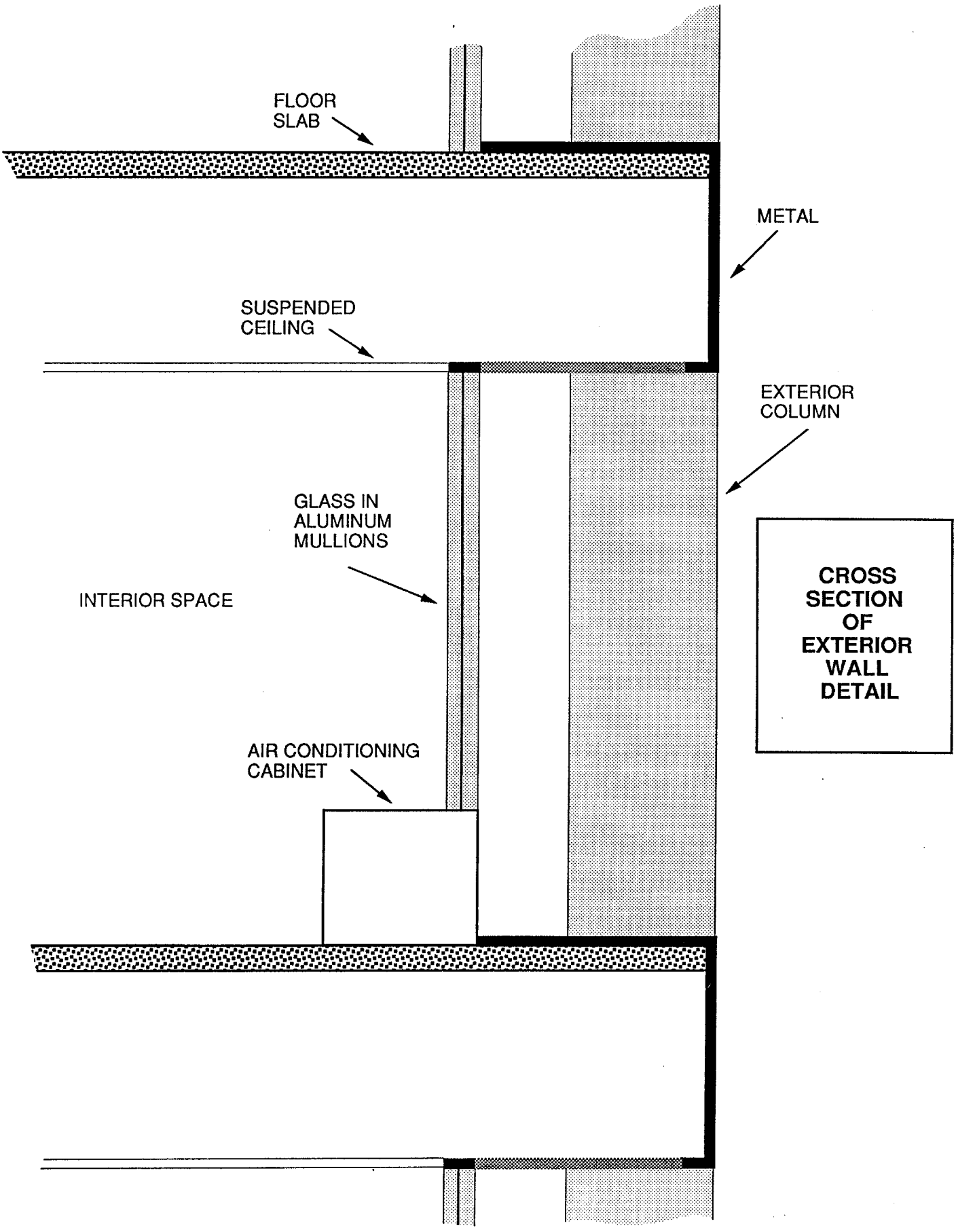
One problem that did surface at the Union Bank Building fire was that the keys provided for the elevators and the stairway doors were all on a single ring and had no identification. Fire fighters who took the first elevator to the 17th story took the ring of keys with them, and left the elevator stranded on that story. The number of keys and the lack of marking made it time consuming to find the correct key when it was needed.

