fire protection planning report

BUILDING CONSTRUCTION INFORMATION FROM THE CONCRETE AND MASONRY INDUSTRIES

NO. 9 OF A SERIES

Fire Protection and Community Planning

Fire protection for a community involves providing firefighting services as well as enforcing local building and fire codes. Community planning requires sharing the responsibility for fire protection between the public and private sectors.

Fire, in its uncontrolled state, is one of the great killers of people and the destroyer of economic wealth. Nearly 7000 people lose their lives in fires each year; thousands more are injured and tens of thousands lose their homes and possessions to its ravages.

In an effort to protect the public from the devastating effects of fire, modern-day building codes have established minimum standards for the protection of life and property. During the last 10 to 15 years, life safety has surfaced as the motivating force behind building code changes. This is justified since life is so very precious and can never be replaced. The fire protection community has alerted the public exceedingly well to the need for greater life safety measures. Now, however, there is also a need for emphasis on property protection.

The Growing Need for Property Protection

In the United States during 1980 there was an estimated $6.25 billion in property damage due to fire. The total economic cost of destructive fire in the United States is estimated to be over $21 billion per year. (See Fig. 1.)

It is in the national interest that new efforts be directed at reducing the loss of property from fire in addition to providing life safety. We cannot afford to lose billions of dollars in goods and services from an economy struggling to reduce unemployment and to be competitive in an increasingly tough world market. Nor can we afford to allow the unnecessary waste of property that must later be replaced from our dwindling supplies of natural resources and energy.

Fire protection consists of both life safety and property protection. (See Fig. 2.) Although, in the total fire protection outlook, they are interrelated and work together, nonetheless, each is directed at achieving a different and distinct objective. As goals are set for reducing loss of life, so too must they be set for reducing property loss. It is time to place property protection back where it belongs, not above life safety or below it, but alongside of it.

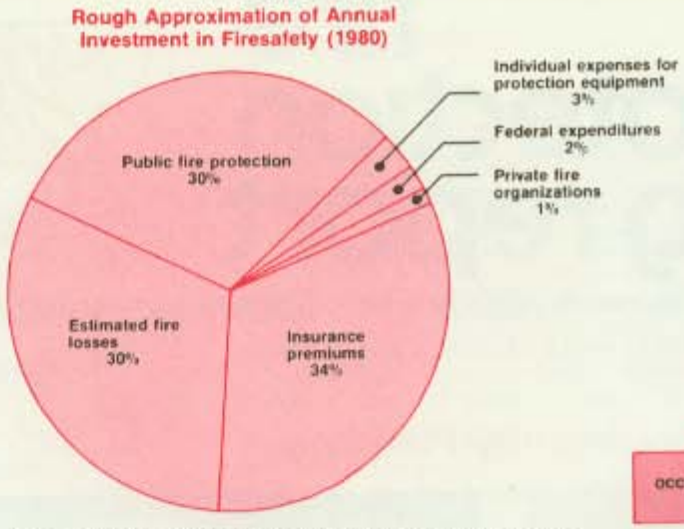

Fig. 1. For 1980, it is estimated that over $21 billion was spent on fire in the United States. Of the total, over $6 billion was due to direct property loss, nearly $7 billion was spent on insurance premiums, and over $6 billion was spent for public fire protection.

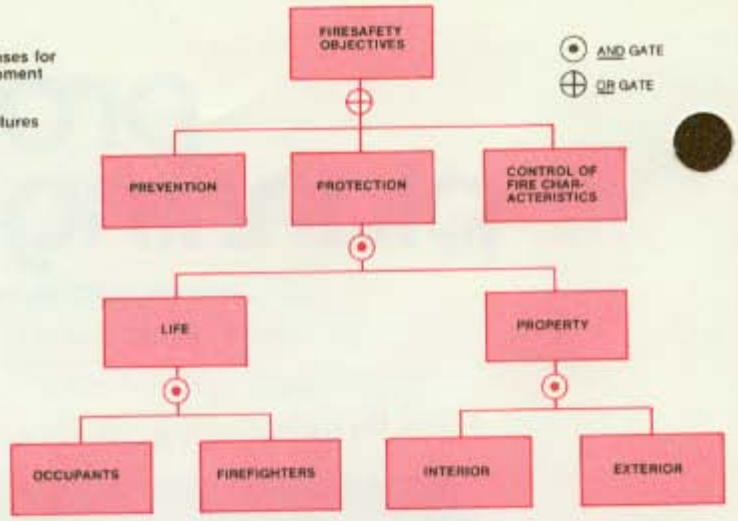

Fig. 2. A portion of the General Services Administration decision tree. In order to achieve the overall firesafety objectives through protection, both life and property must be protected.

Indirect Losses

The effects of property loss are much more devastating than is at first obvious. The indirect losses caused by fire are often overlooked. (See Fig. 3.) Unfortunately, human suffering always accompanies the destruction of property.

