Despite a wide-open interior, the configuration of this huge Navy Yard buildi

Construction

BY SALVATORE J. SANSONE
Deputy Assistant Chief
Bureau of Operations

Building 294 of the Brooklyn Navy Yard, built during World War II, was used for the construction of submarines. It's a cavernous building with more than 100,000 square feet of production area and a *mold loft* (for molding submarine parts) about 90 feet above the main floor. A separate, 20-foot-deep structure attached at the front contains office space and two fire tower stairways. When fire struck on October 30, 1992, the building was occupied by New York Modular, making prefabricated residential units at a capacity of 3,000 square feet per day.

The building's size and unusual construction would be the makings of a long, difficult operation—48 hours long and involving more than 200 FDNY units.

In transmitting the alarm, the dispatcher stated that there was a report of a fire on the roof of the building. Division 11, where I was a deputy chief at the time, is assigned on alarm boxes in the Navy Yard, and we responded. Engine Co. 211, though third-due on the box, was the first-arriving unit because the company's firehouse is near the Navy Yard's Kent Street gate and the experienced chauffeur, Fr. Bill Corsello, knew the location. Capt. Brendan Rynn transmitted the 10-75.

Approaching this large building, we could see a glow from the interior. But we couldn't get a clear picture of the fire's magnitude because the windows were made of cloudy, corrugated, wire-reinforced glass. The exterior walls were composed of these windows (in metal frames) and sheet metal panels.

Although we didn't yet know the size of the fire, a second-alarm assignment was clearly needed because of the size of the building and the number of personnel it

NAVY YARD:
See sidebar, p.7.