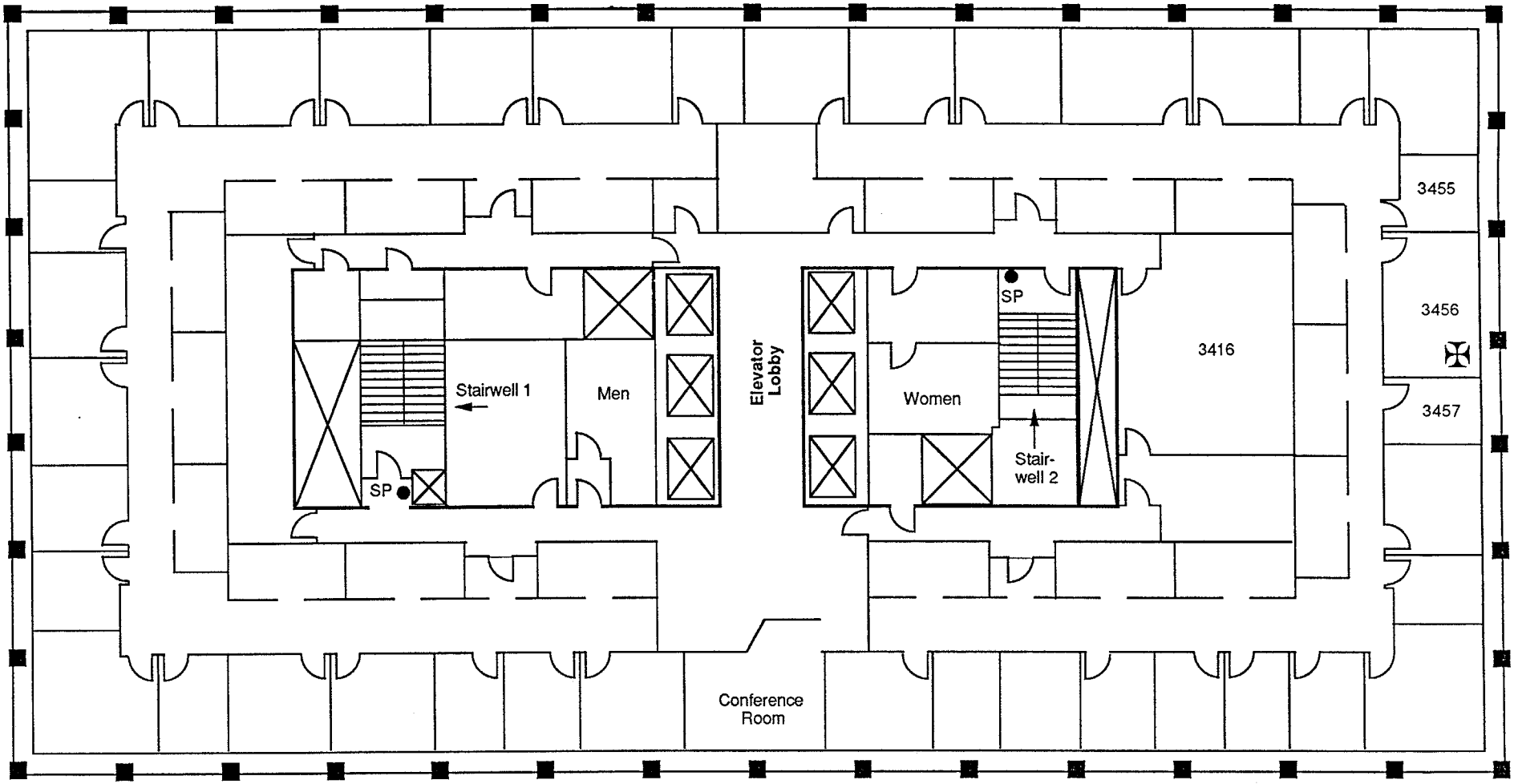
The fire department had no problems obtaining water at this fire. For a brief period the hose lines on the 35th story were not as effective as the company commander desired due to the orifice plate in the standpipe connection, but increasing the pressure from the pumper supplying the standpipe siamese solved the problem. The handlines used on the 34th story were reportedly effective at all times even though the first handline onto the floor was punctured by a falling piece of metal debris from the ceiling. The orifice plate at the valve on the 33rd story was taken out before the hose line was attached.

Lack of effective radio communications was a major factor in the First Interstate Bank Building fire. The normal fire department UHF frequencies did not allow fire fighters in the building to communicate effectively at all times with those outside. In the Union Bank Building fire a limited number of portable radios on an 800 mhz frequency were available on the fire ground early in the fire. These radios were given to chief officers in strategic locations in order to aid communications among the command staff and to enable messages from company officers using the UHF radios to be relayed by the command officers to the command post outside the building.

Fire department operations appeared to have gone very smoothly and, as noted previously, the fire was fairly easily confined to a small area. Fire departments faced with providing protection to high-rise buildings, however, need to be aware of not only the potential for fire development but also the amount of resources necessary to stage an effective fire attack. In this fire the initial response consisted of 28 fire fighters and a command officer. This well exceeds the total resources available in many communities faced with high-rise fire problems. The total resources committed to this fire consisted of more than 200 fire fighters, 11 chief officers, and 54 fire fighting apparatus.

There were no injuries to fire fighters and only one worker was injured. Because the fire happened in the evening, the building was not heavily occupied and fire fighters did not have to compete with massive evacuation down the stairways as they ascended.


FLOOR
SLAB
METAL
SUSPENDED
CEILING
EXTERIOR
COLUMN
GLASS IN
ALUMINUM
MULLIONS
INTERIOR SPACE
AIR CONDITIONING
CABINET
CROSS
SECTION
OF
EXTERIOR
WALL
DETAIL



Union Bank Building
34th Floor

✠ **Area of origin**

North