

The Architect's and Engineer's Case for

Lightning Protection

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Presented by

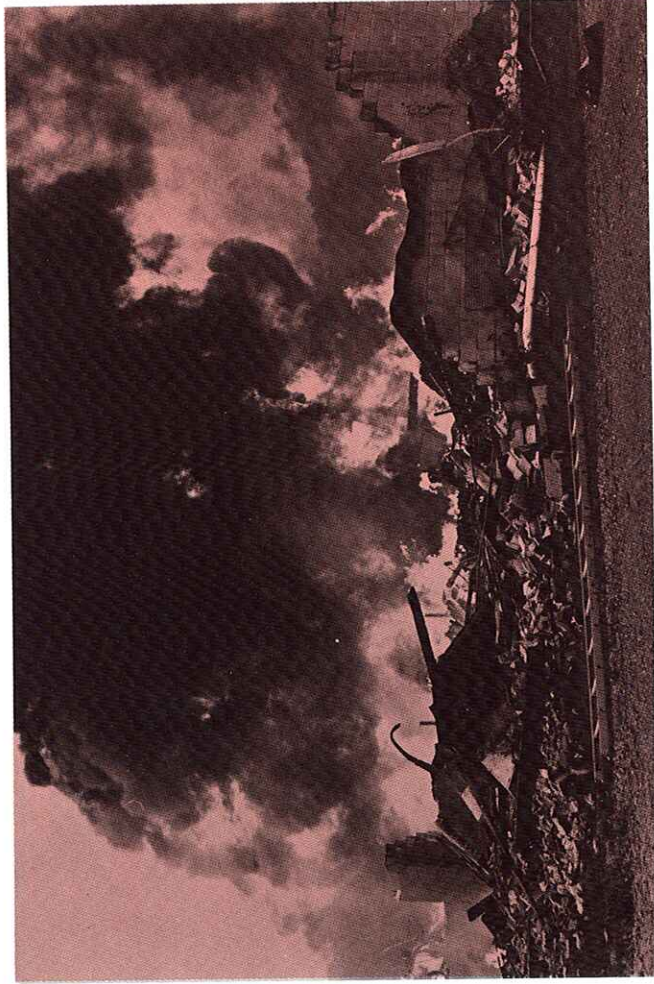
THOMPSON

LIGHTNING PROTECTION INC.

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Architects, Lightning and the Law

The trustees of a church destroyed by lightning while still under construction sued—and almost ruined—an architect and a construction firm.



Why? The architect, they said, failed to specify adequate lightning protection. And the construction firm, whose engineers, they contended, should have known better, did not insist on it. Both had relied on the unreliable "cone of protection" theory. Only one air terminal was installed. It was placed on the steeple, the highest point of the building. Lightning struck the rear of the structure. A fire reduced the dreams of an entire congregation to ashes.

Lightning damage was once considered by the courts to be "an act of God". Today lightning itself remains an act of God, but lightning protection, nearly 100% safe, has become the responsibility of man.

A seasoned Chicago trial attorney recently stated he would gladly accept clients who wished to sue building owners, architects and construction firms for failure to specify or install adequate lightning protection. "Lightning", he said, "has long been considered 'an unforeseeable intervening force'." (Prosser on Torts) However, I believe it is a 'reasonably foreseeable danger' for which there exists a simple, inexpensive system of protection. Failure to specify or install such a system, even while remodeling older buildings, is a simple case of negligence."

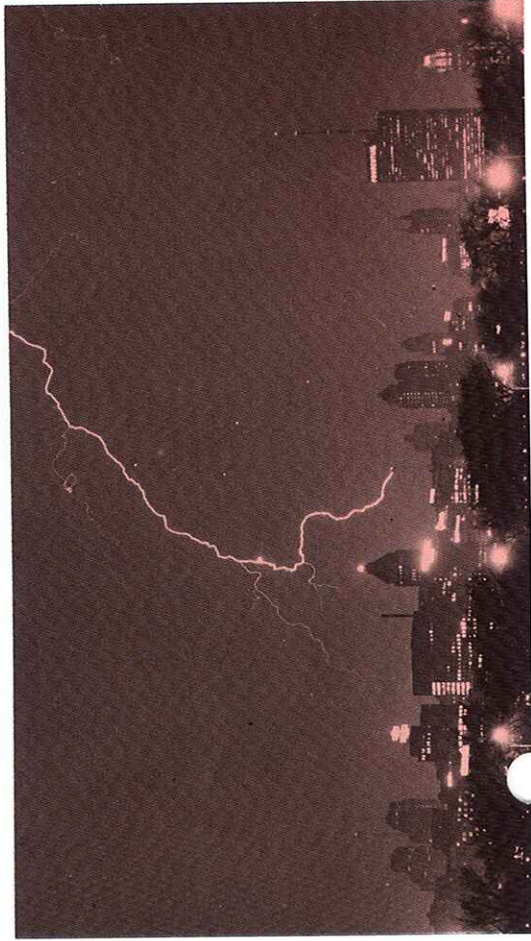
The attorney added that tenants in unprotected or poorly protected buildings or owners and tenants of nearby buildings destroyed or damaged by fires caused by lightning would, in all likelihood, have strong grounds for suit.

