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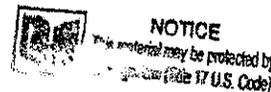
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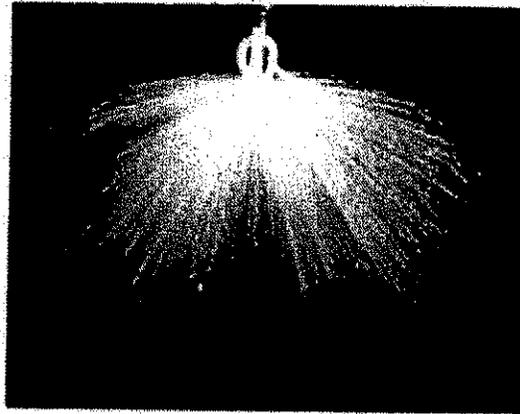
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## Sprinklers Cut Fresno's Fire Losses and Budget

EDWARD J. REILLY and JOHN A. VINIELLO

IN THE 1960s, the city of Fresno, California began the process of basing its municipal firesafety program on the installation of automatic sprinklers. As a result, the city decreased its fire losses, decreased the percentage of the municipal budget allocated to its fire department, and improved its insurance rating.

Many of the details of the Fresno program were explained in a March 1975 *FIRE JOURNAL* article entitled "How the City of Fresno Achieved Better Fire Protection." A major element of the program was the enactment by the Fresno City Council in 1961 of the Dangerous Building Ordinance, which focused on the central business district and gave city officials the power to remedy the hazards resulting from unsafe buildings or structures. City officials were empowered to condemn those buildings or order their repair, renovation, or restoration so that they would meet the requirements of the *Fresno Building Code*.

Under the provisions of the Dangerous Building Ordinance, buildings owners could choose among several alternatives to bring their buildings up to the requirements of the *Building Code*. Most owners found that the most economical way to comply with the *Code* was to install automatic sprinklers.

The city coupled the Dangerous Building Ordinance with a funding plan that city officials arranged with the local agency that administered the federal urban renewal program in Fresno. Federal funds were provided to the

city by the US Department of Housing and Urban Development for the acquisition of property and the demolition of buildings not worth saving. The city's agreement with the urban renewal agency specified that any new construction in the city's urban renewal area would be sprinklered in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. Finally, the urban renewal agency agreed to help interested owners find loans for building renovation. The agency did not, however, provide funds to owners or guarantee loans made to owners.

As a result of these two actions by the city — enactment of the Dangerous Building Ordinance and the agreement with the federal urban renewal agency — sprinkler protection became almost universal in the 18-block central business district and a separate 22-block area once considered a slum. More than 95 percent of all the buildings in both areas ultimately were protected by automatic sprinklers.

Representatives of the National Automatic Sprinkler and Fire Control Association (NAS), which was involved in the initial discussions that resulted in the Fresno program, revisited the city in 1977 to study the results produced by the program. What follows is a recounting of the effects that the organization found the program had made on the fire department and fire losses.

### Fire Department Results

In 1955, Fresno's population stood at 115,000. By 1977, 69,500 people had been added to its population, a

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65 percent increase. In 1955, Fresno covered only 21 square miles. By 1977, through a process of annexation, its area had jumped to 58 square miles. During the same period, the number of Fresno's engine companies increased from 9 to 11, a 22 percent increase. Total paid fire-fighting personnel increased from 218 men in 1955 to 276 men in 1977, a 26 percent increase. The number of fire fighters on duty around the clock remained unchanged: 68 men on duty during any 24-hour period in 1955, and 68 men on duty around the clock in 1977.

The burden per fire fighter had increased enormously between 1955 and 1977. In 1955, there were 3.2 fire fighters per square mile of area to protect. By 1977, the number of fire fighters per square mile was reduced to 1.2 men per square mile. Therefore, each fire fighter was required to protect more than 2½ times the number of square miles of area in 1977 than he was required to protect in 1956.

