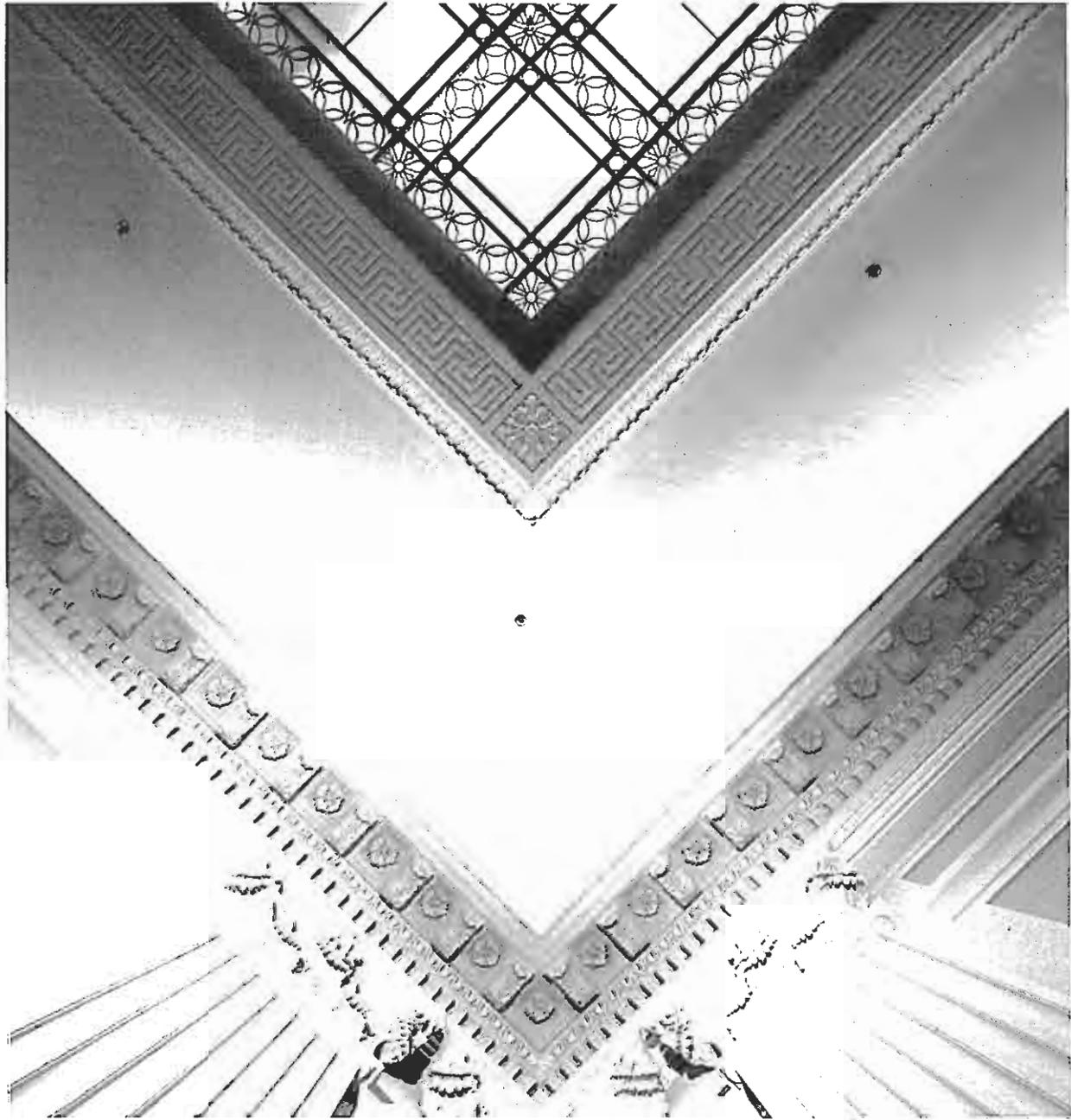

FIRE SAFETY RETROFITTING IN HISTORIC BUILDINGS



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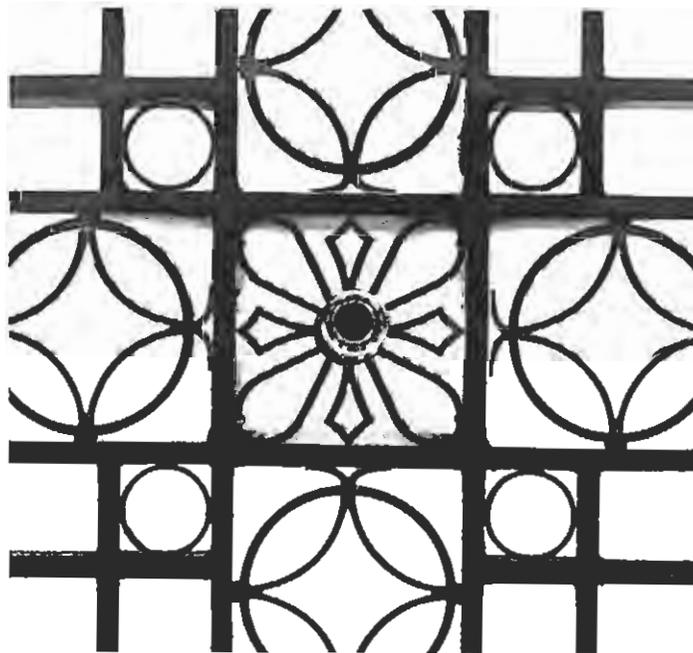
Advisory Council on Historic Preservation and the General Services Administration

AUGUST 1989

On the cover: In a courtroom of the U.S. Military Court of Appeals building, Washington, DC, a fire sprinkler system is visible in the elaborate ceiling skylight and surrounding plaster.

Opposite page: A closeup of the skylight shows a sprinkler head placed in the center of the decorative "cross."

**FIRE SAFETY RETROFITTING
IN HISTORIC BUILDINGS**



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General Services Administration**

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Preface

The concern for public safety and the protection of property, within the context of historic preservation, has led to challenges in the continuing use of historic properties. Older buildings, constructed before modern fire safety requirements were established, must be made safe for the public.