Because of this subtle but important development, architects are advised to always specify lightning protection. If the owner refuses such protection, the architect should have a document to that effect. In the case cited above, the church also sued the lightning protection installer. The court absolved the installer, however, since he proved he tried to persuade the architect and the construction engineer to install adequate protection.

There are many more reasons why a lightning protection system is more important today than it ever has been. When discussing the matter with their clients, architects frequently cite the following seven reasons:

- 1 Lightning is the greatest natural destroyer of buildings—worse than tornadoes, hurricanes or floods!
- 2 Lightning is the one natural destroyer against which protection is positive, yet economical.
- 3 Lightning damage costs more than ever because of higher replacement costs, presence of expensive electronic equipment, and lost usage of the building.
- 4 Lightning is not rare. Every year 90,000,000 cloud-to-ground bolts strike American land areas.
- 5 Lightning protection prevents losses for which ordinary insurance can only partially compensate—such as bodily injury, death, loss of important records, good will or business.
- 6 Lightning protection frequently adds to the charm of the building, e.g. air terminals can be ordered in various architectural styles, they may be barely visible.
- 7 Lightning protection is economical and the cost can be financed with other construction.

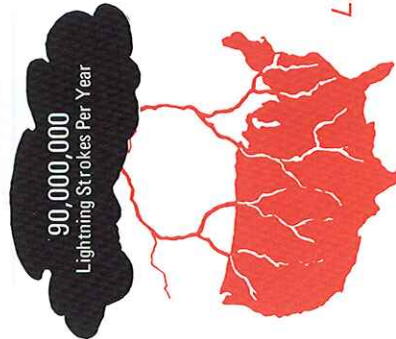
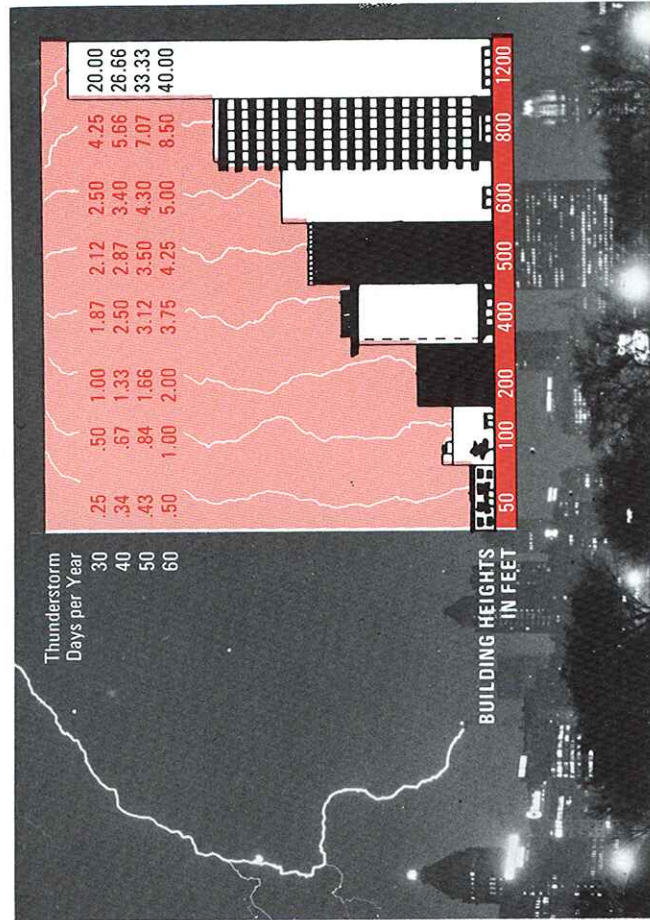
Seven More Reasons Why...