Separate tower structure

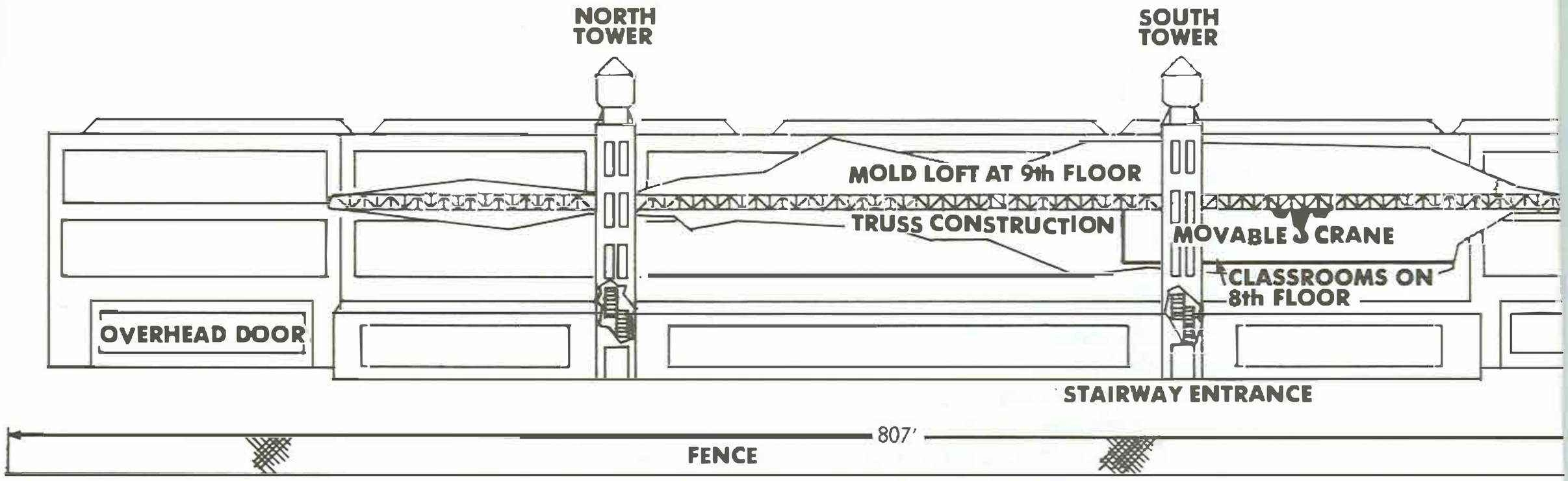
Prefab units

Box 8050
1834 hours

Fire on roof

10-75
1840 hours

Magnitude obscured



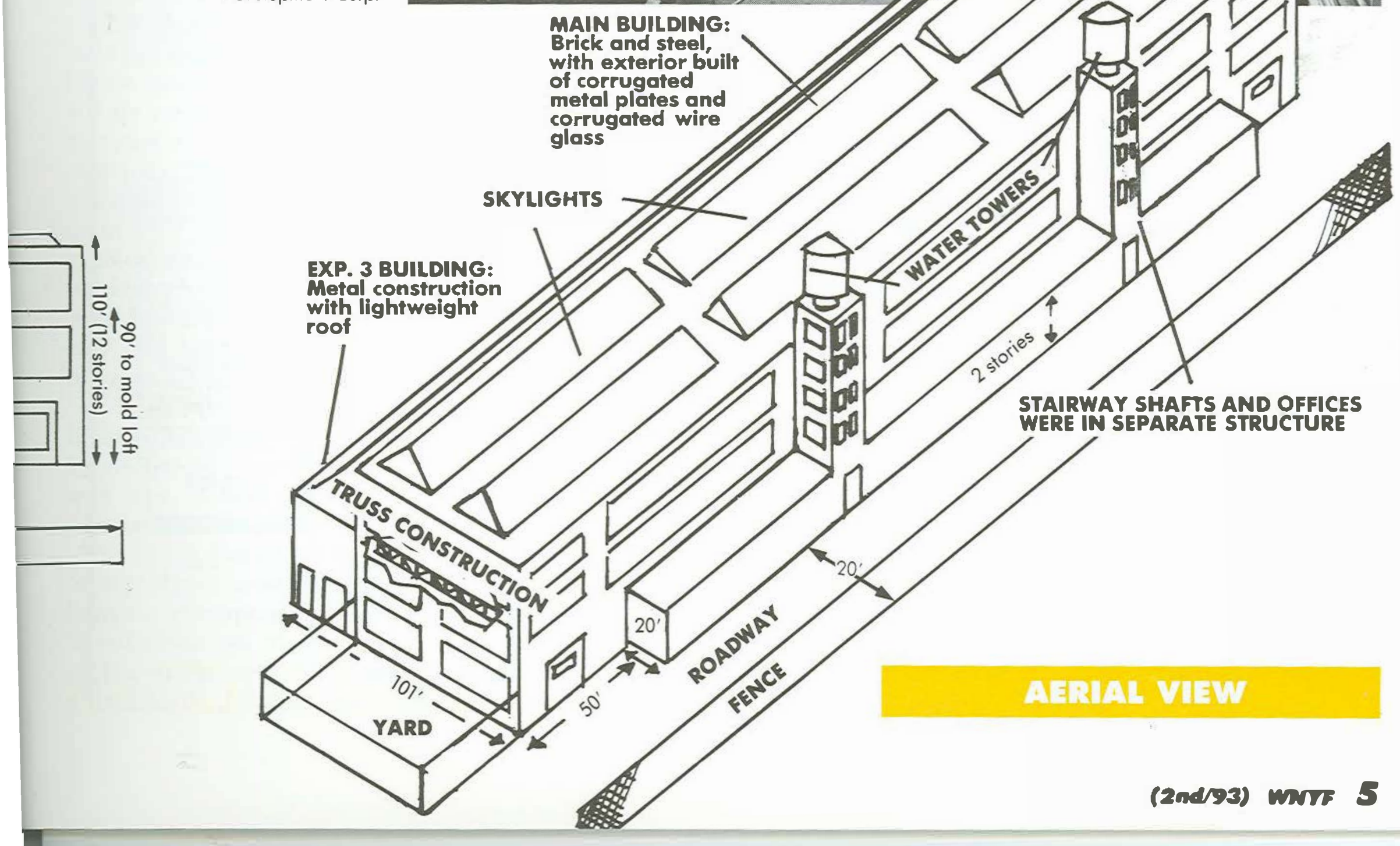
BUILDING CONSTRUCTION AND DIMENSIONS: FRONT VIEW

ade the fire inaccessible for hours.

Delays

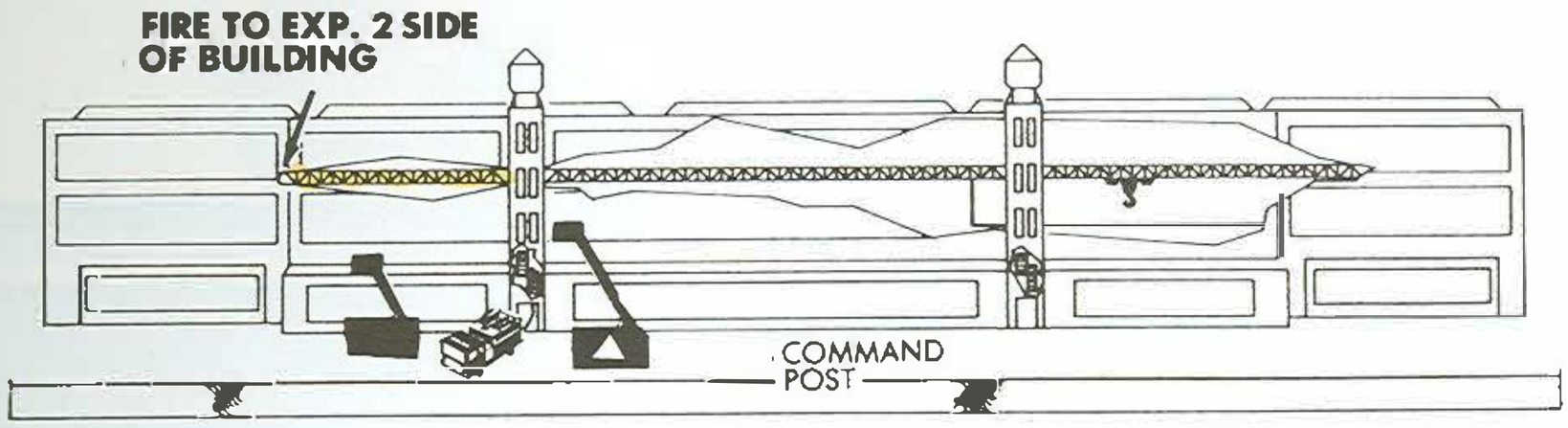
To Fit a Submarine

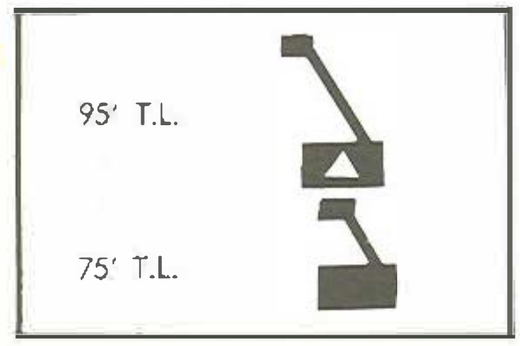
The interior of this wartime building dwarfed employees now working on prefabricated residential units. The mold loft's truss construction is visible overhead. *Photo courtesy of the Brooklyn Navy Yard Development Corp.*



AERIAL VIEW

FIRST INTERIOR SIZE-UP





2-2
1846 hours

would take to put lines and equipment in place. I transmitted the second alarm when I arrived.

Reports soon started coming in from the first-arriving units.

Catwalk

B.C. Robert Hesse, Battalion 31, contacted me. He had entered the main building at the north end and was now

Interior size-up

able to give me a good size-up: It had a wide-open interior. About 20 feet below the sawtooth roof, there was a floor which ran the complete length of the building—about 800 feet.

Skylights

The fire was burning on

Fire on underside of floor

the underside of this floor over a large area and was heading toward exposure 2; it might be accessible only by tower ladders. The first floor was being used to build prefabricated homes; this would cause a problem if the fire dropped down onto the construction materials.

