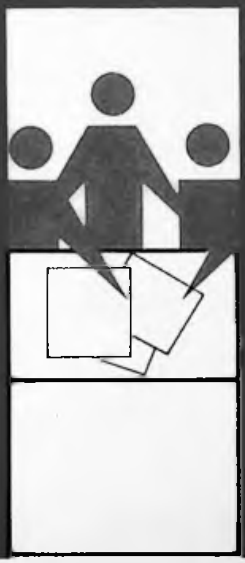
of Housing and Urban Development
velopment and Research

Rehabilitation Guidelines 1980

1 Guideline for Setting and Adopting Standards for Building Rehabilitation



Prepared by the

National Institute of
BUILDING SCIENCES
Washington, D.C.

for the U.S. Department of Housing and Urban Development
Office of Policy Development and Research
under Cooperative Agreement H-5033

The Institute is grateful to the following organizations whose representatives participated in the development of these guidelines:

- U.S. Conference of Mayors
- National League of Cities
- National Association of Housing and Redevelopment Officials
- AFL-CIO Building and Construction Trades Council
- Association of Major City Building Officials
- National Association of Home Builders
- National Trust for Historic Preservation
- U.S. League of Savings Associations
- National Housing Rehabilitation Association
- National Home Improvement Council
- Building Code Action
- Council of American Building Officials
- National Conference of States on Building Codes and Standards
- National Fire Protection Association
- American Institute of Architects

THE SECRETARY OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410

Residential building codes exist to protect people, but no one doubts that they are both necessary and desirable. But when the codes are applied to rehabilitation projects, they have unintended effects because, having been designed to apply to new construction, their specific requirements may simply be inappropriate to the rehab situation and lead to increased costs, delays, and frustrations.

As the Congress understood, if the Nation's aging housing stock is to be restored rather than abandoned, there has to be a better match between the codes and the construction they regulate. Thus in 1978 the Congress mandated that the U. S. Department of Housing and Urban Development develop model rehabilitation guidelines. They were to be used in conjunction with existing building codes, and they were to be voluntary. Here they are: eight separate volumes.

Should local policymakers, building code enforcers, and citizens' groups wish to modify their existing codes and regulatory processes, these guidelines can help them.

The work of three people has been central to the development of the guidelines: Robert Kapsch, program manager for HUD's Office of Policy Development and Research; William Brenner, project manager for the National Institute of Building Sciences; and David Hattis, consultant from Building Technology, Inc.

Moon Landrieu

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Secretary

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The Rehabilitation Guideline Series

The *Rehabilitation Guidelines* were prepared by the National Institute of Building Sciences for the Department of Housing and Urban Development in response to the requirements of Section 903 of the Housing and Community Development Amendments of 1978.

As Congress intended, the *Rehabilitation Guidelines* are not a code, nor are they written in code language. Rather, they are designed for voluntary adoption and use by States and communities as a means to upgrade and preserve the nation's building stock, while maintaining reasonable standards for health and safety. The term "rehabilitation", as used in the guidelines, includes any set of activities related to the general view of existing buildings as a resource to be conserved, rehabilitated, or reused.

This initial edition of the *Rehabilitation Guidelines* is published in eight separate volumes. The first four guidelines are designed for use by building officials, members of the executive and legislative branches of government, and related commissions and organizations involved in developing or implementing building regulations. These guidelines cover the following topics:

1 The *Guideline for Setting and Adopting Standards for Building Rehabilitation* provides an introduction and background to the building regulations that affect rehabilitation. It describes methods for identifying regulatory problems in a community, and recommends ways to amend, modify, or supplement existing regulations to encourage rehabilitation.

2 The *Guideline for Municipal Approval of Building Rehabilitation* examines the inherent differences between regulating new construction and regulating rehabilitation, and presents specific recommendations for dealing with rehabilitation within municipal building departments.

3 The *Statutory Guideline for Building Rehabilitation* contains enabling legislation that can be directly adopted by communities to provide the legal basis for promoting rehabilitation through more effective regulation.

4 The *Guideline for Managing Official Liability Associated with Building Rehabilitation* addresses the liability of code officials

involved with the administration and enforcement of rehabilitation, and provides recommendations for minimizing liability problems.

The remaining four guidelines are technical in nature, and are intended for use by code officials, inspectors, designers, and builders. They cover the following topics:

5 The *Egress Guideline for Residential Rehabilitation* lists design alternatives for the components of egress that are regulated by current codes such as number and arrangement of exits, corridors, and stairs, travel distance, dead-end travel, and exit capacity and width.

6 The *Electrical Guideline for Residential Rehabilitation* outlines procedures for conducting inspections of electrical systems in existing buildings, and presents solutions to common problems associated with electrical rehabilitation such as eliminating hazardous conditions, grounding, undersized service, number of receptacle outlets, and incompatible materials.

7 The *Plumbing DWV Guideline for Residential Rehabilitation* presents criteria and methods for inspecting and testing existing drain, waste, and vent (DWV) systems, relocating fixtures, adding new fixtures to existing DWV systems, extending existing DWV systems, and installing new DWV systems in existing buildings.

8 The *Guideline on Fire Ratings of Archaic Materials and Assemblies* contains the fire ratings of building materials and assemblies that are no longer listed in current building codes or related reference standards. Introductory material discusses flame spread, the effects of penetrations, and methods for determining the ratings of assemblies not listed in the guideline.

Single editions of the *Rehabilitation Guidelines*—or copies of specific guidelines—are available at no charge, as long as supplies last, from HUD USER, P.O. Box 280, Germantown, Maryland 20767. Phone (301) 251-5154

The *Rehabilitation Guidelines* are also available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

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Bibliography

Acknowledgments

The material herein was prepared by the National Institute of Building Sciences on the basis of research conducted by the Council of American Building Officials and the National Conference of States on Building Codes and Standards. Supplemental material was developed by Joseph Stein and Goldberg Research and Development Associates. The guideline was written and arranged by David Hattis.

Overall management and production of the *Rehabilitation Guidelines* was directed by William Brenner of the Institute, with David Hattis of Building Technology, Inc. the principal technical consultant. Guideline cover graphics and layouts were designed by the Design Communication Collaborative.

Purpose of the Guideline and Intended Users

This guideline is intended to serve the following purposes:

- To present a method for describing and analyzing a community's existing regulatory system as it affects both existing buildings and new building construction, and for identifying all pertinent codes and regulations and the departments involved in their administration and enforcement;

- To present a method for assessing the impact of a community's standards, as set by the existing regulatory system, upon building rehabilitation, and for identifying problems and constraints for rehabilitation; and

- To recommend methods for amending or modifying the existing regulatory system so as to establish, administer, and enforce standards which encourage rehabilitation.

