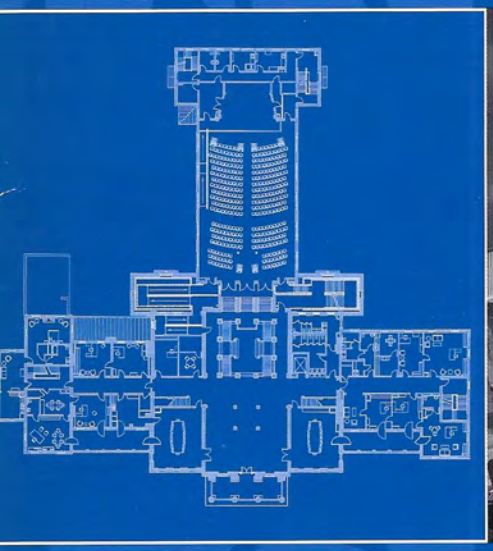
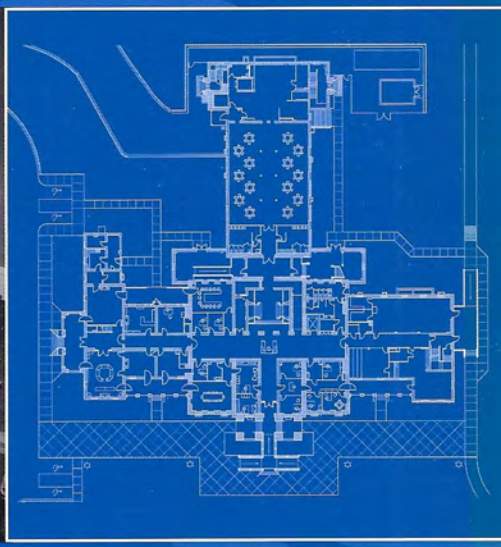
a national trust publication

Building Codes and Historic Buildings

by Melvyn Green, P.E., and Anne Watson





Building Codes and Historic Buildings

by Melvyn Green, P.E., and Anne Watson

Rehabilitating a building can prove surprisingly complicated. Projects may get off to a good start, only to bog down in legal difficulties. At times, building codes and regulations may seem obscure or even obstructive. Bringing a historic building up to code may present obstacles that seem insurmountable, such as dealing with open stairwells, inadequate or poorly located exits, nonexistent handicapped access, and so on.

Since each building rehabilitation project is unique, and codes vary from jurisdiction to jurisdiction, there is no "cookbook" solution for any building, much less a historic building. Furthermore, each situation where the safety of any building is put to test—fire, earthquake, flood—is different. Therefore, building deficiencies cannot be fixed piecemeal, and owners, architects, and regulators must look at the building overall and its deficiencies, and then come up with acceptable solutions.

Therefore this publication is not an explanation of how to make your rehabilitation project comply with the local building code. Instead, this booklet is intended to make building rehabilitation a little easier by discussing techniques for working with codes. It summarizes what codes do and why, and gives useful tips to help developers and property owners prepare for the construction approval process and get through it with minimal frustration.

What Are Building Codes?

The purpose of building codes is to protect the public health, safety, and welfare by regulating construction. Building codes regulate the construction of new buildings and rehabilitation of existing ones. The term "building code" gives the impression that such a code would apply to all buildings. However, it is more useful to think of the "building code" as the code that regulates the *activity* of building; that is, the code that regulates new construction, including new construction on existing structures.

Written by private organizations, codes are enacted into law by state and local governments. They are primarily enforced by local building departments through plan review and construction inspection.

Codes apply to fire and life safety; structural safety; accessibility; electrical, heating and air-conditioning; plumbing; energy; elevators; and many other building-related issues. They provide for emergency exiting, safety of architectural glass, and structural performance of buildings under normal loads as well as in earthquakes and windstorms. They also set criteria for such characteristics as steepness of stairways, strength of safety railings or "guards," flame spread rating of finish materials, and fire resistance of roofing.

Typically, the building code is updated at three-year intervals to incorporate new knowledge and address new markets. While this is a good practice, it may cause confusion about buildings erected prior to the new requirements. Are they safe or unsafe? What does it mean if a building is "not up to code?"

History of Building Codes

Throughout history, codes have been enacted in response to hazardous situations that threaten public health or to catastrophes such as large fires or earthquakes. Fire protection has always been a major impetus behind the establishment of building codes. In 1896 the National Fire Protection Association was founded to establish uniform sprinkler standards in the mills and warehouses of the Northeast. First published in 1897, NFPA standards were used until the mid-20th century.

Many of the health- and safety-related aspects of current codes originated in the 19th century, when reform movements sought to correct the density, decay, and unhealthy conditions predominant in many cities. These efforts resulted in the establishment of codes or ordinances, such as the series of New York Tenement Laws published between the mid-19th century and 1910. These laws covered minimum room sizes and ceiling height, mandatory water closets, and minimum stair tread widths.

As the 20th century progressed, new standards were developed in response to catastrophic events. For example, the NFPA 1927 Building Exits Code, later adopted into the Life Safety Code, was a direct response to the 1911 New York City Triangle Shirtwaist Company fire in which 145 people died, in part due to locked and inadequately sized and located exits. New technology and inventions, such as the battery-operated smoke alarm, first available in 1969, also resulted in the development of new standards.

Application of Codes to Existing Buildings

Technically, each time the code is updated, all existing buildings are no longer "up to code." Yet it would be impossible to remodel all buildings every time the code changes—and unnecessary as

Cover: Building codes regulate the activity of building, including new construction on existing structures. Pictured on the cover is the recently renovated auditorium at Walker Hall, a 19th-century building located on the campus of the South Carolina School for the Deaf and Blind in Spartanburg, S.C.

– Photo by Marc Lamkin

Code provisions often include alternative methods for compliance to allow building owners to maintain as much historic fabric as possible.

– Photo by Dick Milligan

Application of Codes to Existing Buildings

The International Building Code has the following provisions, which are commonly called nonconforming rights.

> **102.6 Existing structures.** The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Property Maintenance Code or the International Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

Matching provisions appear in the International Existing Building Code.

> **101.4 Existing buildings.** The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Fire Code, or the International Property Maintenance Code, or as is deemed necessary by the code official for the general safety and welfare of the occupants and the public.

well. *A structure that does not conform to current regulations is not necessarily dangerous or inadequate.*

On the other hand, some of the updated code provisions address hazards that should be corrected. Such work may be done when the building is rehabilitated voluntarily. An example of a code upgrade that would be triggered by a building rehabilitation is replacement of ordinary glass in human impact hazardous areas with safety glass.