Recently, a study was conducted to determine the cost of indirect losses due to residential fires. (Ref. 1) Indirect costs were considered for medical expenses, temporary shelter, missed work, funerals, demolition, legal fees, extra cost of meals, and other miscellaneous expenses. It was estimated that in 1976, the total indirect cost of residential fires was between $220 and $322 million. However, no monetary value can be placed on the pain, both physical and psychological, experienced by fire victims.

In commercial occupancies, indirect losses can be very costly. When a thriving enterprise is struck by fire, and key processes or equipment are damaged, serious business interruption can occur. Often this interruption is more costly than the direct losses and can have devastating effects on interrelated businesses and the community. In addition, a business may suffer a permanent loss of customers, as well as the loss of skilled employees who are forced to seek other employment. Also, there are extra costs for demolition, temporary quarters, replacement of valuable records, and replacement of depreciated buildings and equipment with new facilities. It is not surprising that many businesses never reopen after a severe fire.

The community as a whole also suffers when a business sustains a major fire loss. There is a loss of circulation of employee payroll, loss of taxes on destroyed property, and an increased burden on welfare funds, all of which can be particularly severe in smaller communities.

Community Fire Protection

The most basic form of fire protection a community can provide is firefighting services. These services are usually adequate to handle existing conditions. However, as a community grows, firefighting services must expand to meet the changing needs.

Today, most communities have less tax money to maintain adequately staffed, trained, and equipped fire departments. This is an especially difficult problem for growing communities, where the construction of more multifamily buildings and large industrial sites places severe burdens on local fire department services. In the past, fire services tended to rely on bigger budgets and more manpower to handle community growth. However, this resulted in labor-intensive organizations and rapidly escalating costs. (Ref. 2)

Since the community is responsible for implementing and enforcing local building and fire codes, greater reliance will have to be placed on these codes in order to control fire losses as costs of providing firefighting services increase and available tax dollars decrease.

Master Planning

To cope with the fire protection problems of growing communities, many cities and states have developed and implemented master plans for fire prevention and control.

Since fire protection will always be a local responsibility, each community must tailor its system of fire protection to meet its own special needs. This system must be responsive not only to prevailing conditions but also to predictable changes. Planning is the key. (Ref. 3)

A master plan must address itself to the following four goals:

1. The particular fire protection problems of the jurisdiction must be identified. Data and statistics should be used, forming a base from which a comparison can later be made as a measure of performance.

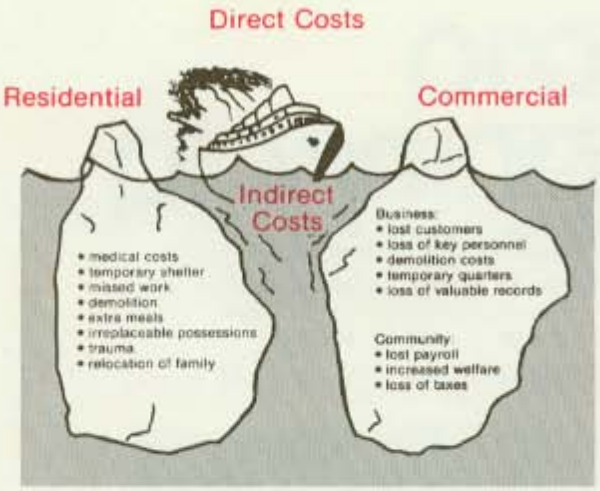

Fig. 3. Like much of the iceberg, indirect costs of fire are not at first apparent.

"Multi-Family Apartment Buildings containing three (3) or more dwelling units and two (2) or more stories in height, shall have the following fire resistance rating for structural elements:

Tenant separation walls, ceiling and floor of each dwelling unit, and all corridors, stair enclosures, heating, laundry and equipment rooms, shall be not less than two (2) hour fire resistance rated non-combustible construction.

Non-bearing partition walls in the interior of dwelling units shall be one (1) hour rated.

Exterior wall construction shall be of masonry (cavity type or solid), and have a fire resistance rating based on fire separation distance, but not less than two (2) hours."

Fig. 4. The Village of Westchester, Ill., adopted this ordinance in order to increase the firesafety of newly constructed multifamily residences in its community.

2. Acceptable levels of risk for life and property must be defined by setting goals and objectives commensurate with the community's funding capability.
3. Each community must decide on an appropriate level of investment in fire protection. When the cost of providing necessary fire services extends beyond public resources, the private sector must provide assistance. New buildings can be required to have built-in protection such as fire separation walls and floors, as well as smoke detectors and sprinklers. Determining the optimal level of fire protection will require the private and public sectors to share the responsibility for fire protection.
4. The fire protection master plan should not only seek to provide the maximum benefit-to-cost ratio for fire protection expenditures but also establish a framework for measuring the effectiveness of these expenditures.

For a master plan to be successful, it is necessary to have the cooperation and commitment of the entire community. Representatives of citizens groups, community agencies, the commercial and industrial sector, as well as the fire service, must become involved in the planning process. Only then can adequate levels of protection, and the balance of responsibility, be determined.