The following groups or individuals may use this guideline:

- Citizen groups (voluntary or appointed) who wish to assess the impact of the existing building regulatory system upon rehabilitation in their community;

- Policymakers in city government (mayor, council, city manager, community development director, etc.) who wish to assess the impact of the existing building regulatory system on rehabilitation and/or to amend or modify the system to encourage rehabilitation; or

- Department heads of code administration and enforcement agencies (e.g., building officials) who wish to assess the need for amendment or modification of the existing building regulatory system in order to encourage rehabilitation.

This guideline does not contain a precise definition of "rehabilitation" and other related terms because the nature of building rehabilitation which may encounter regulatory problems and constraints, and the nature of the problems themselves, are a local phenomenon. A community using this guideline will naturally evolve its own definition of "rehabilitation", which could include any specific set of activities related to the general view of existing buildings as a

resource to be conserved, rehabilitated, or reused in the community's ongoing development process. What is important for the users of this guideline to realize is that there are many different kinds of rehabilitation projects and many different kinds of code-related problems, and that this and the accompanying guidelines can be useful in dealing with most of them.

Chapter 1
Introduction to the Regulation of Building Rehabilitation: State-of-the-Art

1
Building Regulations

In order to adapt or modify a jurisdiction's existing building regulatory system so as to promote rehabilitation, particularly residential rehabilitation, or in order to minimize the constraints which that system may impose on rehabilitation projects, it is first necessary to understand the building regulatory system in general terms and how that system regulates existing buildings.

1.1
How the Building Construction and Maintenance Regulatory System Regulates Existing Buildings

Communities or other jurisdictions (e.g., states, counties) currently regulate new and existing buildings by one or more of the following five types of regulations:

- Construction codes
- Building maintenance codes (property maintenance/housing/health/fire prevention)
- Hazard abatement codes
- Past construction codes
- Retroactive laws and regulations

CONSTRUCTION CODES

Construction codes are generally referred to as "building codes". Actually, they include a building code (regulating structural, fire, accident, and health safety), an electrical code, a plumbing code, a mechanical code, and a variety of specialty codes controlling such elements as boilers, elevators, etc. The objective of these codes is to provide a certain level of safety, health, welfare, and property protection for building occupants and for the general public. To accomplish this, they regulate design, construction, repairs, use, maintenance, moving, and demolition of buildings or portions thereof.

Building codes may provide two distinct approaches to compliance: prescriptive and performance. Under the prescriptive approach the acceptable materials, sizes, and methods of construction are prescribed in the code. Under the performance approach any material, design, or method of construction meeting the specified level of performance is acceptable. The relevance of this distinction to rehabilitation will be discussed later. Codes today are generally prescriptive, though most modern building codes also provide a performance approach by providing for the acceptance of alternate materials and methods of construction. The following sections of the Uniform Building Code, published by the International Conference of Building Officials (ICBO); the Standard Building Code, published by the Southern Building Code Congress International, Inc. (SBCCI); the Basic Building Code, published by the Building Officials and Code Administrators International, Inc. (BOCA); and the National Building Code, as published by the American Insurance Association (AInsA), define this approach:

Uniform Building Code - 1979 Edition

"ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION

"Sec. 105. The provisions of this code are not intended to prevent the use of any material or method of construction not specifically prescribed by this code, provided any alternate has been approved and its use authorized by the building official.

"The building official may approve any such alternate, provided he finds that the proposed design is satisfactory and complies with the provisions of this code and that the material, method or

work offered is, for the purpose intended, at least equivalent of that prescribed in this code in suitability, strength, effectiveness, fire resistance, durability, safety and sanitation.

"The building official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency."

Standard Building Code - 1979 Edition

"103.6 ALTERNATE MATERIALS AND ALTERNATE METHODS OF CONSTRUCTION

"The provisions of this code are not intended to prevent the use of any material, or method of construction not specifically prescribed by this code, provided any such alternate has been approved and its use authorized by the Building Official. The Building Official shall approve any such alternate, provided he finds that the proposed design is satisfactory and complies with the provisions of Chapter XII, and that the material, method, or work offered is, for the purpose intended at least the equivalent of that prescribed in the code in quality, strength, effectiveness, fire-resistance, durability, and safety. The Building Official shall require that sufficient evidence or proof be submitted to substantiate any claim that may be made regarding its use. If, in the opinion of the Building Official, the evidence and proof are not sufficient to justify approval, the applicant may refer the entire matter to the Board of Adjustments and Appeals as stipulated in Section 111."

Basic Building Code - 1978

"109.4 ALTERNATE MATERIALS AND EQUIPMENT

"The provisions of this code are not intended to prevent the use of any material or method of construction not specifically prescribed by this code, provided any such alternate has been approved. The building official may approve any such alternate provided he finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the

equivalent of that prescribed in this code in quality, strength, effectiveness, fireresistance, durability and safety."

National Building Code - 1976

"100.7 MATERIALS AND METHODS OF CONSTRUCTION

"Nothing in this Code shall be construed to prevent the use of any material or method of construction whether or not specifically provided for in this Code if, upon presentation of plans, methods of analysis, test data or other necessary information, to the building official by the interested person or persons, the building official is satisfied that the proposed material or method of construction complies with specific provisions of or conforms to the intent of this Code."

Such provisions provide local officials with a significant potential for flexibility, which can be used to encourage building conservation, rehabilitation, and reuse, or to reduce constraints thereto, when existing buildings cannot easily comply with the prescriptive requirements of the codes. However, the "alternate materials and methods" approach traditionally has been used primarily for approval of new products for new construction where the basis for acceptance is reasonably clear. It has been used to a much lesser degree as a basis for accepting alternate design solutions that meet the intent of the code when problems arise during rehabilitation.

There are two reasons for this. First, there is no general agreement on what is covered by the terms "materials and methods of construction". For example, some interpret these to include dimensions specified in the code (e.g., stair widths), while others consider such specifications as "design specifications" to be excluded from "materials and methods." Second, while the model codes all contain a general statement of purpose at their outset, they lack clear statements of "code intent" for the several general building attributes regulated (e.g., structural safety, fire safety, accident safety, health and hygiene) and for most specific code provisions.