Other times updated code provisions require changes whether rehabilitation takes place or not. An example of a required retrofit would be installation of smoke detectors in houses and apartment buildings.

But what if the glass is historic stained glass or if installing a smoke detector would ruin decorative painting on a ceiling?

In such cases, it is important to find alternative means of meeting the intent of the code without damaging character-defining materials. The owner, code official, and designer or architect should work together to find another way to achieve the safety goal.

Somewhere between the extremes of total preservation and total conformity to the code written for new construction is a middle ground that combines acceptable safety with maximum reasonable preservation of historic materials. The key to finding this middle ground is an understanding of both "acceptable safety" and "maximum reasonable preservation." Those definitions hinge on individual project conditions, on the building's risks, and on its objective historic value.

It is important to keep in mind that codes regulate existing buildings, and from the building code point of view, historic buildings are simply a subset of existing buildings. Code provisions often provide special considerations for historic buildings and the preservation of historic fabric and include alternative methods for complying with the code.

What Codes Do I Need to Know About?

There is no national building code that governs all building activity. Instead there are model codes that are available for adoption by states or localities. States can adopt one of the model codes in part, in entirety, or with modifications. Let's look at these model codes in more detail.

Model Building Codes

Between 1915 and 1941, three organizations of code enforcement officials were formed in different areas of the United States. In the Northeast and Midwest, the principal code-writing organization was Building Officials and Code Administrators (BOCA) International. In the West it was the International Conference of

Building Officials (ICBO). In the southern states, the principal group was the Southern Building Code Congress International (SBCCI). Each of these groups wrote and published its own model building code: *The National Building Code* by BOCA, *The Uniform Building Code* by ICBO, and *The Standard Building Code* by SBCCI.

In their early years, the model codes competed with one another and were substantially different in scope. Each addressed the major problems of its region. Over the years, they became more coordinated. In 1994, the International Code Council (ICC) was established to develop a single set of national model codes to replace the fragmented model code system. The codes that were developed by ICC were called the International Building Codes. Today a majority of the states have adopted them, however a few states and local jursidictions still have the previous model, state, or local code in effect.

The International Building Code Family

The International Codes published to date include a Building Code, Residential Code, Mechanical Code, Plumbing Code, Property Maintenance Code, Energy Conservation Code, and Electrical Code. In 2003 ICC published the International Existing Building Code (IEBC), which contains a chapter on historic buildings. Many states have adopted this code or variations of it. In general, the IEBC establishes a sliding scale of requirements depending on the extent of new work undertaken.

Standards

Standards are detailed provisions that usually relate to a specific system or product. They are developed under approved consensus procedures. For example automatic fire extinguishing systems are designed under NFPA (National Fire Protection Association) Standard 13. This standard has been adopted by the building codes. Thus, the detailed design of automatic fire extinguishing systems is consistent across the country. Standards are adopted by building codes, usually by reference.

Specialty Codes

Besides the building code, all the model code groups as well as the ICC have documents governing electrical, plumbing, unsafe buildings, elevators, energy conservation, fire regulations, zoning, housing, and property maintenance. These codes vary in their applicability to existing buildings.

Local or county governments may also have local laws or may adapt the model codes for local conditions, such as potential for flooding or seismic damage. Information about local codes and other requirements may be obtained from local code enforcement agencies.

State and Local Codes

Instead of using a model code, states, counties, and cities may write their own codes, or they may modify one of the model or International Codes. State and local laws also may include regulations governing energy conservation and disabled access, specific uses such as schools or hospitals, as well as general building construction. Local code enforcement agencies can help you determine the code in effect in a specific city.

Definitions of Historic Buildings

Local jurisdictions may modify the International Existing Building Code definition of historic buildings to meet their own survey and regulatory organizational needs:

> **Historic Building.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

International Building Code provisions permit the building official to regulate historic buildings with alternative or even less restrictive requirements.

> **3407.1 Historic buildings.** The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard.

National Fire Protection Association Codes

The National Fire Protection Association (NFPA) originally cooperated with the ICC to develop one family of codes, however it has since elected to expand its own set of codes. Some jurisdictions have adopted NFPA's Life Safety Code instead of the international codes. NFPA codes are identified by both titles and numbers. For example, NFPA 914 is the Code for Fire Protection of Historic Structures. NFPA 5000 is the Building Construction and Safety Code.

Smart Codes—What Are They?

"Smart Codes" refer to building codes that include special provisions to address rehabilitation issues. These codes recognize that while older buildings must be safe and accessible, just as new buildings are, they can be evaluated and regulated differently. Several states including Maryland, New Jersey, Vermont, Washington, and California have adopted these codes.

New Jersey, for example, adopted a more flexible, user-friendly rehabilitation subcode in 1998. Under New Jersey's rehab code, older buildings being renovated or altered are not automatically required to meet all modern-day standards. Instead code requirements are based on the amount of work planned and the current and proposed use of the building. Using a "cookbook" format, the subcode provides a "recipe" of code requirements for each category. These range from "repair," which involves almost no new code compliance requirements, to "addition," which triggers the most stringent requirements for that portion of the project. The rehab code also has a section with specific provisions for historic buildings undergoing rehabilitation.

The U.S. Department of Housing and Urban Development has published a useful publication, *Smart Codes in Your Community: A Guide to the Building Rehabilitation Codes*. Copies of this report can be downloaded from *www.huduser.org/publications/destech/smartcodes.html*.

Other Regulations

Zoning Regulations

Zoning regulations set up districts and regulate uses in them. Zoning may become an issue when an owner wants to change the use of a building or build an addition to it.

Local Preservation Ordinances

A municipality may pass an ordinance establishing or regulating historic structures and districts. In general these ordinances create a local preservation commission, designate historic districts and landmarks, set out design criteria that govern commission design review, establish a process for enforcing design review, and establish an appeal process for owners who are denied a "certificate of appropriateness."

Such ordinances are designed to further preservation. It is important to determine whether your jurisdiction has such an ordinance and how to work within its requirements if it does.

The Americans with Disabilities Act

The Americans with Disabilities Act (ADA) is a civil rights law. Its technical provisions, known as the Americans with Disabilities Act Accessibility Guidelines, are incorporated for the most part within the International Building Code. Some states may have additional provisions for accessibility. Fair housing accessibility requirements are also met by using the provisions in the IBC.

State and Local Historic Building Codes

A few state and local governments have special legal approaches to historic buildings. These may give owners alternate means of meeting the intent of the codes in effect. Most such laws require that a building be designated or eligible for designation in the National Register of Historic Places.