Many communities, particularly those that are growth-oriented, have decided "to freeze suppression services at their present level, while at the same time placing more of the future burden for fire protection on the residents of the community." (Ref. 3) This is usually accomplished by increasing the fire protection requirements of municipal or state building codes through the passage of local ordinances or code changes.

Local Ordinances and Code Changes

While a master plan is not law, it is a statement of community policy. Local ordinances and code changes may be passed to implement and enforce the intent of the plan. (Ref. 2)

Commercial and industrial occupancies can often benefit from fire-resistive construction. Upgraded code requirements commonly call for such buildings with more than 20,000 sq ft to be compartmentalized into 10,000-sq-ft-maximum areas separated by two-hour fire walls. This greatly reduces the amount of property at risk from a fire and provides areas of refuge for the occupants.

In order to increase the firesafety in residential occupancies, many cities and states have passed ordinances and code revisions upgrading the fire resistance requirements of walls and floors separating individual dwelling units in multifamily buildings. These ordinances commonly specify the use of two-hour fire-rated noncombustible construction for all tenant separations. (See Fig. 4.)

By adopting such an ordinance or code change, a community can provide its citizens with buildings of greater firesafety. In multifamily residences, fire-resistive, noncombustible construction limits the spread of fire and minimizes dollar losses more effectively than does any other type of construction. (Ref. 4) The lives and property of the residents of these buildings will be adequately protected from the accidental or intentional actions of their neighbors. Of course, residents of these buildings will also benefit from lower annual fire insurance rates. (See Table 1.)

Summary

The need for greater protection from fire is increasing. Our economy can no longer afford the annual loss of billions of dollars in goods and services and billions more in damaged property. Property protection and life safety are two separate objectives; only when both are accounted for can the overall goal of fire protection be achieved.

Current emphasis on cost-effective programs,

TABLE 1. Fire Insurance Cost Comparison
Building Cost: $200,000

OUTSIDE COOK COUNTY, ILL. CONSTRUCTION CLASSIFICATION

Occupancy Apartment Building 3-story, 6-unit			Precast concrete roof and floors, 2-hr fire rating 4-in. brick, 4-in. block wall		4-in. brick, 4-in. block wall, wood-frame floors and roofs		Wood-frame walls, floors and roof	
Type of insurance		Insurance coverage	Rate	Annual premium	Rate	Annual premium	Rate	Annual premium
Building	Fire	200,000	$.075	$150.82	$1.115	$2231.81	$1.719	$3438.53
	Extended coverage	200,000	.040	80.00	.438	876.00	.438	876.00
Contents	Fire	50,000	.177	88.50	.209	104.65	.263	131.58
	Extended coverage	50,000	.04	20.00	.438	219.00	.438	219.00
Total Annual Premium				339.32		3431.46		4665.11
Total Monthly Premium/Unit			5.06		30.68		56.39	

APARTMENT BUILDING—Dimensions: 50 x 40 = 2000 sq ft. Height: 3 stories, 35 ft. Total building area: 6000 sq ft. No basement, exterior wall with maximum of 20% glass windows, no exposure to adjacent structures. Rates based on 80% coinsurance and listed as $ per $100 of insurance per year. Six total apartment units.

Rates calculated by NATLSCO, National Loss Control Service Corporation, a subsidiary of Kemper Corporation, for the Masonry Advisory Council, Park Ridge, Ill.

reducing taxes, and other financial restrictions necessitate new, creative thinking in the area of property protection. Since less money is available to the fire services for equipment, staffing, and training, a greater portion of the fire protection burden will have to be placed on the private sector if loss of life and property from fire is to be controlled. Many communities have found that a master plan for fire prevention and control is the way to handle this situation.

Master planning involves community participation in the development of a plan dealing with the future fire protection requirements of the community. The planning involves determining what level of protection is desired and what level of spending is necessary to achieve it. Responsibility for fire protection must be shared by the private and public sectors.

Many of the growth-oriented communities have placed more responsibility on the private sector by upgrading the fire resistance requirements of the municipal or state building code. For residential buildings, this can be accomplished by adopting a local ordinance or code change requiring two-hour fire-rated noncombustible floors and walls separating living units in multifamily buildings. In larger commercial and industrial occupancies, upgraded code requirements may call for these buildings to be compartmentalized into 10,000-sq-ft-maximum areas separated by two-hour fire walls. It is the community's right and responsibility to adopt such ordinances or code changes in order to implement and enforce a master plan for fire prevention and control.

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Organizations represented on the CONCRETE AND MASONRY INDUSTRY FIRESAFETY COMMITTEE

BIA	Brick Institute of America
CRSI	Concrete Reinforcing Steel Institute
ESCSI	Expanded Shale Clay and Slate Institute
NCMA	National Concrete Masonry Association
NRMCA	National Ready Mixed Concrete Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

Concrete and Masonry Industry Firesafety Committee

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