Building codes often give the enforcement official the authority to modify code provisions in individual instances, when practical difficulties in full compliance are involved. While this modification authority provides the official with the opportunity to exer-

cise judgment, it is not adequate for use as a general vehicle for the encouragement of building conservation, rehabilitation, and reuse.

Construction codes may be adopted at the state or the local level, depending upon state law. The various codes (building, electrical, plumbing, etc.) may be enforced by one agency or by various agencies of government. These varying arrangements may have significant impact on building regulation in general, and on building conservation, rehabilitation, and reuse in particular. The enforcement of construction codes is usually triggered by an application for a permit (e.g., building, electrical, plumbing) to construct.

Construction codes are periodically updated. The model codes, which are adopted by many jurisdictions, are updated and republished every three years, with amendments published periodically between each new edition. The updating of codes involves five types of code modifications:

- Elimination of references to materials and methods of construction no longer used in modern construction (i.e., "archaic" materials and methods);
- Addition of references to new materials and methods of construction;
- Addition of new requirements;
- Modification of administrative provisions; and
- Change in required levels of performance.

It is believed that, in general, the updating of codes represents a constant increase in the implied levels of safety, health, welfare, and property protection. While this statement is in need of proof, and while notable instances of reduction in code requirements can be found, it is clear that building codes change periodically in response to changing technology, new materials and products, and the changing needs of building occupants and the community at large. A building constructed to a past building code is not likely to meet all provisions of the current code.

Building codes also regulate building rehabilitation and reuse. This is discussed at length below in Part 2 of this chapter.

BUILDING MAINTENANCE CODES (PROPERTY MAINTENANCE/ HOUSING/HEALTH/FIRE PREVENTION)

The basis for the adoption of a property maintenance code is most often contained in the building code. The three model building codes, and nearly all other modern building codes, contain sections which require that all buildings constructed under current or previous codes be maintained in a safe and sanitary condition. Building codes requiring maintenance and repair allow repairs to be made in a manner consistent with the original construction. Where materials are no longer available (e.g., wood lath) a modern-day counterpart can be used.

Maintenance essentially means that the structural, fire, and health and safety features of a building are to be maintained at levels comparable to those existing at the time the building was constructed.

Communities may regulate existing buildings by means of property maintenance codes. The most widely used maintenance codes are the housing (or health) codes. Housing codes have traditionally been used to establish minimum levels of health in existing residential occupancies (one- and two-family dwellings, apartments, and hotels). Property maintenance codes contain the requirements of the housing code plus requirements applicable to other occupancies. Housing codes contain many specific requirements, while property maintenance codes tend to be more performance based (containing general statements of objectives). General property maintenance codes are usually adopted at the local level because they are applicable to any occupancy. However, the adoption of these general codes is not widespread.

Fire prevention codes are also a form of property maintenance code. They are intended to control the fire hazard in buildings by proper operation and maintenance procedures.

Housing codes and fire prevention codes are adopted either by the state or local government. They are often administered and enforced by a different agency from that charged with enforcing the building code. The enforcement of housing and fire prevention codes is usually triggered by citizen complaints and by routine periodic inspections (the latter inspections often concentrating on selected occupancies or selected neighborhoods). In some communities, the enforcement of these codes may also be triggered by periodic license or permit requirements (e.g., business license,

fire marshal's permit). In many communities, it is likely that a significant number of buildings do not comply with the housing and/or fire prevention codes because limited resources make routine inspection of all buildings impossible. A positive note: housing code enforcement is often done by persons with special sensitivity to the needs of residents—a feature which may be of potential benefit for the encouragement of building conservation, rehabilitation, and reuse.

Housing codes and property maintenance codes cover many of the same attributes of buildings regulated in new construction codes. For these same attributes, however, they usually establish levels of health, safety and welfare which are lower than the respective levels established by the new construction codes. The actual levels established by the maintenance codes are not usually stated explicitly.

The enforcement of housing and property maintenance codes often triggers mandatory repairs in existing buildings (see Part 2 below). However, these codes may be employed to encourage building conservation, rehabilitation, and reuse by establishing a baseline level of health and safety for existing residential and/or other buildings.

HAZARD ABATEMENT CODES

Codes for the Abatement of Dangerous Buildings, or similarly titled documents, provide a basis for measuring or evaluating the condition of an existing building. These codes very carefully provide for due process to ensure that an enforcing body acts legally when it deems a building to be dangerous and requires its repair, evacuation, or demolition.

Both the International Conference of Building Officials (ICBO) and the Southern Building Code Congress International (SBCCI) publish a code for the Abatement of Dangerous Buildings. The Building Officials and Code Administrators International (BOCA) includes similar provisions within the Basic Building Code.

These codes include easily implemented provisions for structural analysis and contain specific limits for material stresses. The requirements for fire safety, accident safety, and health generally refer back to the code under which the building was built, and

address how the required building safety elements are currently operating and being maintained. These requirements are stated in general performance language.

Hazard abatement codes have traditionally been used as the means to secure the demolition of buildings. Their enforcement is usually triggered by complaints, inspections, or any other action which bring the potential hazard to the attention of the authorities.

These codes establish levels of safety and health which are lower than those established in building codes for new construction. It may be implied that these levels are also lower than those of property maintenance codes.

In all building regulations and in hazard abatement codes is the implied concept of "imminent hazard". This is the absolute lowest level of safety an existing building can reach. The discovery of an "imminent hazard" in a building will justify drastic enforcement action without permitting any delay in correction. While not specifically defined in the codes, a guideline for determining an "imminent hazard" is included in Chapter 3 of this guideline.

PAST CONSTRUCTION CODES

Most building codes and property maintenance codes imply that an existing building and any required safety equipment and devices must be maintained at the level required by the code under which the building had been constructed. As discussed earlier, these past codes establish levels of health, safety, welfare, and property protection which are usually different from, and are usually lower than, those of current new construction codes.

RETROACTIVE LAWS/REGULATIONS

In some cases states or local governments have declared certain building features to be unsafe or otherwise undesirable, and have required that all buildings of a certain occupancy or class be altered to remove the unsafe or undesirable condition. In other cases they have required the installation of some specific feature that contributes to a building's increased safety (e.g., smoke detectors).