To learn about historic building regulations in your state, contact your state historic preservation office, or SHPO. The SHPO is the primary information source for historic structures for each state. Each state has one, but they are located in various agencies. The address and telephone number of your SHPO should be available through government directories.

Addresses and telephone numbers are also available through SHPO websites. You may find your SHPO's web address at: *www.cr.nps.gov/nr/shpolist.htm* or from the website of the National Conference of State Historic Preservation Officers, *www.ncshpo.org*.

Local Restrictions

Local restrictions may include historic district controls, mandatory commission approvals, or other city or county requirements. Most local governments call for approval from several departments—such as fire and zoning—not just the building department. Get a list of those agencies and find out what they need before they will approve a project.

What Do I Need to Know About Codes and My Historic Building?

Modern Code Approach to Existing Buildings

Applying building regulations to existing buildings can be problematic. The owner of an existing building has what are called "nonconforming rights." That is, since the nonconforming construction preceded the code provisions, the building is not required to conform to them. However, certain "triggers" will lead to the requirement that existing buildings be adapted to meet current needs. How these triggers are determined has varied through the years.

An early approach was the so-called "25-50 percent rule." This rule required partial compliance when the value of rehabilitation work reached 25 percent of the building's assessed value, and full compliance at 50 percent of assessed value. This approach discouraged rehabilitation, and was abandoned by the model code organizations in the early 1980s.

Building and fire departments look carefully at occupancy when evaluating a building's safety. Buildings such as theaters and restaurants where a large number of people gather at one time have more stringent requirements than an owner-occupied home.

– Photo by Frank Monkiewicz

The codes changed after that and only new work was required to comply with the current code provisions. Existing nonhazardous conditions were not required to be brought up to current code level. All new construction, however, was required to meet current code.

The approach taken by the International Existing Building Code is to require varying levels of conformance based on the extent of the new work. This sliding scale of requirements is called "proportionality." Proportionality is defined as a reasonable relationship between the work an owner wishes to do on an existing building and the additional improvements required to accompany that work as a matter of regulatory policy.

For example, an owner who wishes to make a few minor changes to a building would not be forced to add major code-required upgrade work in order to get a permit. Thus, the extent of mandated work would be "proportional" to the extent of the work that triggers the need for a building permit in the first place.

Early clarification of what will be required when different levels of rehabilitation are performed in existing buildings is called "predictability."

To establish predictability and proportionality, the International Existing Building Code divides work on existing buildings into the following categories based on type of work:

- Repair
- Alteration Level 1
- Alteration Level 2
- Alteration Level 3

Repair is defined as "the patching, restoration, or minor replacement of materials, elements, equipment, or fixtures for the purposes of maintaining such materials, elements, equipment, or fixtures in good or sound condition."

Repair involves minor work. It triggers the least level of required building code conformance.

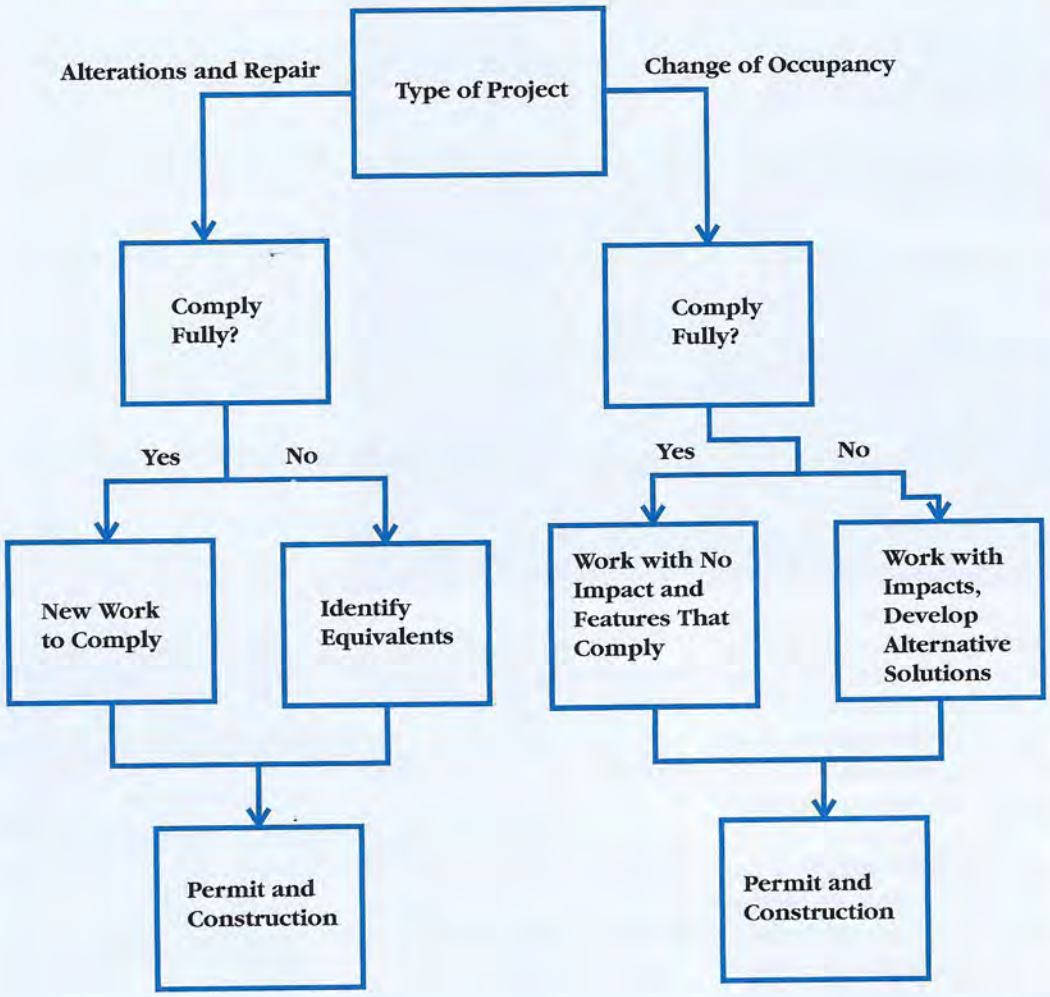
Alteration - Level 1 is defined as "the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose."

This level of work involves structural work or extensive repair, but no reconfiguration of floor space.

Alteration - Level 2 (referred to as Modification in the Maryland code) is defined as the"reconfiguration of any space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment."