3-3
1855 hours

With this information in hand, I transmitted the third alarm. Given that the fire was 90 feet above street level, there would be a need to supply more than one tower ladder, to assist with water supply when the Maxi-Water Unit and Marine Co. 6 arrived (both were assigned on the box), and to stretch 2½-inch handlines up the fire towers.

A security officer had helped Ladder 110, the first-arriving truck, to locate the best entrance to the fire area; this turned

North tower

out to be the north fire tower. The company forced entry on the ground floor and climbed the stairs to the fire floor, which was the 9th floor. Confronted with heavy smoke and seeing the large open area, Lt. Wayne Smith immediately asked the chauffeur to bring up search ropes.

Engine 211's Capt. Rynn ordered a 2½-inch line stretched up the well hole of the

South tower

north tower to the fire floor. This was accomplished with the use of three engine companies. Capt. Rynn reported that his company was unable to put water on the fire because it was burning on the under side of the mold loft (in the air space

MOLD LOFT: *See diagram, p.7.*

between the plywood floor and the corrugated steel below it).

After calling for search ropes, Lt. Smith of Ladder 110 had wisely headed to the floor below to get a better picture of the fire floor. But he discovered there was no "floor" below—only a catwalk. From it, Lt. Smith saw the fire beneath the floor spreading toward the exposure 2 side of the building. At this time, he received word from Ladder 110's outside vent and roof members, who were on the roof, that they had vented large skylights, but conditions were worsening.

Division 11 ordered all members off the roof. Ladder 110 then operated from the protection of the fire tower, assisting the engine companies.

Based on the conditions reported by the companies in the north tower and B.C. Hesse inside the main building, it was decided to emphasize an exterior attack. The two fire towers would be used

Attack from separate structure

for handlines, since their location in a separate structure would protect the interior forces. But the main strategy would be to use tower ladders to open up the outside of the building and place water on the mold loft. (The separate structure containing the fire towers never became involved in the fire, but it did have to be searched and surveyed for fire extension.)

Only later in the operation would we

Additional floor of classrooms

find out that there was an additional floor, of classrooms, below the mold loft. This floor extended from the south fire tower to the exposnre 4 side of the building.

The fire had a good hold on the mold loft from the north tower to the exposure 2 side of the building, and it was now heading for the south tower and the exposure 4 side of the building.

Second-alarm units were rapidly put to use, with two engine companies assigned to a second handline in the north tower. Two engines from the third-alarm assignment, when they arrived, stretched a

BOX 8050

Div.11	E.210	E.207 & M.W.1
Bn.31	E.211	E.9 & Sat.1
L.110	E.226	R.2
L.119	E.205	Sq.1
		Mar.6