The following examples illustrate the types of issues that can be addressed through retroactive regulations:

- Regulations adopted by the California State Fire Marshal for existing high-rise buildings regulating, among others, emergency exits, alarms, fire protection devices, emergency pre-fire planning, and protection of openings in vertical shafts such as elevators, utility ducts, and stairwells;

- Ordinance No. 142,713 adopted by the City of Los Angeles requiring alterations to existing apartment houses, hotels, and apartment hotels more than two stories in height that do not conform to specified minimum exiting, stairwell enclosure, and corridor protection requirements;

- Draft regulations for "Earthquake Hazard Reduction in Existing Buildings" approved by the Earthquake Safety Study Committee regulating all unreinforced masonry bearing wall buildings constructed before 1934 and imposing differing corrective requirements based upon a four-level hazard classification system; and

- Appendix Chapter 12 of the 1979 Uniform Building Code entitled "Existing Buildings" requiring existing nonconforming Group R, Division 1 occupancies (hotels and apartment houses, and convents and monasteries accommodating more than 10 persons) more than two stories in height to conform to specified minimum exiting and other fire safety criteria (set out in Appendix 1).

All existing buildings covered by a retroactive regulation are required to be modified to conform to the new minimum provisions. The levels of health, safety, welfare, and/or property protection required by such retroactive regulations may be the same as, or lower than, the respective levels required by codes for new construction.

The retroactive regulation will generally contain a provision for enforcement, often through special inspections to insure compliance. However, enforcement is often constrained by a lack of available resources, in which case the community may establish an enforcement schedule based on neighborhood location, type of building, or other factors.

1.2
Continued Use and Occupancy: Building Codes and Existing Buildings

A building code traditionally permits the continued use and occupancy of buildings in existence at the time the code is adopted. This is often referred to as the "nonconforming rights" of existing buildings. Section 104(c) of the 1979 edition of the Uniform Building Code is illustrative:

"Existing Occupancy. Buildings in existence at the time of the adoption of this code may have their existing use or occupancy continued, if such use or occupancy was legal at the time of the adoption of this code, provided such continued use is not dangerous to life."

Section 105.1 of the 1978 edition of the Basic Building Code reads as follows:

"Continuation of existing use: The legal use and occupancy of any structure existing on [date of adoption of this code] or for which it has been heretofore approved, may be continued without change, except as may be specifically covered in this code and the housing code or as may be deemed necessary by the building official for the general safety and welfare of the occupants and the public."

Similar code sections occur in other modern building codes used throughout the United States. Accordingly, there are three possible ways to mandate that an existing building be repaired or brought up to some minimum level of safety:

- Establish that a building is dangerous in accordance with a hazard abatement code or similar regulation;
- Enforce a property maintenance code; or
- Enforce a retroactive law or provision.

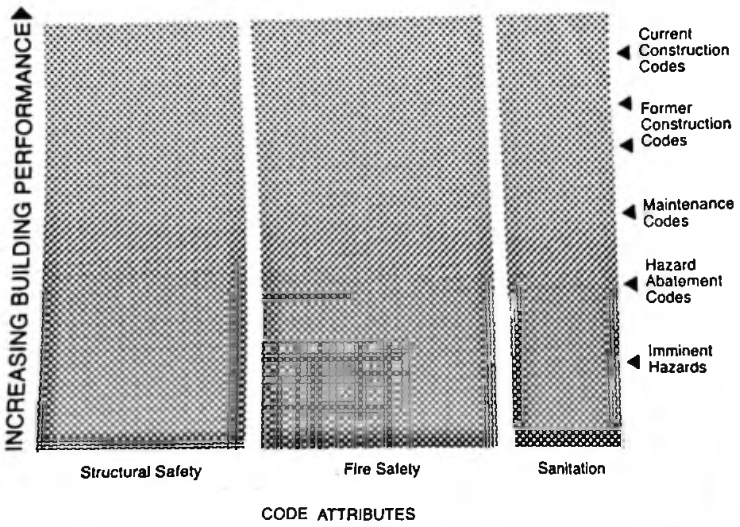
1.3
Levels of Health, Safety, Welfare, and Property Protection

The preceding discussion has alluded to the various levels of health, safety, welfare, and property protection implied by the various codes and regulations being discussed—with new construction codes defining the highest, and hazard abatement codes defining the lowest. It may be useful for communities considering setting or adopting standards for building rehabilitation to formalize this concept of levels of performance required by the various codes and regulations.

The major objective of the codes—health, safety, welfare, and property protection—are achieved by regulating various attributes of a building, e.g., structural safety, fire safety, sanitation, and accident prevention. The requirements imposed for these attributes differ among the various classes of codes and regulations, and one can conceive of a scale of performance that is implicitly created. New construction code requirements may be thought of as generally defining the upper limits of such a scale; hazard abatement codes may be thought of as defining the lower limits of such a scale (with "imminent hazards" being specific points below or at the lower limit). Property maintenance codes and past building codes may be viewed as occupying given points between those limits. Diagram 1 illustrates this concept.

An existing (legal) building may be thought of as embodying levels of health, safety, welfare, and property protection that are anywhere between these limits or even above the upper limit. Retroactive laws and regulations mandate the upgrading of such a building to some specified level (with regard to the specific code objective or attribute being regulated). However, when a building is rehabilitated, the existing set of regulations explicitly or implicitly require that the building reach a new specified level. Part 2 below discusses how this new level of performance is currently specified by building regulations.

Diagram 1.



Conceptual Diagram of Various Levels of Building Performance Implied by Various Types of Building Regulations

While this concept of "levels" may be useful in considering building rehabilitation, it should be kept in mind that it may not be possible to actually quantify or measure a given level or the difference between levels (e.g., egress potential of current codes and older codes).

Finally, for every attribute which is regulated by a set of code requirements, the "alternate materials and methods" provision of modern building codes recognizes that alternatives to prescribed

code requirements can provide the required level of performance. Such alternatives achieve *equivalent* performance. It is essential to make a clear distinction between equivalent performance achieved by alternative means and a different level of performance that may be provided under different codes.

2
Implication of Current Regulations for Building Rehabilitation

2.1
Current Regulations and Building Rehabilitation

In general, building codes address two categories of building rehabilitation:

- Maintenance, alteration, and repair of existing buildings not involving a change of use or a change of occupancy; and
- Change of use or occupancy in existing buildings.

NO CHANGE OF USE OR OCCUPANCY (25-50% RULE)

Rehabilitation work not involving a change of use or occupancy can be further qualified into two distinct categories:

- Voluntary maintenance, alterations, or repairs (modernization, upgrading, etc.); or
- Mandatory maintenance, alterations, or repairs.