This level of work involves changing doors, windows, or partitions, or the installation of equipment, such as new heating or air-conditioning equipment.

Basic Regulatory Process Model for Historic Buildings



Alteration - Level 3 is defined as a situation "where the work area exceeds 50 percent of the aggregate area of the building."

This level of work involves changing hallways, corridors, or exit ways; or work that requires a building or part of a building to be closed for construction. It triggers the highest level of required building code conformance. This is often called a "gut rehab."

Occupancy and Use

Occupancy is a technical word that appears in codes to determine risk. It means roughly the same as "use," but not exactly. The difference is that the term "occupancy" is more complex because it groups buildings according to potential hazards, types of users, and number of people at risk.

For example, college buildings are regulated as a different occupancy from school buildings with students through 12th grade, because of the age and presumed competence of the college-age students. So both would be described as school buildings by a nonprofessional, but the code sees them differently.

Change of occupancy involves changing the use, or relative risk in the building or portion thereof. In preservation terms this is often called "adaptive use." Change of use frequently occurs with historic structures since often a building is no longer suited or needed for its original purpose. Traditionally codes required full compliance with the provisions for new construction when a change of occupancy occurred. Today there are different requirements considering risk. See sidebar on page 8.

The IEBC chapter on historic buildings contains special provisions for a report and development of alternatives when a rehabilitation project cannot meet the specific code requirements.

Building codes contain a section defining occupancy. Consult this section to determine the occupancy of a building and also to know whether the project involves a change from one occupancy to another. Each occupancy will be described in the text of the code, and probably also in a chart. In case of doubt as to the appropriate occupancy, consult the local building department for a determination.

Since degree and type of hazards vary with occupancy, building and fire departments look carefully at proposed occupancy and occupancy change to evaluate the building's safety.

The following factors will be considered in evaluating the risk involved in an occupancy or occupancy change:

The $120 million rehabilitation of the Washington State Capitol Legislative Building, completed in 2004, successfully merged historic preservation, life safety features, seismic upgrades, and access for the disabled. Many of the updated safety features are hidden from the visitors and occupants. In the public spaces, the fire sprinklers and smoke detectors are concealed in the ceilings, and motors to open chamber doors are buried in historic thresholds. To bring the building into compliance with the Americans with Disabilities Act, the outside stone plazas were raised so that people using wheelchairs can enter the Capitol without being lifted. The rehabilitation of the Capitol, which has ridden out three earthquakes (1949, 1965, and 2001), also involved substantial reinforcement to prevent future earthquake damage.

– Photos by Dick Milligan

1. Is the building private or public? An owner-occupied home is evaluated much less stringently than a museum, office building, or theater.

2. How many people will be using the building at the same time? The higher the occupant load, the more cautiously the building will be evaluated.

3. How familiar are users with the building and its exits? A clear example of this principle is a comparison of hotels with apartment buildings. Apartment dwellers know the building and its exits, whereas many hotel guests do not familiarize themselves with the building layout during a brief stay. Thus, the potential for a fire with serious life loss is higher in a hotel.

4. What contents would be expected in this occupancy? Any occupancy with very flammable or explosive contents will be more closely regulated than one with ordinary flammable contents, such as a residence.

5. How capable are the occupants? Depending on use, occupants may be asleep (house or hotel), incapacitated (hospital), restrained (jail), too young to escape on their own (some schools), or have some other impediment. If occupants are likely to be impaired in their efforts to escape, the code will be carefully enforced.

6. What fire ignition sources would be expected in this occupancy? Ignition sources in some occupancies are more dangerous than in others. For example, a grease fire in a restaurant kitchen is less likely to be lethal than a slow-burning upholstery fire in a private home. Understanding the real problem with a particular occupancy is important when proposing alternatives.

Occupancy Groups

Building codes define occupancy by the character of use. This may relate to the risk of death and injury in fire, livability, and other factors. In the past building code occupancy groups ranked the buildings by occupant load (the number of people in a building or space). These went from Group A through Group J, with Group A being a theater with a stage and J being a detached garage or garden wall.

Today the code "Occupancy Group" uses letters that describe the character of use. Within the Occupancy Groups are subgroups to distinguish between subcategories of use. The Occupancy Groups are:

Group A – Assembly Use: theaters to restaurants

Group B – Business: offices to animal hospitals

Group E – Education Facilities: typically through the 12th grade and day care

Group F – Factories: manufacturing facilities

Group H – High-hazard: includes manufacturing, processing, and storage of materials that constitute a physical or health hazard, such as refineries or computer chip manufacturing plants

Group I – Institutional: hospitals, jails, child care facilities

Group M – Mercantile: department stores, markets, other retail and wholesale uses

Table 812.4.1 Hazard Categories And Classifications: Life Safety And Exits

Relative Hazard	Occupancy Classification
1 (Highest Hazard)	H
2	I-2, I-3, I-4
3	A, E, I-1, M, R-1, R-2, R-4
4	B, F-1, R-3, S-1
5 (Lowest Hazard)	F-2, S-2, U

Typical Hazard Ranking table taken from the IEBC. Moving up or down on the chart, or even remaining on the same ranking, may require certain work to improve safety.

Group R – Residential: hotels, multifamily buildings, single family dwellings, and group housing

Group S – Storage: warehousing and storage, subgroups depend on the hazard of the contents.

Group U – Utility and Miscellaneous: tanks, towers, private garages, and barns (for livestock)

In addition, zoning regulations control location of particular building uses. Make sure the planned occupancy is permitted where the building is located.

An owner has no "nonconforming rights" to a change of occupancy. However, the project may not be treated exactly as a new building if, in the opinion of the code official, the proposed change creates no hazards.

Voluntary and Mandated Work

"Voluntary activities" is a shorthand term summing up all the owner's plans and dreams for a building. In effect, it's the work the owner wants to do. The work that will be required by the code in order for the desired work to receive a permit is referred to as "mandated work."

When building owners apply for permits, they may find that the building department requires that they do work they hadn't expected. This can cause confusion and frustration. It is important that the building owner understand the reasons for such additional work, and not all local agencies explain these reasons well. Retroactive requirements occur because codes develop, not from universal truths or abstract ideas, but in reaction to real-life experiences with building safety.

An example is the exiting restrictions in today's codes. In the latter part of the 19th century and the early years of the 20th, a series of fire disasters occurred in schools, factories, theaters, and other supposedly "fireproof" buildings. New restrictions governing exits, doors, door hardware, and other fire safety features were passed retroactively. The hazard to life was too great for "nonconforming rights" to take precedence.