This publication is designed to address concerns about maintaining safety and property integrity, while preserving the distinct historic features of that property. The Advisory Council on Historic Preservation encourages the incorporation of preservation issues into the comprehensive program planning developed by Federal agencies for managing their properties, and the procedures recommended throughout this text emphasize the necessity of thorough and early planning for successful and efficient retrofitting of fire safety systems in historic buildings. With any undertaking, however, Federal agencies must take into account the effects of that undertaking on historic properties, as required by Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Any alterations planned by a Federal agency for a historic structure, such as the addition of fire safety systems, must include compliance with the Section 106 review process, which is administered by the Council under its regulations at 36 CFR Part 800. During this process, Federal agencies must provide the Council an opportunity to comment on any agency activity or undertaking that may affect historic properties, and must take the Council's comments into account. The Section 106 review process consists of five steps: identifying and evaluating historic properties within the areas of potential effects, assessing effects on the properties, consulting with appropriate parties to avoid or reduce any adverse effects, Council comment, and proceeding with the undertaking. This publication recommends specific examples of methods for retrofitting fire safety systems that can avoid harm to historic features and discourages other specific methods likely to be incompatible with those features. Following these recommendations will facilitate Section 106 review of fire safety retrofitting projects.

The General Services Administration is author of this publication. The Advisory Council on Historic Preservation and General Services Administration are jointly publishing these technical notes to reinforce both agencies' concerns for the issues raised in the text discussion. The Council and GSA hope that this publication will be used widely as agencies plan for fire safety retrofitting in historic buildings in such a manner as to comply with both protective requirements and Section 106.

The publication makes clear that the protection of life and property are paramount to the enhancement of the historic features of a property. However, through careful consideration of the issues of preservation and fire safety that are presented in this publication, and by incorporation of those issues into agency planning, agencies can efficiently coordinate policies and programs with those of the National Historic Preservation Act and effectively fulfill the need for public safety as well.

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Figure 1. Blair House, the Presidential guest quarters, Washington, DC, has undergone a fire safety retrofit. A sprinkler head is visible below the cornice line.

Fire Safety Retrofitting in Historic Buildings

Standards for fire safety retrofitting

The challenges of fire safety retrofitting in historic buildings today are

- *first, to provide for the protection of life;*
- *second, to protect the property; and*
- *third, to ensure that the installation of fire safety devices has minimal impact on the historic features of the property.*

Fire safety systems must perform so that building occupants are ensured of sufficient time for protected egress during fire or other emergency conditions, property is protected to ensure minimal loss during fire, and continuity of mission is not disrupted due to fire.

In protecting the significant historic features, two principles must interact: the installation and operation of fire safety and suppression devices should have minimal impact on the historic features, and these systems and devices should provide maximum protection for the historic features.

Designing fire safety systems to ensure the maximum protection of significant historic building features must be accomplished within the context of the absolute need to protect life from fire and its effects. Within this context, protection and preservation of significant features can be accomplished

by applying the following standards:

- *Creativity to ensure the consideration of all possible alternatives that would balance the needs to protect life and property with the overall preservation objectives.*
- *Flexibility to apply and adapt fire safety codes or risk reduction requirements to achieve both the safety and historic preservation objectives.*
- *Practicality to resolve conflicts between fire safety and historic preservation objectives creatively and flexibly.*

The complexity of retrofitting historic properties for fire safety varies with the degree of existing fire safety systems and the historic significance of the building. The more significant the historic features, and the more fire safety risks there are present, the greater the complexity is in achieving these standards.

Since each project has its own unique issues of preservation and fire safety, it is vital that each project team utilize a design process that will successfully integrate the contemporary needs of fire safety into the building with minimal effect on the significant historic features. This process needs to be sufficiently specific to guide each individual team member, yet sufficiently flexible to accommodate all projects. This guide will describe the project team required, the process for achiev-

ing successful fire safety retrofitting in historic buildings, code issues and fire safety systems, and specific applications with recommended and not recommended treatments.

The project team

The individuals (project team) involved in the renovation and retrofitting of fire safety systems in an historic structure typically include the building manager, the building occupants, the architects, the historic preservation specialist, the fire protection engineer, and the review authority(ies) having jurisdiction (Figure 2).

Both historic preservation and fire safety issues generally require specialists to properly research, document, and then recommend solutions for a given project. Because of the special requirements for each area, it is necessary that consultation and project coordination occur at the earliest possible time so that individual project objectives can be shared and developed into mutual objectives. Such consultation and coordination must occur between the project specialists as well as required participants, such as the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.