Voluntary repairs or building maintenance involves work which only need conform to the code under which the building was initially constructed. The idea and action are voluntary. Rehabilitation work in this category is generally included in the building's nonconforming rights under the current building code. However, it may also trigger a requirement to correct a host of violations considered hazardous which are unrelated to the voluntary work. It may also trigger some degree of compliance with new construction codes through the 25-50% Rule. Whatever requirements are imposed, their enforcement is triggered, in this

case, by an application for a construction permit (building, electrical, plumbing, etc.).

Mandatory repair or maintenance requires a building to conform to the level of safety as defined by law (codes for the abatement of dangerous buildings, property maintenance codes, housing codes, and/or specific retroactive provisions). The applicant may be given a period of time to comply. The idea and action are mandatory. Rehabilitation work in this category may also trigger some degree of compliance with new construction codes through the 25-50% Rule.

The 25-50% Rule is commonly used by building codes as a means to control rehabilitation with no change of use or occupancy.

According to research done by the National Conference of States on Building Codes and Standards (NCSBCS), the 25-50% Rule first appeared in building codes as part of provisions dealing with nonconforming buildings within fire districts. As population and building density increased in urban areas, several fire disasters alerted communities to the danger of fire literally consuming whole areas of a city where many buildings were of wood frame construction. The demolition or replacement of frame exterior walls with conforming construction was required when the value of work to be undertaken exceeded 50% of the building's value. The original purpose of the rule, therefore, was to *prevent* rather than *promote* the rehabilitation of certain classes of buildings.

The actual wording of the 25-50% Rule in the four model codes is contained in the following sections:

- Basic Building Code, Section 106.0 (1978 Edition)
- Standard Building Code, Section 101.4 (1979 Edition)
- Uniform Building Code, Section 104 (1976 Edition)
- National Building Code, Section 104.3 (1976 Edition)

Section 104 of the 1979 Uniform Code makes no reference to the cost of rehabilitation. For the purposes of the following discussion, reference will be to the 1976 edition since many jurisdictions are still using this edition.

There are certain similarities and differences among the four versions which should be noted.

a. Over 50%

The Basic, Standard, and Uniform Codes all contain the basic 25-50% Rule. The National Code contains reference only to reconstruction or restoration if the cost exceeds 50% of the value of the building, exclusive of foundations. All four codes are consistent in requiring that the entire building be brought into compliance with current code requirements if the cost of the work exceeds 50% of the value of the building. The National Code apparently does not administratively address the issue if costs are below 50% of value. Hence, the balance of this discussion is directed to the three remaining model codes.

Both the Basic and Standard Codes state that the physical value of the building will be determined by the building official. The Basic Code also states that the value will be based on replacement cost.

All three codes indicate that the rule applies only if the alterations or repairs are made within a 12-month period. The Basic and Standard Codes differentiate between alterations exceeding 50% and repair of damages exceeding 50%. The 12-month period does not apply to the repair of a building damaged in excess of 50% in value.

b. Between 25-50%

Where the cost of the work is between 25 and 50% of the value of the building, the Basic and Standard Codes leave to the building official's discretion the extent to which the portion of the building altered or repaired must conform to new construction requirements. The Uniform Code provides that only the addition, alteration, or repair be made in conformance with the current code, provided that the entire building not exceed areas and heights specified by the code for new construction.

c. Under 25%

Where the cost of the alteration or repair is under 25%, the Basic and Standard Codes allow restoration with the same types of materials as those used at the time of original construction, provided that the public safety is not endangered or a nonconforming or hazardous use is not extended.

The Uniform Code distinguishes between work affecting structural and nonstructural parts of a building. For structural additions, alterations, or repairs the changes must conform to new code requirements. Minor work, with the building official's approval, may be made with the materials used at the time of original construction, provided that the entire building may not exceed the areas and heights specified for new construction. Nonstructural alterations and repairs can be made with the same or like materials provided they do not affect any member or part of the structure having required fire resistance.

Jurisdictions that use the 25-50% Rule sometimes vary the terms from those in the model codes. Los Angeles and Phoenix are two examples.

Los Angeles may be said to have a 10-50% Rule, related to location with respect to fire districts. The Building Code of the City of Los Angeles, 1976 edition states:

"SEC. 91.0103 — APPLICATION TO EXISTING BUILDINGS

* * *

"(d) Alterations. Any alterations may be made to any building in any location provided the building as altered conforms to the requirements of the Los Angeles Municipal Code for new buildings in the same location.

"EXCEPTIONS: 1. Alterations or repairs to any existing nonconforming building outside of every Fire District may be of the same type of construction as the existing building, provided the aggregate value of such alterations or repairs in any two-year period does not exceed 50 per cent of the replacement value of the building.

"2. Alterations or repairs may be made to any building in any location provided the new construction conforms to that required for a new building of like area, height and occupancy in the same location.

* * *

"SEC. 91.1603 -- GENERAL REQUIREMENTS

* * *

"(b) Nonconforming Buildings. Alterations and repairs to a nonconforming building in a Fire District may be of the same type of construction as the existing building if the aggregate value of such repairs, in any one year, does not exceed 10% of the replacement cost of the building.

"Alterations or repairs in excess of 10% of the replacement cost of the building or structure may be made provided all of the repairs and the new construction conform to the materials and type of construction required for a new building of like area, height and occupancy in the same location.

"Whenever a nonconforming building or structure has been damaged, or is in need of repairs or alterations required by the Los Angeles Municipal Code in an amount exceeding 50% of the replacement cost, the entire building or structure shall be made to conform to the Code or shall be demolished."

The City of Phoenix, Arizona, briefly reported the following information:

If Cost of Repair is:

0-10%	-	Replace with like material
10-50%	-	New work must meet code
Over 50%	-	Entire building must meet code

In summary, the 25-50% Rule requires the upgrading of existing buildings to the performance levels required for new construction if work exceeds 50% of the value of the building, and allows various lower performance levels to continue to exist in buildings when lesser work is involved. It should be noted that the "alternate materials and methods" provisions of building codes, while generally

applicable to *all* provisions of the codes, is not explicitly referenced in relation to compliance with the 25-50% Rule.

The 25-50% Rule has been the target of much criticism with regard to its negative impact on building conservation, rehabilitation, and reuse. This criticism is underlined by the historical basis of the Rule which was intended to promote the removal, not the re-use, of existing nonconforming buildings. One drawback of the 25-50% Rule is that the numbers are arbitrary. In addition, it may unintentionally or by default force a rehabilitated building into complete new construction code compliance when the 50% limit is exceeded. Furthermore, the 25-50% Rule has an adverse effect on the rehabilitation of buildings of a low value, and it may discriminate between similar buildings located in different real estate markets.