The codes represent society's best judgment about what is safe, but that "best judgment" is a product of the time the building is constructed. At a later time, corrections may be necessary.

Additional rehabilitation work may be mandated in the following situations: for substandard buildings, for dangerous or unsafe buildings, or for specific retroactive building codes requirements.

Substandard Buildings

"Substandard" is a housing code term. A residential building is considered substandard if it lacks satisfactory natural light and ventilation, sanitation, heating, plumbing, or electrical system; or if it is not structurally and functionally safe, adequately weather-protected, and free of vermin. It is also required that habitable rooms have minimum areas and ceiling heights. The housing code developed early, as a response to slum conditions that promoted communicable diseases and conflagrations. The International Codes document that reflects this regulatory area is the International Property Maintenance Code.

Some of these requirements are less important today than when they were written. For example, minimum room and window sizes, established to check the spread of disease in crowded 19th-century cities, may not be essential under today's public health conditions. However, requirements for safety and basic sanitation are, and should be, subject to little change, if any.

Depending on the jurisdiction, appeals of certain housing code provisions may be fairly routine; for historic buildings, variances of some restrictions may be granted as a matter of policy. However, this will vary with the restriction, its purpose, and its importance under present conditions.

Dangerous or Unsafe Buildings

A building is defined as dangerous or unsafe when it lacks structural safety, exiting safety, and basic habitability. A dangerous building must be repaired or demolished.

Specific Retroactive Building Code Requirements

In rare instances, building improvements will be required to correct a hazard or other serious problem, regardless of whether or not the owner had planned to do any work. An example would be stair enclosure in apartment buildings. After a 1982 fire disaster in Los Angeles in a building with open stairways, all apartment structures of three or more stories were required to enclose stairways. This requirement was duplicated in other cities. Note, though, that it only applies to one occupancy group, multi-family residential (i.e., apartments), and also only applies to buildings of three or more stories.

Similar retroactive code provisions require making improvements to unreinforced masonry buildings in earthquake-prone areas, replacing heat-activated elevator controls to correct hazards to firefighters, and improving building accessibility for people with disabilities.

Where specific retroactive code requirements such as these exist, they probably will be applied to historic buildings as well.

Building owners tend to resist retroactive requirements. It is difficult to believe that existing conditions are hazardous. Corrective work may seem expensive, unnecessary, and uninteresting. However, learning from the experience of others makes good sense. The objective of code alternatives for historic structures is not to

The International Building Code and Historic Buildings

IEBC Section 1001

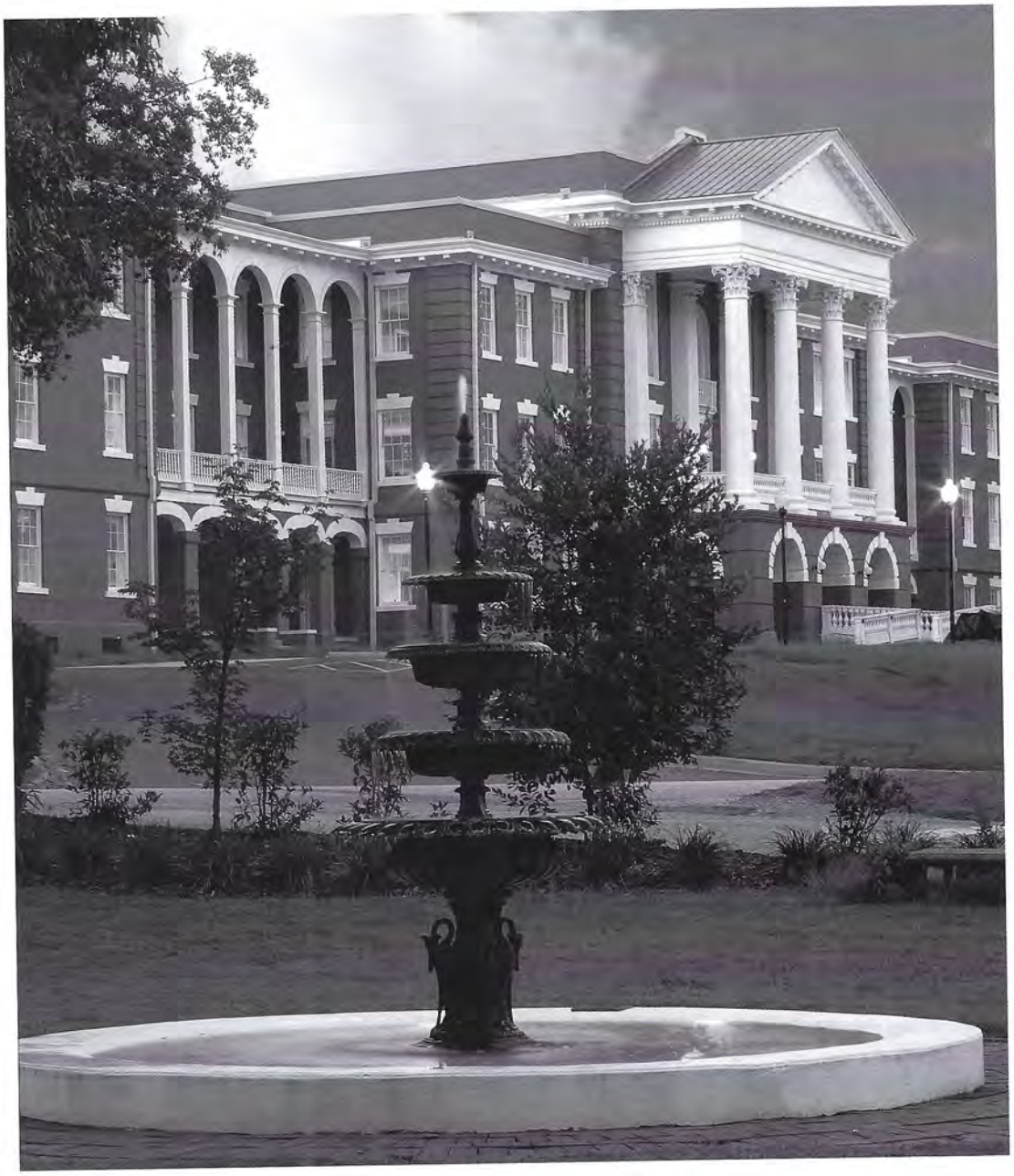
General

1001.1 Scope. It is the intent of this chapter to provide means for the preservation of historic buildings. Historical buildings shall comply with the provisions of this chapter relating to their repair, alteration, relocation and change of occupancy.