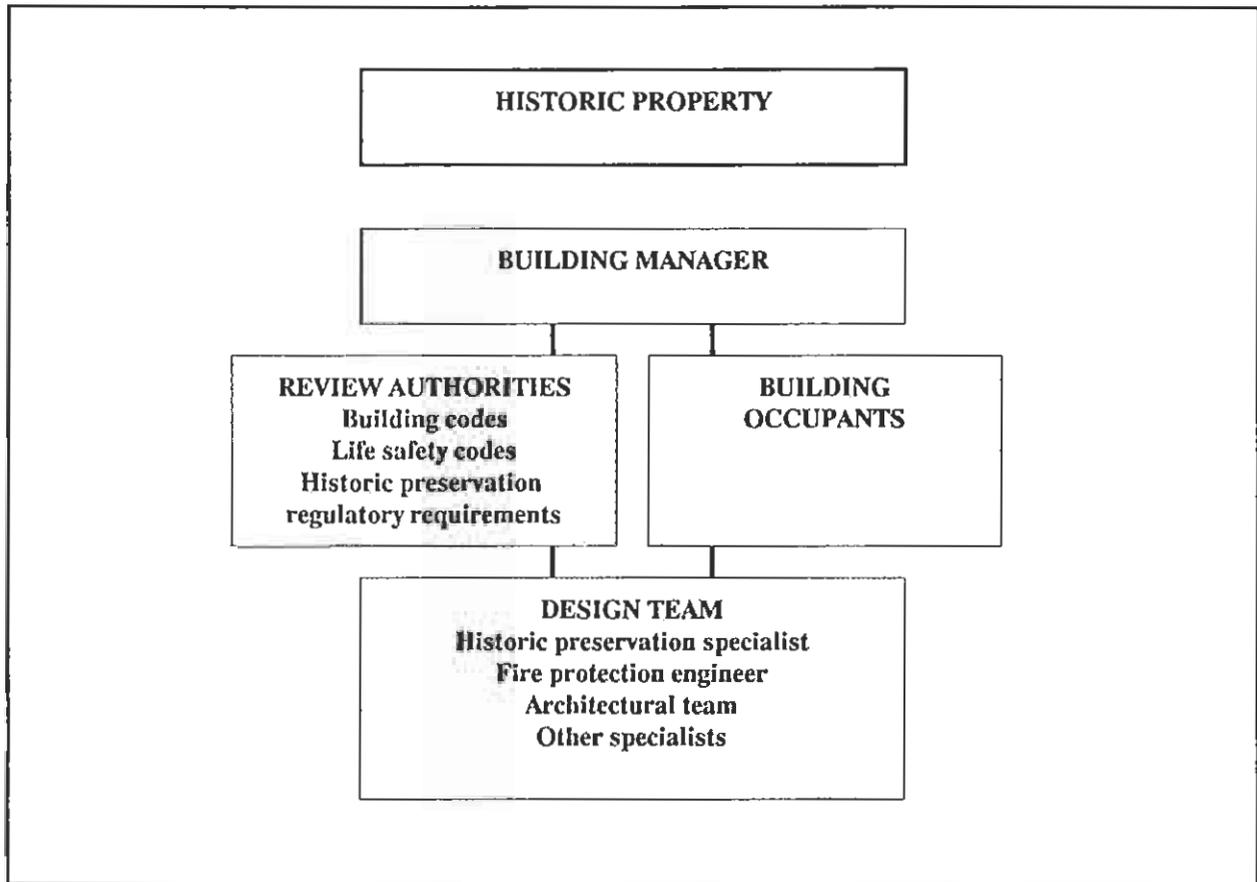


Figure 2. Project team organizational chart for fire safety retrofitting.

The process of fire safety retrofitting

The process for achieving a successful fire safety retrofitting in historic buildings consists of an assessment of the building, which includes an historic preservation assessment and a fire safety assessment; an evaluation of objectives and selection of proposed solutions; a review of proposed solutions; and implementation. Each of these steps is described below (Figure 3).

Assessment of the building

The historic preservation assessment. If a Historic Building Preservation Plan or Historic Structures Report has been completed for the building, it should be used as a frame of reference for the assessment.

For the assessment, the historic preservation specialist examines the building and its site, the zones within the building, and the individual features within the building. The building and its site are evaluated based on factors such as building type, style, use, age, condition,

modifications, site context, and historical associations to determine the building's historical significance and historic character. The zones, i.e., public, private, and circulation spaces, are next evaluated to determine the significance of the zones based on their use, original design, public access, integrity, detailing, and materials. Finally, specific features located in the building are evaluated to determine their significance based on uniqueness, materials, detailing, and condition. The result of this evaluation is a determination of the level of significance of the building, zones, and features. Items

that are determined to be highly significant require creative and flexible approaches to fire safety retrofitting to preserve this significance.

The fire safety assessment.

The purpose of the fire safety assessment is to determine how the building presently performs in the event of a fire, to define what deficiencies need to be corrected to ensure safe building evacuation and building preservation, and to determine how best to correct these deficiencies in a manner that both ensures fire safety and preservation of historical features. Critical to this assessment is the understanding that building codes and life safety codes are guidelines, not prescriptions, for the fire safety retrofitting of historic buildings. Strict application of the codes may result in the destruction of highly significant features and must be avoided through creative and flexible application of codes.

An alternative approach to codes and standards is an evaluation of buildings based on a systems approach with building and life safety codes used as benchmarks in determining building performance during a fire. This entails conducting a thorough inspection and objective evaluation of the entire property, including stairs, doors, corridors, construction materials, fire sources, existing fire safety equipment, operational support systems, and the occupancy as part of the total system relative to overall fire safety.

The result is a logical and reliable determination as to

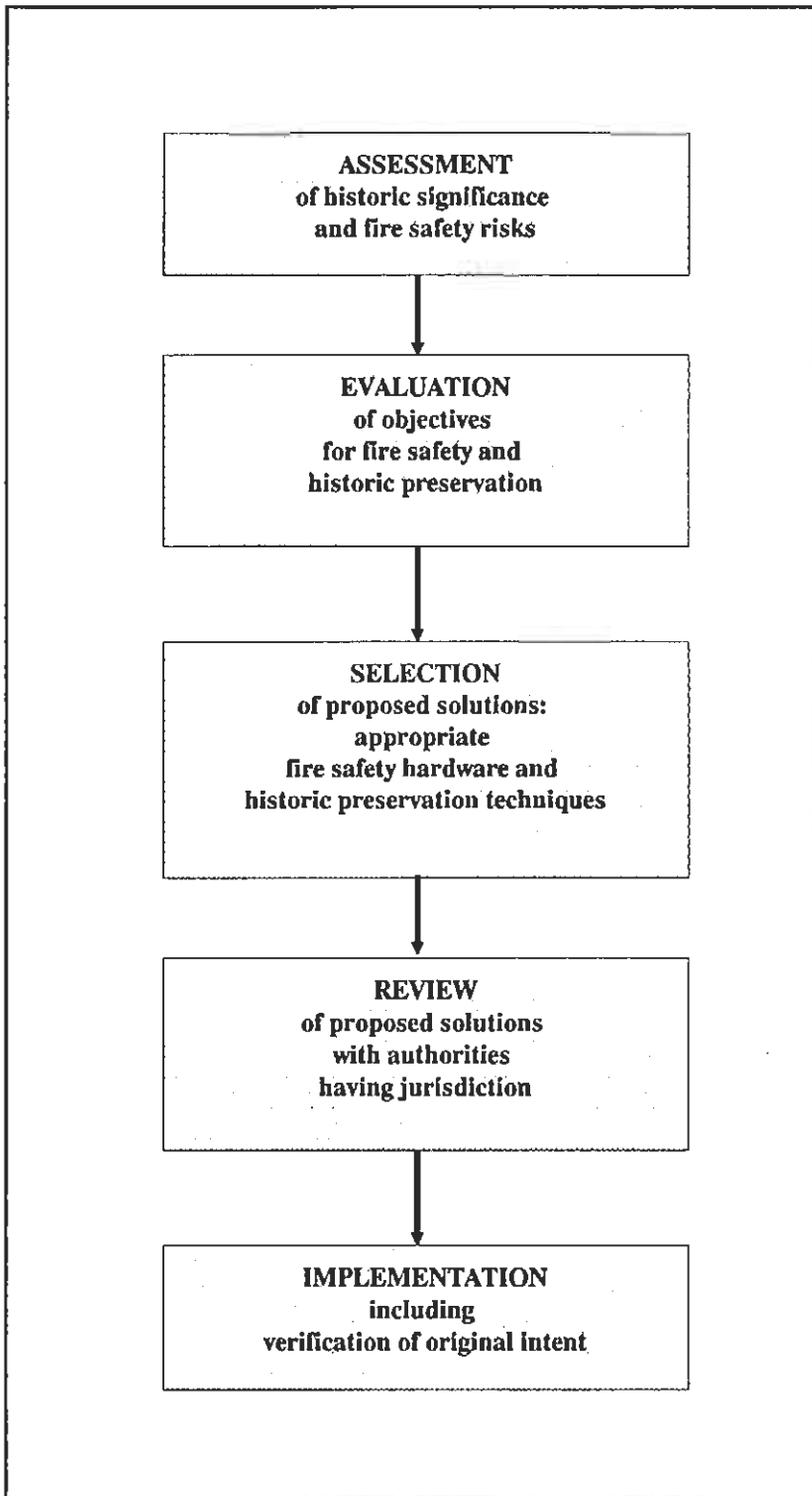


Figure 3. Decisionmaking process for fire safety retrofitting in historic buildings.

whether equivalent or alternative protection exists for any or all conditions.