What are the Odds?

Anyone who has met a victim of lightning damage, many of whom have lost their life's most sentimental possessions, will not wonder about the odds of lightning striking a home—or even a public building. The aftermath is usually too awesome. But for the gamblers, the statistics are persuasive.

Given an average location and exposure, a 50' high building stands a greater chance of being struck by lightning once a year than a gambler has of filling an ordinary flush in a game of poker (1 chance in 4½)! This startling statistic is part of the following "Table of Probability of Annual Lightning Discharges to Buildings of Various Heights". The table is based on data compiled by Mr. Edward Beck, Westinghouse Electric Company.



Another way to estimate the probability of lightning discharges to a given structure is to use data based on average lightning discharges per square mile for various geographic areas. In the United States the average geographic area is subjected to 40 lightning strokes per square mile every year. Using this method, a five story building may receive one to two discharges every four years, while a forty story building may be expected to receive that many every year! This method takes into account the size of a building's foundation as well as its height. Beck's table considers only height.

Lightning is the greatest natural destroyer of buildings—worse than tornadoes or floods!

Fire!

In some areas lightning causes up to 37% of all fires. Rarely does a week pass without word of another building destroyed by lightning-related fire. Two recent studies of fires, one of churches, another of building material yards, indicate the scope of the problem.

CAUSES OF CHURCH FIRES	
LIGHTNING	30.2
Defective wiring and equipment	17.4
Defective heating equipment	11.2
Smoking and matches	9.3
Spontaneous combustion	6.6
Miscellaneous minor causes	25.3
(Source: Insurance Information Institute)	
CAUSES OF BUILDING MATERIAL YARD FIRES	
LIGHTNING	18.2
Defective wiring and equipment	13.1
Defective heating equipment	12.9
Exposure fires	12.5
Set fires (children, tramps, arson)	12.3
Smoking and matches	11.2
Sparks and Stacks	9.7
Misc. and minor causes	10.1
(Source: National Fire Protection Association)	



In addition, "cold" lightning bolts, which cause no fire, cause millions of dollars of structural damage, much of which is unreported. The United States government requires protection on defense sites and other properties. However, one Cape Kennedy launch complex did not have proper lightning protection. The apparatus was struck and the space flight was delayed at heavy cost.

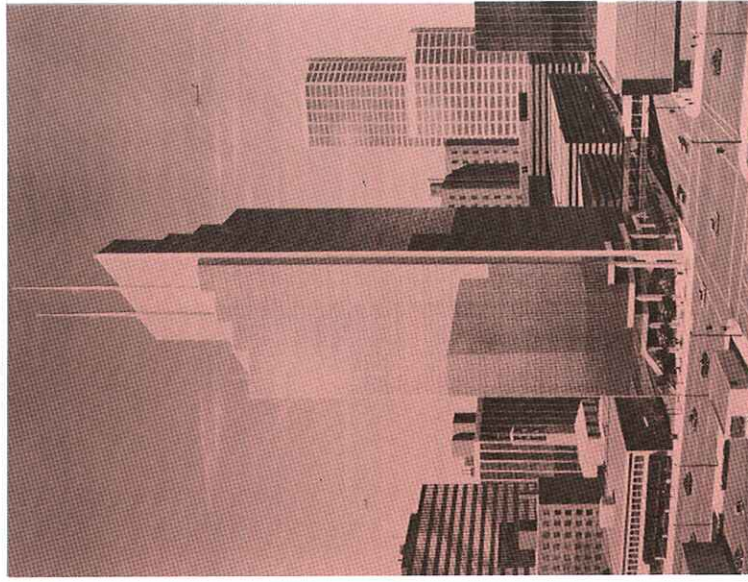
Buildings containing large quantities of electronic equipment are particularly vulnerable. And in Canada entire classes of building must have lightning protection.

OPEN SHORT FORM SPECIFICATIONS:

The contractor shall furnish all labor, materials and items of service required for the completion of a functional and nonobtrusive (concealed or semi-concealed) system of grounds, conductors and air terminals for protection against damage by lightning of (designate type of building, stacks, trees, or other) as approved by the architect. The complete installation must conform in all respects to the current requirements of the L.P.I. Certified System program and all legal, labor, insurance or other authorities having jurisdiction. The installing contractor shall have a minimum of 5 years experience in this specialized work and be a certified master installer of the Lightning Protection Institute. All materials used shall be furnished and recommended for their intended use by a reputable lightning protection manufacturer who is a Manufacturer Member of the Lightning Protection Institute. All materials must be equal to those of Thompson Lightning Protection, St. Paul, MN.