1001.2 Report. A historic building undergoing repair, alteration, or change of occupancy shall be investigated and evaluated. If it is intended that the building meet the requirements of this chapter, a written report shall be prepared and filed with the code official by a registered design professional when such a report is necessary in the opinion of the code official. Such report shall be in accordance with Chapter 1 and shall identify each required safety feature that is in compliance with this chapter and where compliance with other chapters of these provisions would be damaging to the contributing historic features. In high seismic zones, a structural evaluation describing, at minimum, a complete load path and other earthquake-resistant features shall be prepared. In addition, the report shall describe each feature that is not in compliance with these provisions and shall demonstrate how the intent of these provisions is complied with in providing an equivalent level of safety.

Special Occupancies for Historic Buildings - Many jurisdictions have difficulty categorizing "house museums." This section was intended to provide guidance for such building occupancies.

1001.3 Special occupancy exceptions for museums. When a building in Group R-3 is also used for Group A, B, or M purposes such as museum tours, exhibits, and other public assembly activities, or for museums less than 3000 square feet (279 m2), the code official may determine that the occupancy is Group B when life-safety conditions can be demonstrated in accordance with Section 1001.2. Adequate means of egress in such buildings, which may include a means of maintaining doors in an open position to permit egress, a limit on building occupancy to an occupant load permitted by the means of egress capacity, a limit on occupancy of certain areas or floors, or supervision by a person knowledgeable in the emergency exiting procedures, shall be provided.



Walker Hall, the main administration building on the campus of the South Carolina School for the Deaf and the Blind, in Spartanburg, underwent a full-scale restoration, completed in 2004. The work corrected the deterioration that had made the second floor auditorium and third floor of the main building unusable, and addressed modern accessibility and safety code requirements. Previously the north wing did not align with floors on the main building, so that students with mobility limitations could only gain access through the cafeteria on the first floor. Ramps and elevators were installed to provide complete access to all parts of the building. An emergency awareness system that uses colored lights and audio signals was installed to notify students of emergencies. The new emergency and mechanical systems are concealed behind walls and ceilings to minimize their impact on the building's historic character.

– Photo by Marc Lambin

lessen the buildings' safety, but to achieve an acceptable level of safety in a different way.

Building Codes and Archaic Materials

Codes describe and regulate the use of conventional building materials of their time. Code revisions add new materials and eventually drop archaic ones. For example, partitions surfaced with gypsum wallboard are covered by building codes; plaster over wood lath is not, since this construction is no longer used in new buildings. Deletion of a material from the code does not mean it is no longer acceptable.

However, as the years pass, it may become increasingly difficult to find information about a material or to document its performance record. In addition, many provisions of modern codes are based on laboratory fire testing that does not measure the performance of archaic materials.

Archaic materials, if tested, may fall short of code requirements in terms of fire resistance, flame spread and/or structural performance.

Fire Resistance

Much full-scale fire testing has been performed over the years to discover how long specific doors, windows, and wall assemblies can resist fire. Codes specify acceptable construction based on minutes or hours of resistance in these standard fire tests. It may be difficult to assign a rating to archaic construction assemblies such as wood lath and plaster walls or wood panel doors. In other cases, such as glazed corridor walls, common in early 20th-century office buildings, the probable performance can be estimated, and it is unsatisfactory.

There are several solutions to compliance problems relating to archaic materials. One solution is to replace them with new materials that are similar in appearance to the old. In the past, for example, the solution to the problem of glazed corridor walls was either to remove the glazing or to substitute wire glass. In place of this unsatisfactory substitution, it is now often possible to use transparent fire rated ceramics that look exactly like plain glass but have the required fire resistance for corridor safety.

Another solution is to research fire performance information once published in codes. The U.S. Department of Housing and Urban Development has published a booklet titled, *Fire Ratings of Archaic Materials and Assemblies*. Using such a resource, a designer or owner may be able to demonstrate that archaic materials actually do meet the intent of today's codes. This document is also found in the IEBC as Resource A.

Flame Spread

Codes regulate interior finish materials according to the rate of flame spread along their surfaces. There is a standard test for the determination of the flame spread index. Character-defining historic materials such as wood paneling may not meet these standards. Intumescent paints and varnishes may be used to reduce the flame spread.

Structural Performance

Archaic structural systems are common in historic structures. Even if intact, the system itself may need to be reevaluated in light of new information on how a building performs under unusual conditions such as high winds or earthquakes. In addition, the structural members may have lost strength because of deterioration. A building may require reevaluation if floor loads are changed or if other natural hazards are considered.

Alternatives and equivalents are permitted by codes, and specific provisions for historic buildings may be available. However, structural and fire safety issues are complex, and an appeal that involves such issues should be handled with the advice of an expert in the relevant field.

What Do I Need to Know About My Building?

A building owner needs to obtain some basic information before applying for a building permit. Most of this information is available from the local building department.

1. ***The address, legal description, and assessor's parcel number of the building.***

   The requirement for and location of this information varies from one jurisdiction to another, however the building department should be a first step in locating this information.

2. ***Whether or not the building is officially designated as historic or a contributing structure to a historic district, and at what level.***

   National Register designation can be researched at: *www.nr.nps.gov*. State register designation can be researched at the state historic preservation office. Local listings can be determined through the local historical society or historical commission, if any, or from city records. City planning departments may have this information as well.

Interior ramps allow students with mobility limitations at the South Carolina School for the Deaf and Blind to reach all levels of the building.

– Photo courtesy of the South Carolina School for the Deaf and Blind

3. ***What type of construction and/or zoning regulations apply to the building.***

   For laws about construction generally, and about application to existing construction, the building department will be able to help. For zoning regulations, the planning or zoning department should be consulted. For regulations and exceptions that pertain to historic buildings, the state historic preservation office may be another source of information.

Keys to Using Any Code

In using any code, professionals rely heavily on the index (or search function, if the code is in electronic form). Because codes are so complex, this is the only way to find relevant provisions efficiently. Codes cannot be downloaded from the internet, as they are copyrighted material. The mandated codes for a jurisdiction are available through that jurisdiction's public library reference room.

Near the beginning of almost every code is a section that defines its application to existing buildings. Other provisions may define applicability to designated historic structures. Such designated historic structures are accorded special consideration, but they also would be considered "existing buildings" under the code.

In addition, almost every code contains a provision allowing compliance by alternative means and materials. However, acceptance of such materials is at the discretion of the building official. To get approval for alternatives, the applicant must demonstrate that they meet the intent of the code.