In the terms of the conceptual diagram of performance levels discussed in Part 1.3 above, the 25-50% Rule requires rehabilitated buildings to be upgraded to three potentially different levels of performance.

While the 25-50% Rule may be eliminated from all the model codes in the foreseeable future, it is currently found in many local codes. It should be noted that when used in close conjunction with the "alternate materials and methods" provision in the lower range of values, the Rule is often seen as a flexible tool for encouraging rehabilitation by explicitly extending a building's nonconforming rights. This will be discussed later in the guideline.

As stated above, the 25-50% Rule was eliminated from the 1979 edition of the Uniform Building Code and the following wording substituted:

"*Application to Existing Buildings and Structures*

"*Sec. 104. (a) General. Buildings and structures to which additions, alterations or repairs are made shall comply with the requirements of this code for new facilities except as specifically provided in this section. See Section 1210 for provisions requiring installation of smoke detectors in existing Group R, Division 3 Occupancies.*

"(b) Additions, Alterations or Repairs. Additions, alterations or repairs may be made to any building or structure without requiring the existing building or structure to comply with all the requirements of this code provided the addition, alteration or repair conforms to that required for a new building or structure. Additions, alterations or repairs shall not cause an existing building or structure to become unsafe or overloaded. Any building so altered, which involves a change in use or occupancy, shall not exceed the height, number of stories or area permitted for new buildings. Any building plus new additions shall not exceed the height, number of stories and area specified for new buildings.

"Alterations or repairs to an existing building or structure which are nonstructural and do not adversely affect any structural member or any part of the building or structure having required fire resistance may be made with the same materials of which the building or structure is constructed.

> *"Exception: The installation or replacement of glass shall be as required for new installations."*

In summary, Section 104(b) now requires that for additions, alterations, or repairs:

- New work must conform to the code;
- Work shall not cause existing buildings to become unsafe or overloaded;
- Altered buildings involving change in use or occupancy and buildings undergoing addition shall not exceed height and area required for new buildings; and
- Nonstructural work not adversely affecting a structural member or any part having required fire resistance may be done with same materials.

As compared to the former 25-50% Rule in the 1976 edition, the new section affects the following changes:

- Any amount of nonstructural work can now be done with the same or like materials, rather than work amounting to 25% or less under the prior rule.

- With the caveats noted regarding overloading and height and area restrictions, it is now permitted to make additions, alterations, or repairs without bringing the existing structure up to new code requirements.

This substitution for the 25-50% Rule requires the upgrading of rehabilitated buildings to a performance level somewhat lower than that required for new construction, while requiring new construction performance for specifically defined aspects.

A similar substitution to the 25-50% Rule was recommended by the BOCA Code Change Committee in January, 1980, and approved by the BOCA membership in June, 1980.

CHANGE OF USE OR OCCUPANCY

Building codes address a change of use or occupancy in existing buildings because such a change may introduce new or greater hazards. A careful reexamination is required to determine that the building will be safe for the new occupancy. Generally, the three model building codes require that the entire building comply with the new construction requirements for the new occupancy. The model codes state this in various ways.

The 1978 BOCA Basic Building Code addresses change of use in three sections:

"105.2 Change in use: It shall be unlawful to make any change in the use or occupancy of any structure which would subject it to any special provision of this code without approval of the building official, and his certification that such structure meets the intent of the provisions of law governing building construction with a proposed new use and occupancy, and that such change does not result in any greater hazard to public safety or welfare."

"119.2 Buildings hereafter altered: A building or structure hereafter enlarged, extended or altered to change from one use group to another or to a different use within the same use group, in whole or in part, and a building or structure hereafter altered for which a certificate of use and occupancy has not been heretofore issued, shall not be occupied or used until the certificate shall have been issued by the building official, certifying that the work has been completed in accordance with the provisions of

the approved permit; except that any use or occupancy, which was not discontinued during the work of alteration, shall be discontinued within thirty (30) days after the completion of the alteration unless the required certificate is secured from the building official."

"119.4 Changes in use and occupancy: After a change of use has been made in a building or structure, the reestablishment of a prior use that would not have been legal in a new building of the same type of construction is prohibited unless the building complies with all applicable provisions of this code. A change from one prohibited use, for which a permit has been granted, to another prohibited use shall be deemed a violation of this code."

Section 101.4(e) of the 1979 Standard Building Code states:

"If the occupancy of an existing building is entirely changed the building shall be made to conform to the requirements of this code for the new occupancy. If the occupancy of only a portion of an existing building is changed and that portion is separated from the remainder as stipulated in Section 403, then only such portion need be made to conform."

Section 502 of the 1979 Uniform Building Code states in part:

"No change shall be made in the character of occupancies or use of any building which would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of this code for such division or group of occupancy.

> *"Exception: The character of the occupancy of existing buildings may be changed subject to the approval of the building official, and the building may be occupied for purposes in other groups without conforming to all the requirements of this code for those groups, provided the new or proposed use is less hazardous, based upon life and fire risk, than the existing use."*

The Standard Code unambiguously requires compliance with the new construction requirements of the current code. The Uniform Code is similar, but includes an exception which waives compliance with *all* current code provisions (i.e., requires compliance with *some* only). The exception is stated in performance lan-

guage, and the enforcement official must determine whether the proposed use is less hazardous based on life and fire risk than the existing use. The Uniform Code does not define "life and fire risk", nor does it provide guidance as to whether the "risk" applies to property damage as well as life safety. The Basic Code appears to give the enforcement official the greatest leeway (of the three model codes) in determining the extent to which compliance with current code provisions would be required.

In summary, the model codes vary in their requirements for rehabilitation involving a change in use or occupancy. At one extreme, upgrading to the performance levels of new construction is required. At the other, only selective upgrading, based on undefined hazard and risk analyses, is necessary. Here also, as in the case of the 25-50% Rule, explicit reference to the "alternate materials and methods" provision in cases of change or use or occupancy is not made.

2.2 "Code Enforcement Guidelines for Residential Rehabilitation," Published by BOCA

The first edition of the "Code Enforcement Guidelines for Residential Rehabilitation" was published in 1975. It was developed by BOCA, ICBO, SBCCI, and AInsA on the basis of research sponsored by the U. S. Department of Housing and Urban Development.

The document is currently published as Appendix B to the 1978 BOCA Basic Property Maintenance Code.

The extent and nature of the application of this document to residential rehabilitation in local communities is not known at this time.