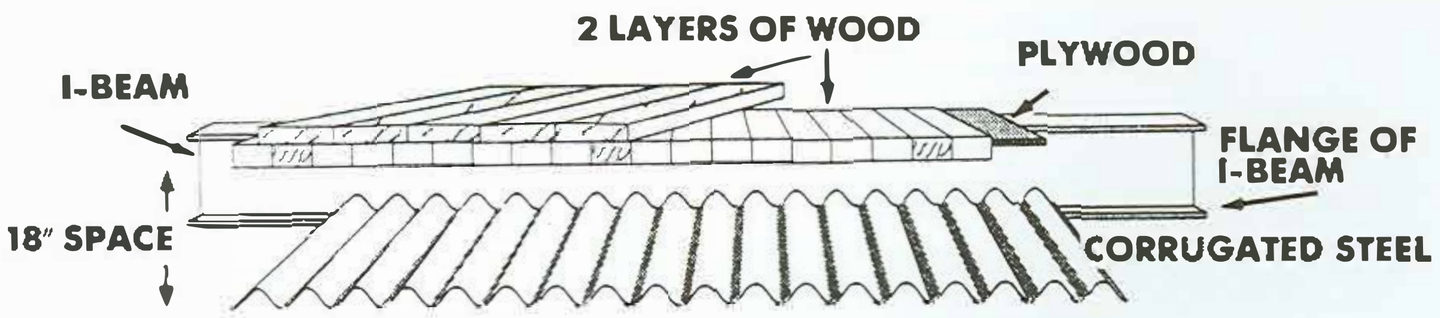
10-75

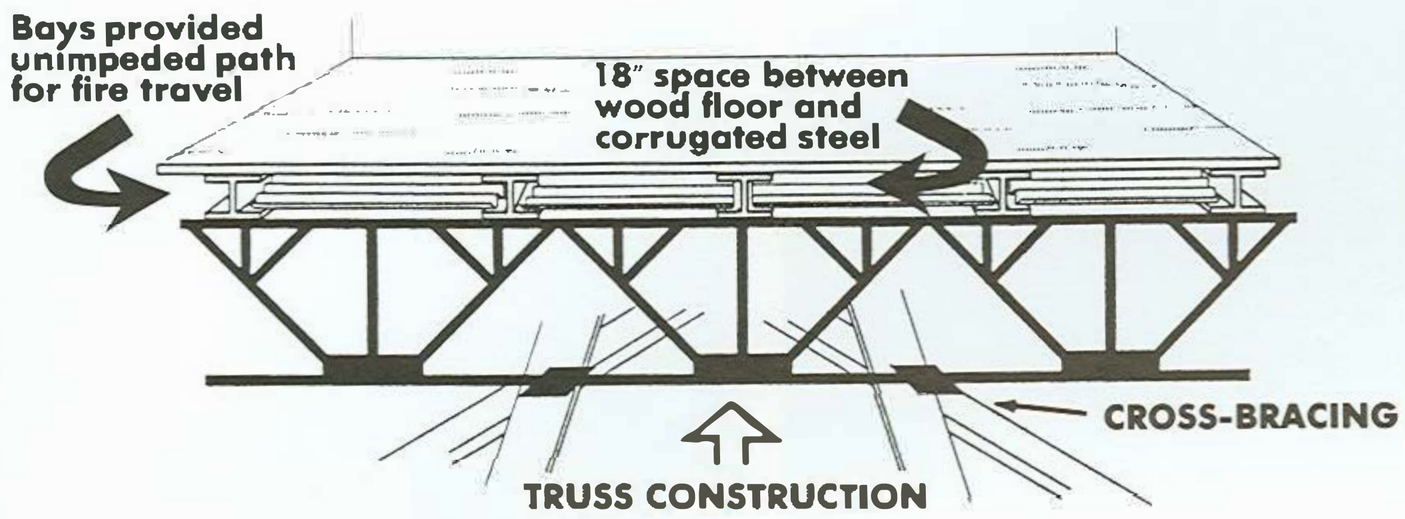
Bn.57

2-2

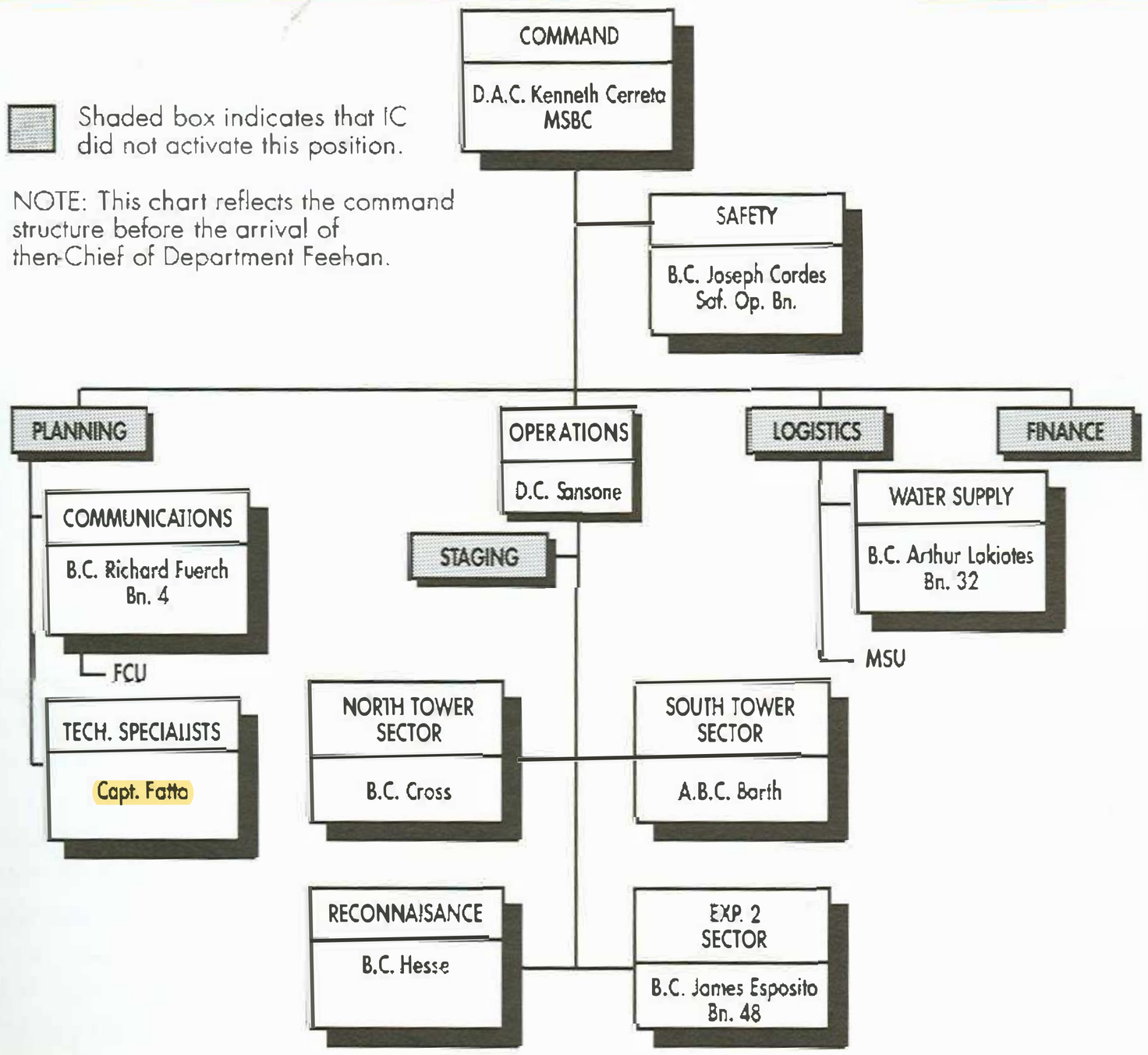
L.102	E.235
L.104	E.284 & Sat.3
E.209	FCU
E.221	Safety
E.216	TSU.1

MOLD LOFT CONSTRUCTION FEATURES





INCIDENT COMMAND STRUCTURE



THE BROOKLYN NAVY YARD

In 1781, three young entrepreneurs—John, Samuel, and Treadwell Jackson—started building ships on the Brooklyn wate rfront. In February 1801, the U.S. Navy bought the shipyard and renamed it the New York Naval Shipyard. From the very first day, however, it was known as the Brooklyn Navy Yard.