Many codes contain a special chapter for existing buildings. This is Chapter 34 in the IBC and other model codes. In this chapter or elsewhere may also be provisions for historic buildings.

It is also important to become familiar with code terminology. For example, codes refer to fire sprinklers as "automatic fire suppression systems." Acquiring the vocabulary will help in using the index and will also avoid misunderstandings when talking to code enforcement personnel.

Understand the reasons for specific retroactive provisions and what causes them to be triggered.

Understand the jurisdiction's appeals process and what constitutes the basis for a reasonable appeal.

Respect the codes. People often resist code enforcement, feeling that it's unfair or unnecessary. In fact, use and enforcement of codes is an important key to occupant safety.

4. ***A copy of the original building permit, if there was one, and previous permits for any additions or alterations.***

   This information may be available from the building department. Older permits and other building information may have been transferred to an archive for permanent storage.

5. ***The building's type of construction.***

   The basic construction types are wood frame, concrete, masonry (brick, stone, and other block), and steel. If previous permits exist, the building department will have a record of construction type. Otherwise, look at the building. If the building has a plaster coating, find out what is behind the plaster. Closets, crawl spaces, utility spaces, or shafts may have exposed construction. Underlying materials may be exposed in damaged areas.

   Most existing buildings are either wood frame construction or masonry walls with wood floor and roof framing. Many parts of the country, notably the southwest, have unique surviving examples of other construction techniques, such as adobe or earthen construction.

6. ***The building's date of construction.***

   Get this information from the original permit, if one exists. If not, the local historical society may be able to help with this type of research. Buildings in some areas, mostly cities, have been mapped for many years for fire insurance purposes; the Sanborn Company maps are well known to researchers. Archival Sanborn maps are available through some archives and libraries, especially major regional libraries, historic societies, and university libraries. The main source of historical information in some communities may be records for utility connections or other incidental information. Effective historical research is a place-specific skill. Ask people with local experience.

7. ***Occupancy information.***

   This includes present and former occupancy and any current or former certificates of occupancy. This information should be available from the building department.

   It is important to check whether a proposed change of occupancy is permissible under zoning regulations. This information should be available from the planning department. City directories are another source of information as to how a building's use has changed over time. Look for these in libraries and historical societies.

Case Studies

Britt Mansion, Los Angeles, California

The Britt Mansion in Los Angeles was constructed in 1906 as a private home. The Colonial Revival building has brick masonry bearing walls and a slate roof. Interior partitions are wood frame with metal lath and plaster. The building is listed in the National Register of Historic Places and is also a local landmark.

The surrounding neighborhood, a formerly exclusive residential area, suffered a decline after World War I. Many of the neighboring buildings were demolished or partitioned into inexpensive rooming houses. Other buildings were rehabilitated for nonresidential uses, including the Britt Mansion.

In 1984 the mansion was rehabilitated for use as a reception center for Olympic activities and the organizing committee, with long-term plans for developing a museum and library. Today the building houses the Amateur Athletic Foundation, a spin-off organization from the

A change of occupancy, from a single-family dwelling to an assembly use, triggered a number of code compliance issues at the Britt Mansion in Los Angeles, Calif.

– Photo courtesy of the Amateur Athletic Foundation

Olympics that supports youth sports programming. A museum addition was later constructed on the property.

The code trigger during the 1984 rehabilitation was a change of occupancy from a single-family dwelling to an assembly use. The occupant load increased from about 30 to more than 600. The change of occupancy raised the following building code concerns:

1. The building had two stairways to the second floor, one of them a "grand" (unenclosed) stairway, the other a tight, unenclosed spiral stair in the service area.
2. The third floor was served only by a spiral stairway that was steeper than the code permitted. The stairway had only one railing, located at its inside edge.
3. Separation of exits was less than the minimum permitted by the code.
4. Some rooms and corridors were finished with wood paneling.
5. The building was not wheelchair-accessible. Only minor modifications were required for the first floor, but the second and third floors required considerable modification.
6. The building had no space for accessible toilets.
7. The building was of unreinforced masonry construction. Single-family dwellings do not have to be retrofitted to better withstand earthquakes. The change of occupancy triggered compliance with retrofit requirements.

The architects, Melvyn Green and Associates, and project planners worked closely with the Los Angeles Building Department to develop safety solutions for the building.

Fire Safety and Exiting Solutions

A new enclosed stairway was constructed between the second floor and the third, using utility spaces that did not contribute to the building's historic character.

The service stair was enclosed, using existing solid wood doors with smoke activated hold-open devices and others in the fixed closed position. Fixed doors did not interfere with the planned user flow in the building. Safety of the service stair was improved by installing a handrail at the outer perimeter, where the treads were widest.

The grand stairway was not altered.

An automatic fire extinguishing (sprinkler) system was installed throughout the building. Concealed heads were used in spaces with ornamental ceilings. The sprinkler system was installed to compensate for the less-than-ideal separation of exits and for the combustible wall finishes.

The architects were able to correct numerous code deficiencies during the four-year rehabilitation of the Gillette Castle, located in East Haddam, Conn., while maintaining much of the building's architectural detail and historic fabric.

– Photo by Al Benner

Accessibility Solutions

A short ramp was constructed, leading to the front porch. The ramp was incorporated into the building's landscaping to make it unobtrusive.

An elevator was installed near the kitchen, enlarging a shaft that formerly had been the location of a dumbwaiter. The elevator serves all three floors.

An accessible toilet facility was constructed in the former chauffeur's quarters.

Seismic Retrofit

The Britt Mansion is an unreinforced masonry building. Such structures have been the cause of death and injury in past earthquakes. Strengthening work included anchoring the floors and roof to the walls, verification of wall stability under lateral loads, and other work such as bracing the chimney. All work was done to meet the criteria of the Los Angeles seismic retrofit ordinance. There is no visual impact from this work, which was done from the floor or ceiling, then patched after completion.

Gillette Castle, East Haddam, Connecticut

Gillette Castle is a 14,000-square-foot structure that was originally built as a private home for the actor William Hooker Gillette. Completed in 1919, the building is unusual in its design and materials. The imposing 24-room mansion is reminiscent of a medieval castle and is built with local fieldstone supported by a steel framework After Gillette's death, The state of Connecticut acquired the nearly 200-acre estate in 1943, and it has been a public park ever since. Following a four-year, $11.5 million restoration project, the castle reopened to the public in 2002.

As part of the rehabilitation, the architects, Barkin Associates of New Haven, Conn., corrected numerous code deficiencies to raise the building to an acceptable level of life safety for public use.