**Evaluation
of objectives**

Once the historic preservation assessment and the fire safety assessment have been completed, each should be analyzed in the context of the other. The most significant historic features and the most important fire safety objectives are identified and prioritized. Each priority is analyzed and design solutions explored to meet the objectives of both fire safety and historic preservation. The objective of this analysis is that each team recognizes and understands the values and/or requirements of the other's program. Such cooperation resolves issues of conflicting values and needs through sensitive design and planning solutions.

The overriding goal of this collaborative effort is to design the highest quality project while satisfying both historic preservation and fire safety values and objectives.

**Selection
of proposed solutions**

In the selection phase, the methods of protecting the building occupants and the historic fabric of the building are decided. Fire safety system selection, which began during the evaluation phase, is finalized as the system requirements are balanced against the need for preserving the historic fabric. Actual fire safety hardware is matched to preservation and restoration techniques and loca-

tions, and details of installation are worked out, along with the logistics of accomplishing these activities.

**Review
of proposed solutions**

Once the solutions from the selection phase have been documented, the project team should review the implications with the authorities having jurisdiction over the various fire safety requirements respective to historic properties.

This is the point at which the Historic Preservation Officer completes the Section 106 review requirements administered by the Advisory Council on Historic Preservation.

Once jurisdictional review requirements have been satisfied, the project manager may then complete the documentation and issue the drawings for implementation.

Implementation

During implementation, the project team must inspect the work at pre-established critical points to verify that the original intentions of the design are being carried out. If construction is required, it is important that photographs be taken prior to commencement of work and be incorporated into the design document to help clarify or pinpoint specific areas warranting added special attention. After project completion, photographs should be taken to document final outcome of the work and for use as pre- and post-construction comparison tools.

**Code issues
and fire safety systems**

**The purpose of codes
in contemporary buildings**

Modern construction is guided by a number of codes and common practice procedures. Specific codes are written for building construction, mechanical systems, plumbing systems, electrical systems, sanitary water supply systems, and life safety. The typical contemporary building is planned for fire safety and contains structural, mechanical, and electrical systems, and materials and methods of construction that are well known to the architect and/or engineer and therefore easily evaluated for fire safety using these codes.

Building and life safety codes establish minimum standards for building construction. Most codes determine allowable construction techniques or materials by weighing the degree of safety provided by the building (its construction classification) against the degree of hazard presented by the user (occupancy classification) and by taking into account such factors as installed fire protection systems.

Building codes

The purpose of building codes, typically, is to provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and

structures within its jurisdiction. The building codes define specific criteria for buildings based on their occupancy classification and/or type of construction. In addition, these codes specify detailed regulations in a number of areas such as existing fire extinguishing systems, wall and ceiling coverings, and elevators.

There are three model building codes that are adopted either in full or in part throughout the country: the Basic Building Code, used mostly in the northeast; the Southern Building Code, used through most of the southeast; and the Uniform Building Code, used primarily in all of the western states. In addition, some of the larger cities such as New York have adopted their own set of codes. Most codes also include appendices that reference industry standards prepared by manufacturers or research associations such as American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), Underwriters Laboratories, Inc. (UL), and Factory Mutual Approval Guide (FM), which provide more detailed information for adaptive use.

Although intended as a minimum, most building code requirements often become the standard of design. However, repairs, alterations, and additions necessary for the preservation, restoration, rehabilitation, or continued use of a building may be made without full compliance of all requirements of a building code given authorization from an authority having

jurisdiction provided no unsafe conditions are deemed present.

Fire safety codes

Life Safety Code. The most widely recognized code that discusses life safety is the National Fire Protection Association (NFPA) Code for Safety to Life, commonly referred to as NFPA 101 or the Life Safety Code. It is this code that is either the model for other local and Federal codes or is enforced through reference. The Life Safety Code addresses those items in building design and operation which affect safe egress from a building and does not address protection of property nor other building safety measures such as are typically included in building codes.

The Life Safety Code focuses on three broad areas: means of egress, features of fire protection, and fire service and fire protection equipment. Similar to building codes, the specific requirements for each of these areas varies depending on the occupancy classification of the building. Occupancy is defined as "the purpose for which a building or portion thereof is used or intended to be used." Thus, the intended reuse or continued use of the historic building will determine the design and engineering of the life safety solutions.

Means of egress is defined as a "continuous and unobstructed way of exit travel from any point in a building or structure to a public way and consists of three separate and distinct parts: the exit access, the exit, and the

exit discharge." The means of egress is an integral component of life safety systems, as it is through this mechanism that safe evacuation is conducted. Specific components of a means of egress include corridors and stairs.

Features of fire protection discussed in the Life Safety Code deal with construction and compartmentalization of the structure, sometimes referred to as passive fire protection. In this section, the code addresses specific requirements for installation of vertical and horizontal fire-rated partitions, smoke barriers, and interior finish materials.

Building service and fire protection section touches on ancillary equipment installed in buildings such as utilities, heating/ventilating/air conditioning (HVAC) equipment, and elevators. In addition, descriptive information is provided regarding various types of fire protection systems including fire alarm, detection and communication devices, automatic sprinkler systems, and other extinguishing equipment. Sprinklers and other fire extinguishing systems are commonly referred to as "active fire protection" features.

Codes in historic buildings

Adherence to the codes is more difficult for historic properties than for new construction. In fact, there are no specific codes to guide installation of fire safety systems in historic properties. In response to the lack of specific code guidance, the

model building codes make special provisions permitting the authority having jurisdiction to waive code requirements for construction, alterations, and the repair of historic properties.

NFPA has published recommended practices for protection of historic structures and rehabilitation and adaptive reuse for historic structures. The purpose of these practices is to provide background material on the historic preservation field and its requirements, information regarding the identification of fire hazards, and recommendations for planning and design approaches and solutions appropriate for the historic building relative to fire protection and prevention.