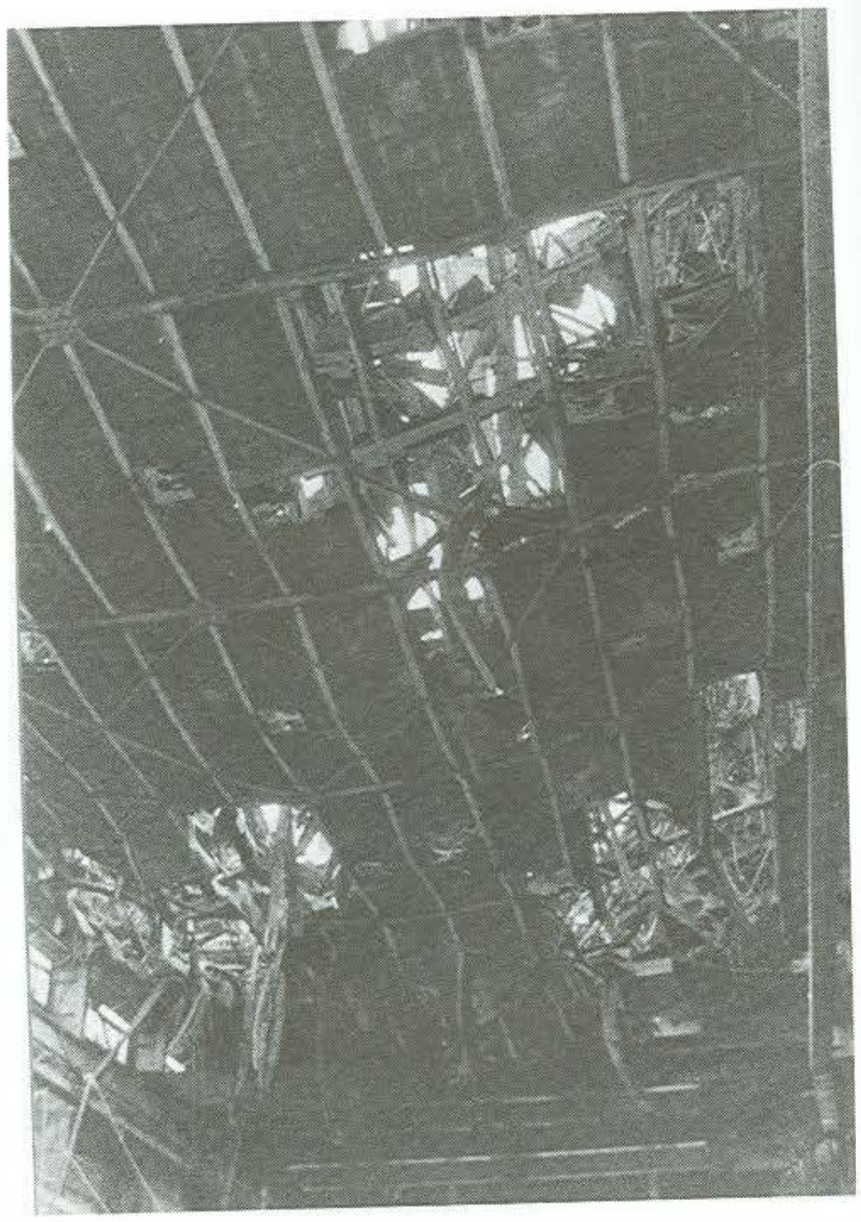
Among the history-making activities at the Brooklyn Navy Yard was the construction of the Civil War ironclad ship *Monitor* and of the caissons used in excavating the East River bed for the Brooklyn Bridge's towers.

During the ensuing decades, the yard changed from a simple shipbuilding facility ta a 260-acre-plus multi-industrial complex. In 1966, the Brooklyn Navy Yard's 160 years of naval shipbuilding came to a close. Today's Navy Yard is a thoroughly diversified industrial complex. Although no shipbuilding takes place there anymore, ships still are brought into dry dock for upgrading.

The fire building described here was built in 1944 for the construction of submarines.

—S.S.

Mold Loft Damage



The destruction of the mold loft at the 9th floor is seen from above and below. Firefighters attempted to pry off the sheets of corrugated steel from below, but the process was slow and exhausting. *Photo by Fr. James Moerschel*

Pairing up on line

handline in the south tower. Since this building was so huge, I thought in terms of a high-rise building and assigned companies in pairs to stretch the 2½-inch handlines up the stairways and to operate two companies to a line.

Alley-like space

bated by the alley-like space. The arriving units were quickly sent to a staging area about 30 feet south of the command post, still inside the fence.

Marine line

In addition, the fence had to be cut in order to stretch the 3½-inch line from Marine 6—which was 1,000 feet west of the fire building—to the manifold of Satellite 3/Engine 284, which was placed in front of the building.

Other access problems

Besides having trouble getting at the fire because of the mold loft construction, we also encountered accessibility problems on the exposure 1 and 3 sides of the building.

Until we put the marine line in service, we had experienced some fluctuations in water pressure. We were also using Engine 204, located about 75 feet northwest of the building, to draft water and feed the Maxi-Water Unit/Engine 207. Maxi-Water was supplying Ladder 14, operating on the exposure 2 side.

Drafting

I had assigned two engine companies and one ladder company from the second-alarm assignment to the exposure 3 side. They reported back that there was no vantage point from which to reach the fire. The exposure 3 building was about 50 feet high, but it was too wide to offer access to the fire. A portable ladder on the roof wouldn't have added much to the firefight.

Exp. 3

At this point, fire duties had been delegated as follows:

■ ***Reconnaisance.*** B.C. Hesse, after giving the initial size-up of the interior, searched the building for good vantage points for line placement. There was a large, overhead door on the exposure 2 side, and B.C. Hesse suggested that a satellite be driven into the building there. Its large deckpipe could be used on the underside of the mold loft. This might have proved to be our best vantage point on the exposure 2 side, but it was too

Exp. 1

On the exposure 1 side, the command post had been set up at the center of the building, inside a fence that ran the length of the fire building. This fence meant limited access for ladder placement and relief of units.

Water placement

When third-alarm units arrived, the area around the command post became very congested. This isn't unusual at multiple alarms, but the crowding was exacer-

EXTERIOR ATTACK

The Maxi-Water Unit's was one of the many large-caliber streams attacking the barely accessible fire. Drafting and a marine line were needed to supply the quantity of water directed at the fire. *Photo by Steven Spak*

dangerous: Large panels of the corrugated steel were dropping to the floor.

Sectors

■ ***North stair tower sector.*** B.C. Dennis Cross, Battalion 57, was in charge of the handlines in and search from the north stair tower.

■ ***South stair tower sector.*** A.B.C. Richard Barth, Battalion 35, was in charge of the south stair tower.