2.3 Possibility of Conflicting Goals of Regulations and Rehabilitation

The goals of building regulations are to achieve private and public health, safety, welfare, and property protection in the occupancy and use of buildings. These goals are usually not explicitly stated by a community, and their achievement through

the administration and enforcement of building regulations imposes certain costs on building owners and on society.

Programs of building conservation, rehabilitation, and reuse are also initiated by communities in the furtherance of certain goals. These goals may reflect a desire to avoid a reduction of the existing housing stock or prevent the deterioration of downtowns or industrial areas.

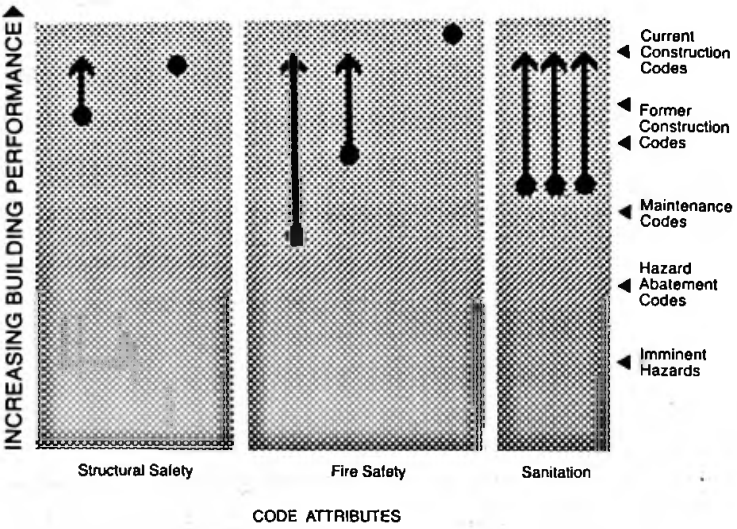
It is useful for a community to realize, whether explicitly or implicitly, that its goals for a rehabilitation and community development program may conflict with the goals underlying its current building regulatory program. In such a case, the enforcement of building regulations will work counter to the community's rehabilitation goals. Specifically, current building regulation may force the upgrading of rehabilitated buildings to the levels required for new construction. This may impose an unacceptable cost on rehabilitation and may prevent rehabilitation from taking place.

If a community finds that its regulation and rehabilitation goals are potentially in conflict, it may decide that in the interest of furthering rehabilitation, some reduction in the levels of performance (safety, health, welfare and/or property protection) required of rehabilitated buildings may be acceptable. A community which develops a rehabilitation policy on the basis of such a determination will find the concept of the various levels of performance introduced in Part 1.3 above useful in implementing such a policy. The concept may help the community to set specific standards and requirements for rehabilitation that are different from the regulations currently in effect.

Such standards and requirements may imply levels of performance lower than required for new construction, but which still reflect levels of safety acceptable to the community.

The following diagram illustrates the levels of performance of a specific, existing building in relation to the performance level required by various regulations in effect. It shows the potential opportunities for establishing specific requirements for building rehabilitation, because in their absence the current 25-50% Rule and change of occupancy provisions often force the building up to the performance levels of the new construction codes.

Diagram 2.



Conceptual Diagram of the Extent of Rehabilitation Work (indicated by arrows) Imposed on an Existing Building by Current 25-50% Rule and Change of Occupancy Provisions. (Each dot represents a special building component such as DWV system, stairs, structure, etc.)

3
Historic Preservation

A discussion of the state-of-the-art of regulating building rehabilitation would not be complete without mentioning historic preservation. Historic preservation is a specific problem, and in addressing it the building regulatory system has accepted the fact that in achieving the policy goals of historic preservation, some compromise with the goals of health and safety may be required. This compromise has been recognized by the model code groups.

The 1978 Basic Building Code states:

"Section 316.0 SPECIAL HISTORIC BUILDINGS AND DISTRICTS

"316.1 Approval: The provisions of this code relating to the construction, repair, alteration, enlargement, restoration and moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state and/or local government authority as historic buildings, subject to the approval of the board of appeals when such buildings are judged by the building official to be safe and in the public's interest of health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, relocation, and location within the fire limits. All such approvals must be based on the applicant's complete submission of professional architectural and engineering plans and specifications bearing the professional seal of the designer."

Similarly, Section 104.(f) of the 1979 Uniform Building Code provides:

"(f) Historic Buildings. Repairs, alterations and additions necessary for the preservation, restoration, rehabilitation or continued use of a building or structure may be made without conformance to all of the requirements of this code when authorized by the building official provided:

> *"1. The building or structure has been designated by official action of the legally constituted authority of this jurisdiction as having special historical or architectural significance.*

"2. *Any unsafe conditions as described in this code are corrected.*

"3. *The restored building or structure will be no more hazardous based on life safety, fire safety and sanitation than the existing building."*

Briefly, buildings may be exempted from full code compliance either individually, as a landmark, or collectively, as an historic district. The local designation as a landmark or an historic district may be made by local public landmarks/historic district commissions, which may rely to varying degrees on state historic preservation offices or a listing in the National Register of Historic Places, maintained by the Heritage Conservation and Recreation Service of the U. S. Department of the Interior.

4
Some Current Regulatory Innovations Related to Building Rehabilitation

It is possible to directly regulate building rehabilitation, rather than take the indirect approach of the building codes through the 25-50% Rule and the change of occupancy regulations. Several specific examples are discussed briefly below.

All the examples establish a set of requirements applicable to rehabilitation. Each, to a varying degree, reflects a reduction from the total set of requirements applicable to new construction. These examples are regulatory innovations which address the problem of setting standards for rehabilitation. Conceptually, they require a level of performance below the upper level implied by codes for new construction (see Part 1.3 above). Each regulatory innovation, intended to solve specific local problems, is likely to have grown or evolved from a very specific set of physical and social conditions.

The following examples are suggested for consideration; they are not intended to form an exclusive or comprehensive list, for similar regulatory innovations may exist elsewhere:

- Washington, D. C. (Appendix 2)
- San Francisco, California (Appendix 3)
- Denver, Colorado (Appendix 4)
- State of Massachusetts (Appendix 5)
- State of California (Appendix 6)
- City of Los Angeles Rule of General Application on Structural Changes Required by Change of Occupancy (Appendix 7)
- State of California Seismic Safety Commission Draft Legislation Relating to Seismic Hazards (Appendix 8)
- Detroit Electrical Code, Chapter 10 (Appendix 9)

The examples can be classified into two categories:

- Comprehensive approaches; and
- Partial approaches.