Alternative approaches to the codes

Qualitative risk assessment is a preferred method for determining proper fire safety retrofitting in historic properties. Risk assessment incorporates the identification and evaluation of the conditions of the building, the potential consequences, and the associated risk to the occupants, property, and the mission. All positive and negative features must be taken into consideration in the building evaluation. This approach will project the expected performance of the property during a fire from which an assessment of risk to life and property loss can be formulated. Once a risk assessment has been determined, the

levels of acceptable risk must be agreed upon.

Risk is the potential harm or, more formally, the potential for realization of unwanted, negative consequences of an event. The objective of control of risk from fires is to reduce the probability and consequences of events leading to and resulting from fires to an acceptable level.

This systematic approach using risk assessment techniques should be applied in determining how conditions are to be corrected. Such techniques should be used by the project team when developing abatement procedures for conditions. Recommendations are to be based on the exposure to risk of loss.

Thus, each historic property must be individually evaluated

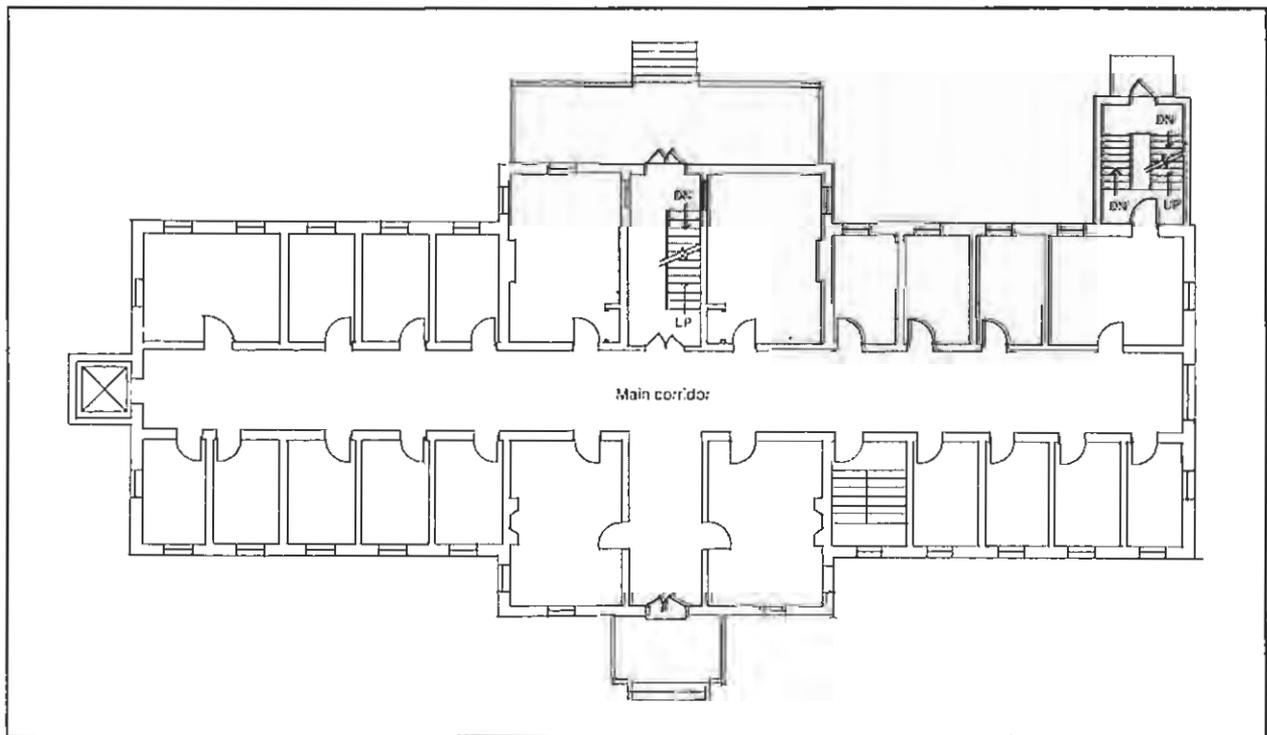


Figure 4. First-floor plan of existing 18th-century Alms House, Bedford, Pennsylvania, to be adapted for reuse. The main corridor was determined to be historically significant.

from a fire safety system standpoint and acceptable levels of risk must be established. The design team should research the existing infrastructure early in the planning stages to determine the value of fire protection inherent in the existing materials and systems as compared to modern building standards. The design team can then approach the applicable fire and life safety codes as a guide rather than a solution.

The team should then design and engineer solutions that apply risk assessment techniques with the need to protect the historic fabric of the property. Resolution of potential conflicts can be coordinated through the authority having

jurisdiction and the historic preservation specialist.

Applications

The following are some general applications to illustrate recommended/not recommended treatments to fire safety and historic preservation issues.

Corridors

Corridors that lead to an exit are typically a component of a means of egress called the exit access. The pathway to an exit must be wide enough to accommodate egress of building occupants and be located in such a manner that travel distances to the exit are not exceeded,

nor that dead end arrangements are prevalent. Corridors should be arranged so that if a fire blocks access to an exit in one direction, an occupant could access another exit from another direction.

In the adaptive reuse of the 3-story masonry Alms House built in the 1860s (Figure 4), the SHPO had indicated that the wide and open corridor flanked on either side by individual rooms was historically significant and due consideration should be given to maintaining the corridor unobstructed. At the same time, the authority having jurisdiction in fire safety matters cited various code violations that would require substantial upgrades of the existing historic fabric to accommodate the planned reuse. Using these