Ladder 102, commanded by Lt. Thomas DeAngelis, had responded on the second alarm and was operating from the south tower. He had gone to the roof initially, while it was still tenable, to assist in roof ventilation. But this proved difficult: Each time a member hit the

Skylights

skylights' corrugated wire glass with a tool, only a small hole resulted.

When members were ordered off the roof, the company went back to the 8th floor of the south tower stairway, where A.B.C. Barth had reported the existence

Classroom floor

of an additional floor containing classrooms. From there, Lt. DeAngelis could see the fire burning in the floor above him. The hose streams' only opportunity to hit the fire was when portions of the corrugated steel collapsed in the advancing fire.

Ladder 102 went out onto the classroom floor and, standing beneath the

Prying down steel

mold loft, tried to pry down more of the corrugated steel. The steel sections ran from I beam to I beam. The members pried the edges up off the bottom flanges of the I beams. Then they pried at the rivets holding corrugated steel sections together. Once a section was free, it could either be pushed back on top of the next section or pulled on by four firefighters with hooks until the steel sections bent enough to be pulled from between the I beams.

Once the ceiling was open, the engine companies were able to put water onto the underside of the flooring, using a bent tip.

Bent tip

This did slow the fire's advance toward their position. But such a slow, exhausting process in so large a fire area wouldn't be much help in controlling the fire and stopping it at that place. As a result, when A.B.C. Barth asked for more units to assist in opening up, I decided to take a look at the fire area to determine how much help was needed.

By this time, command of the fire had been passed to D.A.C. Kenneth Cerreta, Manhattan South Fire Command, and from him to then-Chief of Department William Feehan. When I explained to Chief Feehan what I had found in my survey of the ceiling, he decided it was too risky to keep members under it.

Forces withdrawn

We didn't know at this time that the fire already possessed much of the mold loft in the portion of the building toward the exposure 4 side—meaning the members operating on the classroom floor had fire burning over their heads.

Hazardous cylinders

Hazardous Materials Co. 1 had been special-called and arrived while members were still venting skylights. Capt. John Fatta took his unit to the roof and reported that there were six 100-pound cylinders of propane on the roof, directly over the main body of fire. He then went to the first floor and pointed out that propane was used to power high-lows there, acetylene and oxygen were present, and a number of other unknown pressure cylinders existed.

High-lows

Due to the hazardous conditions in the building, we couldn't have Haz Mat remove the cylinders from either the interior or the roof. If the fire did involve the prefabricated homes and the cylinders

S/C	
L.157	L.14
L.105	Bn.32
L.131	

4-4	
L.108	E.217
E.230	E.239
E.229	

on the ground floor, we could have placed handlines in the doorway of the first floor and still have been protected by the separate front building.

Haz Mat did, however, remove numerous cylinders from an outside yard at the exposure 2 side. This was important, for if there had been a collapse on that side, the cylinders could have been involved in fire. As it was, the rear wall was bulging out over exposure 3 near the exposure 2 side.

4-4
2011 hours

The fourth alarm was transmitted 1½ hours into the fire. Some of these units were used for relief, but most of them stretched additional lines in the towers or helped move or place other lines.

Chief Feehan's progress report three hours later noted that the operation was "using seven tower ladders and extinguishing pockets of fire. This will be an extremely prolonged operation. This fire is under control."

U/C
2300 hours

Exterior operation

Although handlines were kept in the towers almost throughout the incident, this was basically an exterior operation which used five 95-foot tower ladders and two 75-foot tower ladders. The initial tower ladders operated for almost seven hours straight and had great difficulty opening up the wire glass, corrugated wire glass, and corrugated steel so they could put their streams into use.

Cooling trusses

The streams kept the steel beams and trusses cool; this stopped the collapse of portions of the building. But they couldn't actually hit the fire until the corrugated steel panels dropped.

Roof collapse

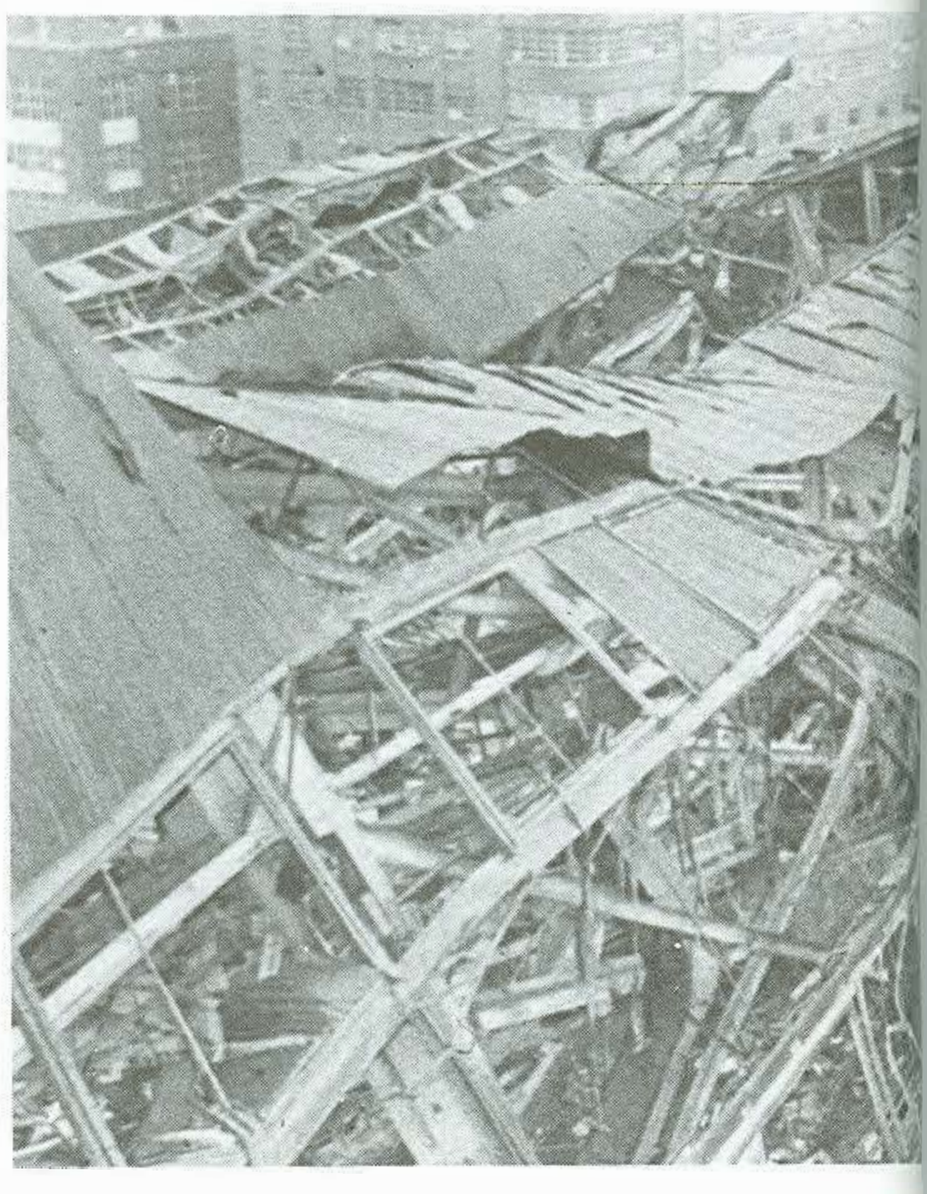
When the fire reached the exposure 4 side between 0300 and 0400 hours, the roof collapsed between that wall and the south stair tower. We were unable to prevent it due to the presence of the two floors in that area, the concealed nature of the fire, and the limited effectiveness of the tower ladder streams. A sturdy, movable crane beneath the mold loft prevented the collapsed roof section from dropping to the ground floor.