The state fire marshal's office inspected the building and noted illegal fire escapes, inadequate headroom, and insufficient stair capacity and arrangement for public use. Although deviations from code were numerous, the fire marshal's office agreed that adequate safety would be provided by the addition of smoke detection and automatic fire extinguishing systems, and construction of one additional exit stair.

The original door locks had unique hand-carved designs, and were not in compliance with requirements for exit doors in a building open to the public. To retain the original hardware, it was decided to keep these doors open during the building's operating hours with smoke-detector-activated devices.

A new exit stair was located in an area where little significant historic fabric remained, and was detailed to suggest, though not imitate, stairs and railings elsewhere in the building. The construction of the interior exit stair made it possible to remove several nonoriginal fire escapes that detracted from the building's historic fabric.

The automatic fire extinguishing system was designed for minimum visibility in the plaster ceiling, however it is not concealed. Its unobtrusive character was achieved by spacing of sprinkler heads and by use of traditional materials such as copper rather than the typically used galvanized or iron piping.

Hecker-Smiley Mansion, Detroit, Michigan

The Hecker-Smiley Mansion, which is listed in the National Register, was built in 1889. The original owner was Col. Frank J. Hecker, a Detroit industrial magnate who built his wealth from the manufacture of railroad cars and dealings in coal, gas, and oil. The mansion, which included 13 fireplaces, was built of limestone to resemble a French chateau. After Hecker's death in 1927, the home became a boardinghouse.

In 1947 the building was converted to a showroom for the Smiley Brothers Music Company, which sold pianos and organs. At that time, the entire third floor was closed to the public and used as a repair and painting facility for pianos.

In 1991 the property was purchased with the intent of converting the building into law offices. The owner decided to take advantage of the historic rehabilitation tax credits and rehabilitate the building in accordance with the Secretary of the Interior Standards for Rehabilitation. The new use was not classified as a change in the building's occupancy.

Much of the rehabilitation work was concerned with reversing the changes that were made for the music company's use. Major character-defining elements were restored and functional uses selected that integrated well with the major interior spaces. New toilet rooms, including barrier-free toilets, and mechanical needs were integrated within ancillary spaces that had less ornamentation and detail.

During the rehabilitation, several code issues emerged:

Access—A new barrier-free ramp was integrated with a new parking area on the north side of the building, accessing the wrap-around U-shaped porch at the rear. The ramp was screened by landscaping. A secondary small ramp was placed at the main entrance to provide accessibility into the main level of the building. The project received a variance from the State Barrier Free Board to not make the basement, second floor, or third floor barrier free, which eliminated the need for an elevator.

Open stairway—The owners worked closely with the city building officials to maintain the ornate interior stairways as the primary means of egress without having to enclose them and destroy the character of the interior spaces. To accomplish this the owner installed pressurized standpipes. This allowed a variance and avoided the requirement for sprinklers.

The fire suppression standpipes and hose cabinets on all floors were allowed to be enclosed within the walls to protect the building's character and provide safety to the occupants.

The Hecker-Smiley Mansion in Detroit was successfully converted to law offices in the 1990s. New access ramps and a fire suppression system helped to bring the building up to code.

– Photo by John Peters

Mechanical—The existing steam heating system was left intact and accounts for about one-half to one-third of the heating load demand. To provide the additional heating, air conditioning, and ventilation, while maintaining the mansion's splendor, a new system was installed. This "space pack" system snakes small two-inch, flexible ductwork through the building's walls, between floor joists, and behind the building's knee walls, attic walls, and areas with sloping ceilings. Mechanical equipment was housed in existing closets.

Electrical—Most of the historic light fixtures were cleaned and rewired. The wall construction of the house made possible the complete rewiring of the power outlets without damage to the major historic fabric. This was done by snaking the conduits down between the studs from story to story.

Conclusion

The main key to using building codes for historic structures is to learn how to work within the system. Know which codes apply to the project and how to use those codes to produce the best safety and preservation results. Know how to find needed information for your project. Ask questions. Building and zoning departments are there to help.

Know how decisions—such as change of use—will affect requirements.

Take time to get familiar with the code and the approval process. The building code will be available for your use— probably in the city clerk's office and the public library. Even better, buy a copy to study. As codes may be too complex for the general public, you may want to obtain additional support publications to make it easier to understand the code provisions. These are available from the code groups and bookstores.

Copies of your zoning regulations should be available from the planning and zoning department. Much information regarding the Americans with Disabilities Act regulations is available in print and online. Learn what's needed. Don't always take someone else's word for what's required, unless that person is a professional employed by you.

Understand exceptions and alternatives available to historic buildings. Understand the principle underlying alternatives: that the same safety objective may be accomplished in more than one way. A building department will be likely to accept alternatives that meet the code intent.

Finally, respect the code. Remember that, although building requirements may seem burdensome at times, they help keep you safe in an emergency. Building regulations work—work with them, not against them.

About the Authors

Melvyn Green is a structural engineer specializing in historic structures. He has been in private practice in the Los Angeles area for over 30 years. He serves as a consultant to governmental agencies, building owners, and code groups. Mr. Green teaches in the masters program in historic preservation at Goucher College in Baltimore and for the National Park Service at the Preservation Training Center.

Anne Watson has a master's of architecture degree from the University of California Berkeley with a specialty in historic preservation. She has worked with Melvyn Green for more than 30 years. She has experience in working with codes and code issues for numerous historic structures.

Resources

The International Code Council (ICC) was established in 1994 as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes. For more information go to *www.iccsafe.org*

The National Fire Protection Association (NFPA) is an international nonprofit membership organization dedicated to all aspects of fire prevention. For more information go to *www.nfpa.org*.

National Conference of State Building Codes and Standards serves as a forum for the exchange of information and provides technical services, education and training to its members to enhance the public's social and economic well-being through safe, durable, accessible, and efficient buildings. For more information go to: *www.ncsbcs.org*.

The National Trust for Historic Preservation is a private, non-profit membership organization dedicated to protecting the irreplaceable. Recipient of the National Humanities Medal, the Trust was founded in 1949 and provides leadership, education, advocacy, and resources to save America's diverse historic places and revitalize communities. Its Washington, DC headquarters staff, six regional offices and 26 historic sites work with the Trust's 270,000 members and thousands of local community groups in all 50 states. For more information, visit the Trust's web site at www.nationaltrust.org.

NATIONAL TRUST
for HISTORIC PRESERVATION

1785 Massachusetts Avenue, N.W.
Washington, DC 20036
202.588.6296