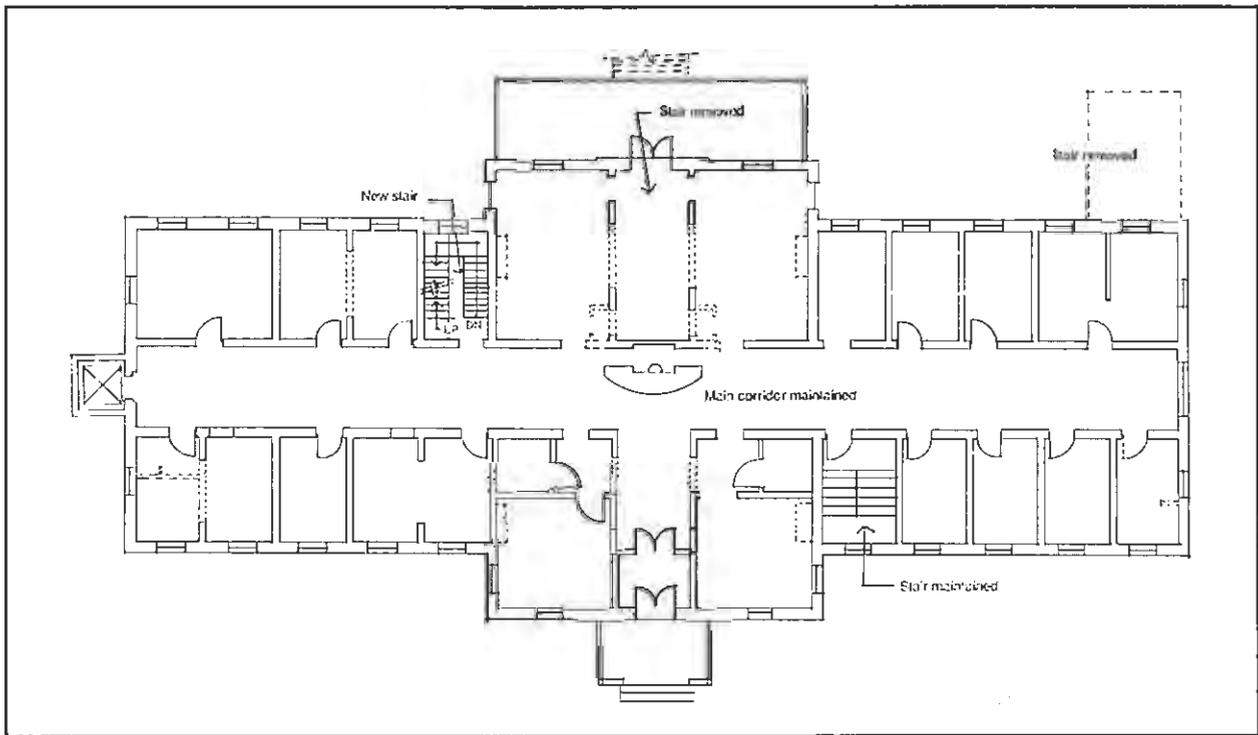


Figure 5. First-floor plan showing the final solution for retrofitting the building with stairs. The significant main corridor is retained.

assessments, the design team first produced a plan to illustrate the code and planning issues and then one that indicated what the SHPO considered significant historic features. Evaluating the two together was a simple matter of overlaying the two plans to visualize the interaction and identify coordination issues between preservation needs and code requirements. The project team then met with the code officials having jurisdiction and an alternate solution was agreed upon. It was determined that the existing masonry walls had an equivalent fire resistance rating of two hours. Although the exist-

ing stairs were unenclosed, and not remotely located from one another, it was resolved that the arrangement could remain, provided automatic sprinklers were installed (Figure 5). The 3-story building does not require sprinkler protection in itself but the sprinkler system became a necessary tradeoff to maintain the historic significance of the corridor without sacrificing fire safety.

Treatments: Corridors

Recommended

- *Maintaining the historically significant building fabric within*

exit corridors without sacrificing fire safety requirements (Figure 6).

Not recommended

- *Permanently altering the appearance of the historically significant ceiling, floor, or wall materials in a corridor to accommodate an exit access corridor.*
- *Removing historically significant openings and doors to accommodate an exit access corridor.*
- *Adding new doors or openings that would permanently alter the appearance of the historically significant building fabric to accommodate an exit access corridor or permanently closing off significant openings.*

Stairs

Stairs are normally a primary component of a means of egress and serve as the exit or protected pathway between the exit access (corridor) and exit discharge (public way or area of refuge). Stairs that serve as exits usually require separation from other spaces by fire-rated enclosures. If an existing stair in an historic building is found to be significant enough to preserve during the restoration, yet requires upgrading to serve as a component in the means of egress, then the project team must design a solution that preserves the stair yet also provides building occupants a safe means of egress.

In a renovation or reuse of an historic building that is lacking sufficient stairs to meet means of egress requirements, additional stairs may be required. In this case, the overall configura-



tion of the existing historic building as well as the intended reuse or renovation must be carefully studied. Creative ways of introducing stairs without imposing on the historic fabric will require information from the project structural engineers regarding the existing structure, as well as design input from the architectural designers.

Depending on the circumstance, a stair may be located inside or outside the historic buildings. Stairs located on the outside of the historic building should connect only at the stair landings and be located on the sides of the property that are not normally viewed by the public. The new outside stair should be sensitive to the design and/or character of the existing historic building and its setting, yet be visually distinguishable.

If a new stair is to be located within the historic building, then the location should be dictated by the historic significance of the interior fabric with consideration for travel distances to exits and dead end corridors. Here, the interior planning for the reuse of the building must be carefully balanced with preservation and code requirements.

Treatments: Interior stairs

Recommended

- *Maintaining the exiting stairway's significant historic characteristics and satisfying fundamental exiting requirements (Figures 7 and 8).*
- *Constructing new exiting stairs, if required to augment existing requirements, so that the alteration to the existing plan of*



Figure 6 (opposite page). A pair of fire-rated doors, added to an existing corridor, are held open by electronic devices wired to close the doors during a fire. These doors are in the U.S. Military Court of Appeals building, Washington, DC.

Figure 7 (opposite). The extension to a historic stair in the U.S. Military Court of Appeals building.

Figure 8 (below). The new landing of this same stair.



the historic building fabric is minimized.

Not recommended

- *Totally enclosing an historically significant open stair without considering alternate means of satisfying fundamental exiting requirements.*
- *Permanently altering the appearance of historically significant fabric to accommodate a new stair.*

Treatments: Exterior stairs

Recommended

- *Placing new stairs to satisfy exiting requirements so that the stairs do not detract from historically significant facades or the setting of the building and are not readily seen by the public.*
- *Constructing the new stairs from approved materials and methods, and in a style that provides a distinct differentiation between old and new.*
- *Minimizing the physical alteration to the existing historic facade at the points where the new stair contacts the building.*

Not recommended

- *Locating new stairs on facades that are historically significant or visible to the public.*
- *Matching new stair construction with existing historic construction.*
- *Altering an existing historic facade to accommodate a new stair.*

Doors

Doors serve as an interface between exit access corridors and exits as well as an interface be-

tween exits and exit discharges. In both cases, the doors are typically fire rated and kept in the normally closed position in order to maintain the fire-rated integrity of the exit and to prohibit products of combustion from interfering with occupant egress. In a number of circumstances, it is impossible to keep these doors in the normally closed position due to high frequency travel between areas or in cases where the doors interfere with the historic integrity of the property. In these instances, electromagnetic door hold-open devices can be used to maintain the doors in the normally open position. Upon receipt of a fire alarm signal, the door hold-open devices will automatically de-energize and release the doors so they will close and latch (Figure 6).