Ground floor

As it turned out, there was never any fire extension to the ground floor. What fell was mainly the corrugated steel sections, and not enough fell at any one time to cause the contents to ignite.

Personnel needed

Although this fire was declared "under control" early, the overhauling and watch-



Two days

line continued for two days and involved more than 200 of our units.

Marshals' report

Regarding the cause of the fire, the fire marshals' report stated that the old roof of the building was in the process of being replaced. It was composed of wood with a tar covering; the same type of materials were being used as a replacement.

Welding

At the same time, work was being done on other portions of the structure. Welders were welding metal brackets on the skylights, and just prior to the fire, welding was being performed on the front skylight closest to the exposure 2 side of the building. While these brackets were being welded, sparks were falling to the mold loft below; a worker was stationed there with a water hose to extinguish them. Although it wasn't fully ascertained, the marshals surmise that the fire was probably started by a spark produced by a welding torch.

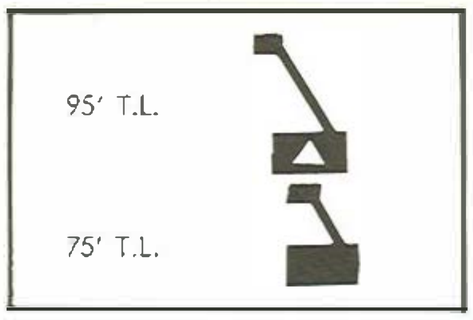
Sprinklers

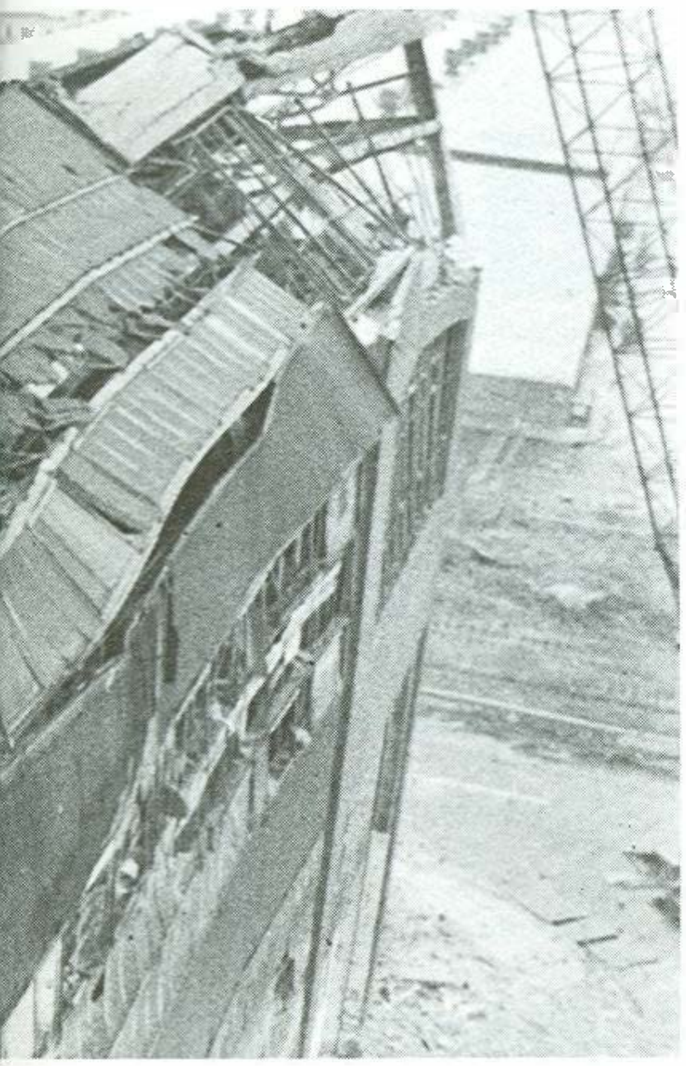
If this structure were built today, damage could have been avoided by placing sprinklers in the inaccessible voids.