The number of fire fighters on duty during any 24-hour period decreased from 6.04 men per 10,000 in 1955 to 3.64 men per 10,000 in 1977. So the fire department was protecting almost twice as many people and property in 1977 as it had predicted in 1955, and had to cover over 2½ times the geographical area with only 20 percent more equipment, and virtually no increase in manpower.

In 1955, Fresno's fire department received so few deficiency points that it was rated as a Class 1 department. If the fire department were to maintain its Class 1 rating, 14 new fire stations would have to have been added between 1955 and 1976. Assuming a cost of \$1 million per station, including land and construction costs, this \$14 million acquisition would have cost the taxpayers about \$2.2 million per year, assuming a 6 percent municipal bond issue floated over a 20-year period.

Fourteen pumpers would have to have been added to maintain a zero deficiency point rating. At \$65,000 per truck, this additional cost would add about \$145,600 per year to the fire department budget with the same 6 percent municipal bond float for the same 20-year period.

It is difficult to calculate with precision the impact of additional manpower required to maintain a zero increment in deficiency points resulting from a manpower shortfall. However, in 1955, the Fresno Fire Department was up to full complement: six men per company, on duty 24 hours a day. By 1976, only four men could roll on a call during any hour of the day or night.

If the three-platoon system (three men working 56-hour shifts around the clock) had been in existence in 1955, 84 new fire fighters would have been required to meet full manpower needs of the department. To say it another way, Fresno's 1977 department of 276 men would have to have been increased to 360 men if the department were to maintain its Class 1 rating. This would have added about \$1.26 million per year to Fresno's fire department budget. This would have increased the 1977 fire department budget from about \$9 million

per year to about \$12.6 million. About a 40 percent increase. If the fire department budget came to 13 percent of the total in 1955, it would have come to about 11 percent in 1977 if manpower, fire stations, and equipment were to be maintained at zero deficiency point levels.

#### Fire Losses

Between 1956 and 1966, per capita fire losses averaged \$4.71. In the decade immediately following, per capita fire losses averaged \$8.11. However, construction cost more than doubles every decade. NAS wanted to measure the cost of replacing buildings destroyed by fire, so it adjusted per capita fire losses to the Building Construction figures published by *Engineering News Record*. Adjusting per capita fire losses to the Building Code Index, "real losses" dropped 22.4 percent in that decade.

Of even greater significance is the fact that nonresidential losses averaged 62.1 percent at the beginning of the 20-year period. By 1976, nonresidential losses had plunged to 43.5 percent of the total, and it was these buildings that became the object of the intensive automatic sprinkler master plan.

#### Conclusions

The Fresno program is a comprehensive fire defense master plan.

In the decade that followed its implementation, the city's fire losses (adjusted for inflation) were cut by 22 percent.

The fact that 95 percent of two urban renewal areas covering 40 square blocks were protected throughout by automatic sprinklers under a combination of ordinances made it possible for the fire department to take full advantage of the 50 percent reductions permitted under the "fire flow" standards of the Insurance Services Office (ISO) grading schedule and the additional 25 percent credit given by ISO for superior construction. This resulted in the imposition of almost zero deficiency points against the water department.

Intelligent planning based upon a thorough understanding of the ISO grading schedule enabled the building and fire departments to take the steps needed to upgrade the city from an ISO Class 3 to Class 2 city.

The implementation of the plan resulted in economies in fire department operations of up to 40 percent of the total operating budget for that department. The 1977 fire department budget of \$9 million would probably range up to about \$12.6 million if the 84 added fire fighters, 14 pumpers, and 14 fire stations required to maintain a zero

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deficiency point rating had been implemented as a solution to the fire defense strategy.

Real losses (measured in replacement cost of buildings destroyed) were reduced by 22 percent. While most cities in the United States are operating with fewer fire stations, fewer pumps and ladders, fewer fire fighters, and less equipment than they had 20 years ago (and many are protecting more land area), Fresno chose to do

so out of an intelligent master concept. Its results: a more efficient municipal government, more fire protection for its citizens at less cost, lower insurance rates, and a smaller, more efficient, higher paid, and well-trained fire department, plus a planning and inspection department with the proven capability to develop and execute a "cost-effective" master plan for municipal fire defense. △