An alternate method for providing a fire-rated equivalency for a historic door could be (but is not limited to) protecting each side of the door with automatic fire sprinklers. This method could be utilized in lieu of replacing the door, or if other means of complying with the fire and building codes would permanently alter the historic significance of the door.

Treatments: Doors

Recommended

- *Maintaining historically significant doors where a fire-rated door is required as a component to the means of egress.*
- *Constructing new fire-rated doors as a component of the means of egress in a manner that creates the required fire-rated assemblies while leaving the historic door intact.*

- *Attaching the historic door to an approved fire-rated door assembly without permanent damage to the historic door, where replacement of the historic door might otherwise be required to conform to a means of egress.*

Not recommended

- *Altering or removing a historic door without considering viable alternatives to meet fire safety requirements.*

Materials of construction

The materials used in the construction of a modern building are required to comply with various fire resistance ratings as set forth by the applicable building and fire safety codes. These materials include the many components and systems used for interior walls, and the finishes that cover these components and systems. As a new building is being designed, the use of these various components and systems ultimately set a number of other parameters for other fire safety requirements, such as the number of exits and the overall size of a building. However, the materials of construction that were used in the building of a historic structure may or may not comply with current fire resistance standards. The materials of construction found in an historic building are typically no longer utilized by today's construction industry and are therefore difficult to categorize within the modern standards set by the fire safety and building codes. However, in many instances, historic buildings involve the use of masonry walls with plaster, which are in-

herently fire resistant. The project team should identify equivalent fire resistive ratings for the various existing materials in the Assessment and Evaluation stages of the fire safety retrofitting process and then select the appropriate means, as required, to create comparable ratings.

Treatments: Materials

Recommended

- Installation of passive fire suppression materials so that the significant historic fabric of a building is not permanently altered.
- Installation of fire proofing materials as required to augment existing nonconforming historic construction so that the

significant historic fabric of a building is not permanently altered.

- *The evaluation of equivalency concepts for existing historic construction so that the least amount of alteration to the fabric takes place.*

Not recommended

- *Permanently altering the appearance of historic walls, ceilings, and floor construction or the removal of significant existing historic building fabric to accommodate passive fire suppression.*
- *Installation of new partitions that damage historic features or historic character of the spaces.*
- *Addition of modern materials over existing historic building fabric.*

Automatic fire sprinkler protection

Where automatic fire sprinkler protection is required for life safety or protection of property, careful planning is required to ensure that its installation is conducted with minimal disturbance and damage to the historic fabric.

Piping should be concealed where such installation is possible. Where piping must be run exposed, the least intrusive methods should be planned, which can include furring of walls and painting piping to match existing ceilings and walls. Although the sprinkler heads themselves must be exposed, there are various methods of installation where their presence can either be min-



Figure 9. Sprinkler heads are tucked under the vaulted ceiling arches at the National Building Museum, Washington, DC.

imal or discretely hidden and not necessarily detract from the aesthetic or historic nature of the property (Figures 9-11).

Treatments: Fire sprinklers

Recommended

- Evaluation of each historically significant space within a building for the selection of the

best-suited fire sprinkler system type.

- Piping routes, sprinkler head types, styles, colors, and locations implemented so that the historic fabric and visual integrity of the building are least affected (Figures 12-17).

Not recommended

- Routing sprinkler pipe so that it is exposed to view within the historically significant building fabric (Figure 13).
- Putting sidewall mounted sprinklers into plaster cornices and reliefs.
- Furring down ceilings in significant interior spaces to conceal piping.



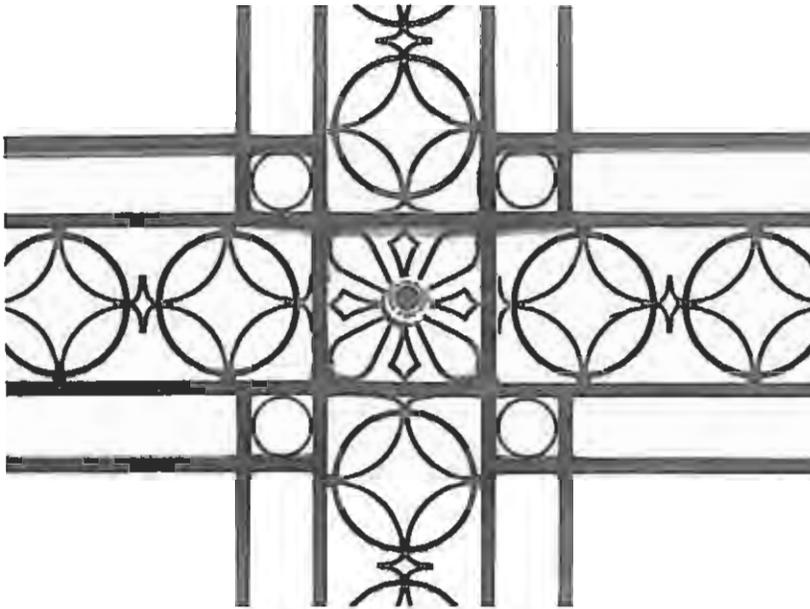
Figure 10 (above). Retrofitting in progress at the National Building Museum, showing sprinkler piping installed in an existing masonry opening.

Figure 11 (left). The resulting sprinkler head is quite unobtrusive: it is the circular brass plate atop the window arch. The window looks out over the central atrium.

Figure 12 (right, above). Sprinkler heads thoughtfully organized into an existing decorative ceiling motif: the sprinkler is in the center of the cross.

Figure 13 (right, below). The location is the courtroom of the U.S. Military Court of Appeals building, Washington, DC. A row of sprinkler heads is also visible in the ceiling plaster surrounding the skylight.





Treatments: Fire extinguishers

Recommended

- Installing fire extinguishers without the permanent alteration of the appearance of the historically significant building fabric.
- Using surface mounted fire extinguisher cabinets in areas where recessed cabinets would alter the significant historic fabric, such as marble wainscoting.
- Using recess mounted fire extinguisher cabinets where possible.
- Selection of a fire cabinet style that is least obtrusive to the surrounding historic fabric.

Not recommended

- Installing fire extinguishers and/or cabinets on existing historically significant walls in a manner that permanently alters their character and appearance.

Fire alarm and detection systems

Fire alarm and detection devices, because of their inherent function, are more difficult to adapt to historic properties. These devices usually cannot be hidden, thus their installation must be closely coordinated between the authority having jurisdiction and the historic preservation specialist. Conduit installation and locations should be treated similarly to that of sprinkler piping.