LESSONS

1. Information from within the building. Because it wasn't possible to judge the extent of this fire from the outside of the building, an interior size-up was vital. Not until I received one from B.C. Hesse

S/C	
E.324 & Sqt.4	L.12
Bn.35	L.9

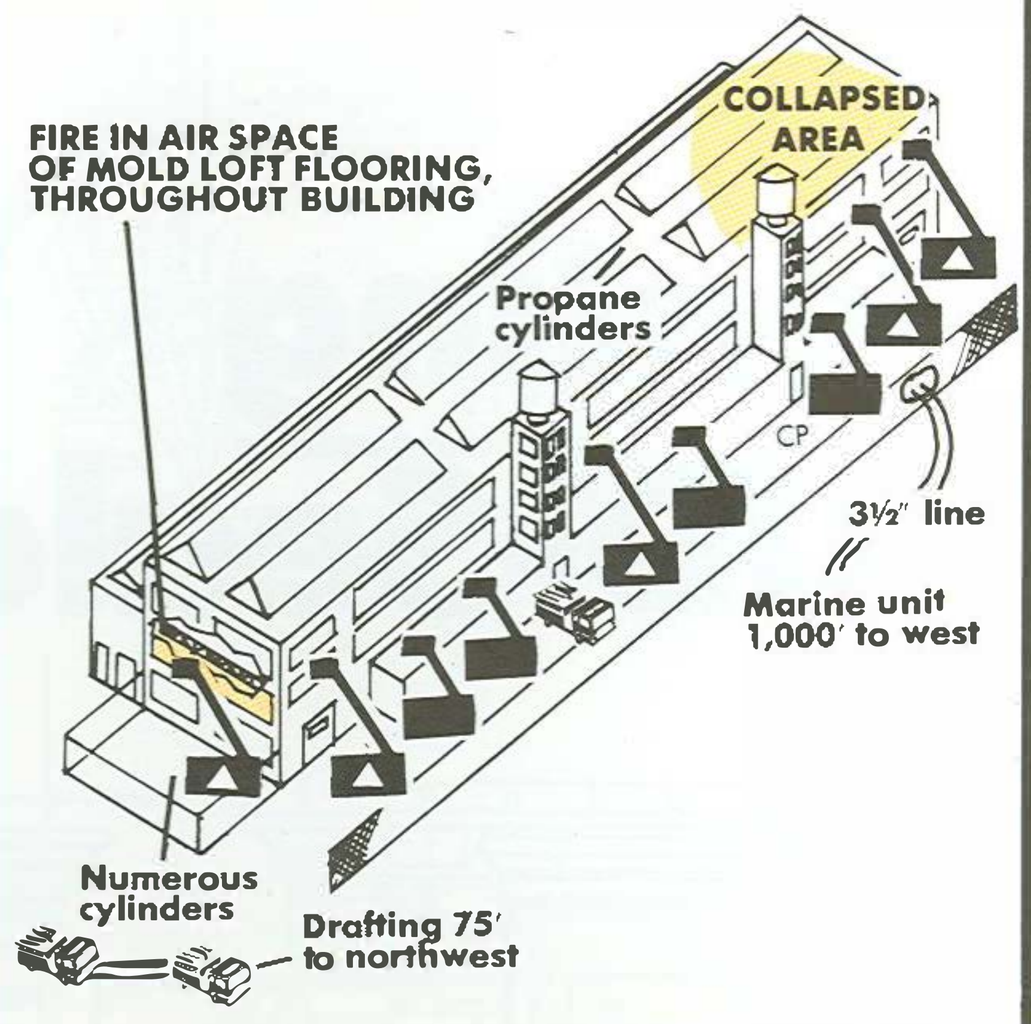




EXP. 4 SIDE

Once the fire had burned through the entire length of the mold loft flooring—about five hours into the incident—the roof collapsed from the south tower to the exposure 4 side of the building. A movable crane under the mold loft kept the wreckage from dropping to the ground floor. *Photo by Fr. James Moerschel*

EXTENT OF FIRE



was I able to determine how many personnel would be needed.

2. ***Building size in relation to personnel.*** A building this size requires a large number of personnel:

Line stretches

- 2½-inch lines were stretched up stairways, and at least two units were needed on each—in some cases three.
- A 3½-inch line was stretched from a marine company 1,000 feet from the fire.
- A manifold had to be fed.
- Two units drafted water.
- Tower ladders required relief. The most difficult task at this operation was opening up the outside of the building (made of corrugated metal panels and corrugated wire glass) in order for tower ladders to operate. Initial tower ladder units operated for about seven hours. By relieving theses units, we were able to use them later in the 6x9 tour.

Opening up outside

3. ***Steel truss construction.*** Even though it was difficult to reach the fire because of the corrugated steel, it was important to continue applying water to the steel trusses. Cooling them prevented collapse. Once the fire caused corrugated steel to fall, those areas were exposed, and the tower ladders could hit the fire.

Continue applying water

4. Hazardous Materials Co. 1. The Haz Mat unit was important for identifying materials in the building and removing cylinders from the yard.

Control in unsafe conditions

5. ***Sectoring.*** The chiefs in the stairways provided clear information on the fire's progress. They also closely supervised the units in an unsafe situation; members could easily have walked out from a stairway and fallen 80 to 90 feet.

Move out of alley

6. Operations in a constricted area. The alley-like area between the exposure 1 side and the fence became crowded with apparatus, and space was limited at the command post. Several pieces of equipment had to shut down and be moved in order to move the initial tower ladders and engine companies so that higher tower ladders and relief units could get in. This not only was time-consuming, but could have given the fire a chance to spread farther.

Cut through fence

- In retrospect, we could have considered cutting a hole in the fence and putting the command post on the other side of the fence.

REPORTING TO C.P.: See FDNY *Regulations for the Uniformed Force*, Sec. 11.3.25.

- Units responding on the third and greater alarms should be directed to a staging area away from the command post. Only company officers should report to the command post.

Like a high-rise

7. Teaming up units. When large-diameter hose is used, stretches are long and the areas to search and cover are extensive. Think in terms of a high-rise building and team up units.

*8. **Advantage of 95-foot tower ladders.*** Although 75-foot tower ladders were used, it was the reach of the 95-foot ladders that was the key in putting water on this fire.