Which Buildings?

The Lightning Protection Institute recommends that all buildings, public or private, be protected against loss by lightning. Some buildings need protection more urgently than others, particularly buildings in the hearts of cities. Use and type of occupancy are considered to be influencing factors, too. But lightning is known to strike tall buildings and small, buildings built on hills or in valleys, in cities and wide-open spaces. The only "safe" building is a properly protected building.



Piper Tower
Hammel Green & Abrahamson Architects
Minneapolis, Minnesota

Architects specified Thompson lightning protection systems for new projects like these . . .

Each day, more and more Architects and Engineers are writing modern lightning protection systems into their building specifications

The Piper Tower Building (shown above) utilizes structural steel as part of the lightning conductor in its L.P.I. Certified

What Others Say...

"Since protection is available it should be secured, for lightning is not only a cause of fire and damage to property, but also of personal injury and loss of life."

NATIONAL BOARD OF FIRE UNDERWRITERS

"Today there is a compelling added reason to build complete and sophisticated lightning protection into buildings . . . the need to also protect increasingly vulnerable and costly contents, such as present and future automated equipment."

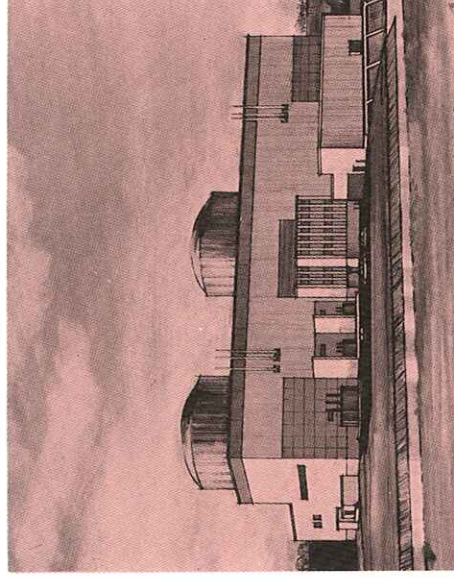
Robert Loewe, Chief Engineer
ARGONNE NATIONAL LABORATORY

Few devices of man are as efficient as a modern lightning protection system."

NATIONAL FIRE PROTECTION ASSOCIATION

"The place to study fire safety is on the architect's drawing board, not after the building is completed."

John C. Thornton, A.I.A.



NSP Prairie Island Nuclear Plant
Pioneer Engineering and Service Company
Architect-Engineer, Chicago, Illinois

Lightning Protection System.

Solid copper air terminals and conductors connected to copper clad steel ground rods and counterpoise network complete the system.

FACTS ABOUT LIGHTNING PROTECTION

Lightning, because of its tremendously high voltage and unpredictability, is far different from commercial electric current. Lightning protection, therefore, should be a separate specification and not tied to electrical specs.

Lightning's known toll of property in the United States runs into hundreds of millions of dollars every year . . . and virtually all of the loss is preventable.

A steel frame building is not protected against lightning damage unless it has a proper roof system of air terminals and roof conductors, bonded to a properly grounded steel frame.

A lightning protection system with tie-ins to metallic bodies of inductance and conductance will reduce static problems on mechanical floors . . . and, in this respect, such protection is more important than ever before.

LPI CERTIFIED SYSTEM LABEL

The LPI Certified System label is a cast metal plate in the configuration shown here. It is issued by the Lightning Protection Institute directly to the Owner of the protected property or through a third party inspector designated by the Owner. When attached to a building, the LPI Certified System label signifies:

- that the manufacturer has by signing the application for certification, attested that all materials furnished have been factory inspected for adherence to the requirements of the material standard, LPI-176;
- that the installing contractor by his signature on the application has attested to adherence to code of his installation layout and workmanship;
- that the Owner or Owner's agent has inspected the system at all stages of construction and found it in compliance with the installation standard, LPI-175;
- that the Lightning Protection Institute, by the signature of its Managing Director, has certified that all LPI Certified System requirements have been properly attested to by responsible parties; and finally,
- that the lightning protection system will be reinspected one year after certification under the annual inspection and maintenance procedure that is a mandatory part of continued system certification.



LPI MANUFACTURER MEMBER

THOMPSON LIGHTNING PROTECTION, INC.

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