Treatments: Smoke detectors

Recommended

- Retrofitting smoke and heat detectors and required electri-





Figures 14 and 15 (above left and immediately above). In the Dillon Room at Blair House, Washington, DC, side-mounted sprinklers have escutcheons painted to match existing historic wallpaper.

Figures 16 and 17 (below left and immediately below). In the Jackson Place sitting room at Blair House, sprinkler heads have been thoughtfully positioned relative to ceiling moldings.

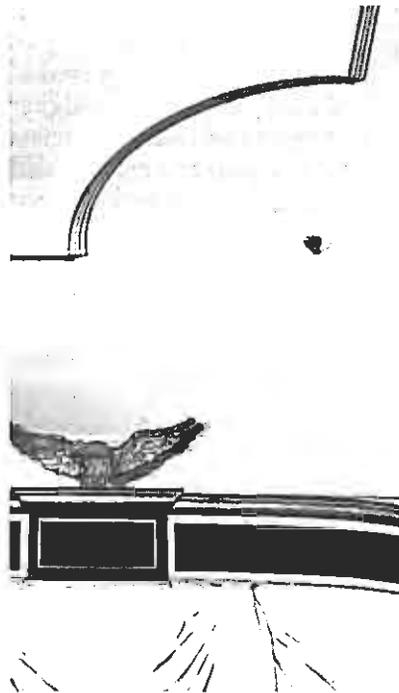


Figure 18 (above right). This sprinkler piping, fire alarm wiring and emergency lighting could have been installed in the wall to create less of an impact on the historic fabric.

Figure 19 (immediately above). In this instance as well, fire alarm and emergency lighting equipment are visually intrusive.

cal conduits so that they are not unusually prominent or do not affect the significant historic fabric of a building.

Not recommended

- *Installing smoke and heat detectors in historic plaster relief or cornices.*
- *Installing smoke and heat detectors on the surface of ceilings that are historically significant.*

should be used only as guidelines. Each historic property must be individually evaluated from a fire safety system standpoint and acceptable levels of risk must be established. Fire safety cannot rely on a single safeguard, but is based on several components. Any one component can fail, and so multiple safeguards are necessary to assure a reasonable degree of life safety.

Treatments: Fire alarms

Recommended

- *Locating fire alarms where routing of conduit will not permanently alter the historic fabric of the building.*
- *Selecting the style of alarm systems so that their appearance is in harmony with other architectural elements of the historic building.*

Not recommended

- *Installing fire alarm pull stations in such a manner that they detract from or permanently change the appearance of the historic building or area.*

Conclusion

Fire safety improvements support historic preservation objectives, as such improvements ultimately will protect the property from extensive damage in a fire incident. In most cases these improvements can be accomplished without significantly altering the historic features of the property. Construction codes define a set of minimum requirements for the design and construction of a building and

Definitions

Advisory Council on Historic Preservation, an independent Federal agency, is charged with administering the provisions of Section 106 of the National Historic Preservation Act. Under Section 106 of NHPA, Federal agencies must afford the Council a reasonable opportunity to comment on proposed Federal, federally licensed, or federally assisted undertakings that may affect properties included in or eligible for inclusion in the National Register of Historic Places. Federal regulations at 36 CFR Part 800, "Protection of Historic Properties," outline the procedures for complying with the requirements of Section 106.

Under Section 110(f), Federal agencies afford the Council an opportunity to comment on such undertakings that may affect National Historic Landmarks. Under Section 202(a)(6), the Council reviews the policies and programs of Federal agencies and makes recommendations on ways in which agencies can ensure that their policies and programs are consistent with those carried out under NHPA.

Element. Items such as a lighting fixture or plaster cornice, which may be found within the context of a feature.

Fabric. Material and its characteristics that elements are composed of, such as a wainscot that is made of marble as opposed to gypsum board.

Feature. A prominent or important characteristic of a building, such as an entry lobby, which contributes to the definition of its historic character.

Federal Preservation Officer (FPO). The official, or designee, specifically responsible for coordinating an agency's activities under the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 *et seq.*

Historic Building Preservation Plan. As described in GSA's publication, *Historic Building Preservation Plan*, the plan is used by GSA and other Federal agencies to assess significance, condition, maintenance and/or repair, and alteration requirements.

Historic context. An organizational format that groups historic properties sharing similarities of time, theme, and geography (e.g., early 20th-century cattle ranching in the panhandle of Oklahoma). Historic contexts are linked to actual resources and are used by public and private agencies and organizations to develop management plans based upon actual resource needs and information (from *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines*, 48 FR 44739, September 29, 1983).

NHPA means the National Historic Preservation Act of 1966,

as amended, 16 U.S.C. 470 *et seq.*

Project team. A team of professionals involved in the retrofitting of an historic building.

State Historic Preservation Officer (SHPO). The official appointed or designated pursuant to Section 101(b)(1) of the National Historic Preservation Act of 1966 to administer the State historic preservation program or a representative designated to act for the SHPO.

References

American Society for Testing and Materials (ASTM). Code available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

American National Standards Institute (ANSI). Code available from The American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

Factory Mutual (FM) System Approval Guide. Code available from Factory Mutual System, 1151 Boston-Providence Turnpike, Norwood, MA 02062.

Historic Building Preservation Plan, General Services Administration, Washington, DC. Available in draft form from GSA Arts and Historic Preservation Division (PGA), Office of Government-wide Real Property Relations, 18th and F Streets, NW., Washington, DC 20405.

National Fire Protection Association (NFPA) publications available from National Fire Protection Association, Batterymarch Park, Quincy, MA 02169:

- NFPA 101, Code for Safety to Life from *Fire in Buildings and Structures*, 1988 Edition
- NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1987 Edition
- NFPA 72A, *Standard for the Installation, Maintenance, and Use of Local Protective Signaling Systems for Guard's Tour,*

Fire Alarm, and Supervisory Service, 1987 Edition

- NFPA 72D, *Standard for the Installation, Maintenance, and Use of Proprietary Protective Systems*, 1986 Edition
- NFPA 72E, *Automatic Fire Detectors*, 1987 Edition
- NFPA 72F, *Installation, Maintenance, and Use Emergency Voice/Alarm Communication Systems*, 1985 Edition
- NFPA 72G, *Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems*, 1985 Edition
- NFPA 80, *Fire Doors and Windows*, 1986 Edition
- NFPA 913, *Historic Structures and Sites*, 1987 Edition
- NFPA 914, *Recommended Practice for Rehabilitation and Adaptive Reuse of Historic Structures*, (Unpublished)

The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, (Revised 1983), U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, DC.

Underwriters Laboratories, Inc. (UL) publications available from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062:

- *Fire Protection Equipment Directory*
- *Building Materials Directory*

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