4.1 Comprehensive Approaches

Washington, D. C., San Francisco, Denver, and the State of Massachusetts are examples of comprehensive approaches. They are comprehensive because each has developed an innovative regulatory system which addresses all aspects of building rehabilitation in most, or all, occupancies. The exception is Massachusetts, which does not address electrical, mechanical, and plumbing requirements.

WASHINGTON, D. C.

Washington's code includes neither the 25-50% Rule nor the general change in occupancy or use regulations. Instead, the code contains prescriptive provisions specifically addressing existing buildings, and specific provisions to be applied when a change in use occurs. The code requires several levels of performance, in increasing order:

1) Code in effect when building was erected

2) Retroactive provisions

3) Provisions concerning alteration or conversion

4) Provisions for new construction.

The code incorporates a hazard ranking by occupancy type and intensity of use. Conversion is defined as a change to a higher hazard use. Alteration is defined as work which affects egress arrangements or fire resistivity. The code provisions were developed over a long period of time, and they are based on the approach of allowing certain deviations from new construction requirements for existing, altered, or converted buildings. The text of these provisions is set out in Appendix 2.

Prescriptive requirements for rehabilitation may be effective in an urban jurisdiction such as Washington, D. C., where the building official may be familiar with a large number of older buildings that pose similar problems for rehabilitation. In jurisdictions with a more varied or diverse building stock, additional prescriptive requirements may be needed to cover the wider range of rehabilitation problems.

SAN FRANCISCO, CALIFORNIA

San Francisco's code, like Washington's, includes neither the 25-50% Rule nor the general change in use provision. San Francisco handles rehabilitation and change in use by establishing three separate approaches. These are:

- For existing residential building rehabilitation: the San Francisco Housing Code (SFHC) together with a "Field Inspection Manual" (FIM).

- For any change in use or occupancy: the San Francisco Building Code (SFBC) which includes a series of criteria which may lessen the specific application of new construction standards.

- For general alterations, additions, and extensions, regardless of use or occupancy: specific criteria for the amount and type of work that may be done before requiring full compliance with present code provisions.

These separate approaches are set out and discussed at greater length in Appendix 3.

The underlying principle for the rehabilitation of existing residential buildings is that existing buildings, legally constructed at some time in the past, shall be considered acceptable today unless they do not conform to a specific list of retroactive requirements (SFHC: 105, 309; Introduction to FIM). These requirements include items related to health and safety, e.g., unenclosed stairways, exits, and fire alarms. The SFHC provisions are less strict than those required for new construction in the SFBC. For example, acceptance of smoke barriers (non-rated construction) for stairway enclosures which by the SFBC would have to be 1 or 2 hour fire resistive construction (SFHC: 807).

The Field Inspection Manual (FIM) provides guidance to field personnel enforcing the SFHC. The FIM contains interpretations of conditions or configurations that have been common over the years in buildings in San Francisco. These interpretations assist an inspector during an inspection by directly providing him with the expertise of the Superintendent of Building Inspection. The interpretations have the force of law, based upon City Attorney opinions. The FIM has been under continuous reexamination and revision since adoption as a working tool in 1961.

The change of occupancy or use provisions cover change from non-residential to residential usage. The applicable requirements are contained in the SFBC. The code intent is to require a level of compliance with the SFBC based upon the degree to which the overall hazard to the public is increased due to the proposed change. This relative increase in hazard level is specifically provided for in the form of a matrix of original and proposed occupancies (SFBC: Table No. 5.1). This matrix allows the code user to easily determine the probable degree of application of new construction standards to the particular building.

Alterations, additions, and extensions are regulated by the SFBC, which requires that all new work meet present day construction standards and arrangements. Under certain circumstances, areas outside of the proposed work areas may be subject to new code requirements as well. These specific instances are cited in the SFBC, Sections 104.B thru F.

There is a seismic requirement in the SFBC that only applies under certain circumstances. This requires that when the structure is to be upgraded seismically, it need only meet the lateral force levels of the SFBC (SFBC: 104.F). This was specifically written to permit retention of unreinforced masonry type buildings (not permitted for new buildings) provided that the seismic force levels can be resisted by structural elements such as rigid steel frames, x-bracing, or shear walls. This provides a mechanism for retaining and reusing older buildings while protecting public safety.

While the San Francisco approach appears complex and does involve development of specific code philosophies and auxiliary documents, it has addressed the several problems of existing buildings, their upgrading, change of use, and retention without requiring the sacrifice of public safety. It has recognized that existing buildings are a considerable asset. Most importantly, the San Francisco approach clearly separates the rehabilitation of an existing residential building from the requirements that may apply for a change in use or occupancy or those invoked by alteration, addition, or extension.

DENVER, COLORADO

Unlike Washington and San Francisco, the Denver building code includes both the 25-50% Rule and the general change of occupancy regulation. However, in apparent recognition of the inadequacy of these regulations to support Denver's rehabilitation needs, the City of Denver added a special chapter to its building code entitled "Rehabilitation of Older Buildings" (Chapter 31). This chapter achieves several results:

- It exempts buildings of specific occupancies erected before 1950 from code compliance under the 25-50% Rule and the change of occupancy regulations.
- It declares as a matter of policy that the rehabilitation of older buildings is a public necessity.
- It establishes an administrative mechanism for the development of guidelines to be used by the building official when deciding a rehabilitator's request for a deviation from code requirements.

Thus, Denver's regulatory innovation is to explicitly permit deviations from strict code compliance in the case of rehabiliation. It is unclear whether Denver's guidelines imply reduced levels of performance for rehabilitation when compared to new construction requirements, or whether they merely encourage the acceptance of alternative solutions of equivalent performance. Denver's approach is too recent to provide a response to this question.

The City of Denver reports that Chapter 31 is being utilized for the rehabilitation of Denver's landmarks and designated historic places, and, recently, for other buildings built before 1950. In all cases, it is reported that approvals consider public safety as paramount.

Chapter 31 is published in Appendix 4.

STATE OF MASSACHUSETTS

Prior to June, 1979, the Massachusetts State Building Code included the BOCA code version of the 25-50% Rule and the general change of occupancy regulation. Article 22, enacted that date, is a regulatory innovation that replaced the 25-50% Rule and the change of occupancy regulation. In general, Article 22 contains the following:

- Definition of hazardous conditions related to structural performance, number of exits, and capacity of exits which must be eliminated in all existing buildings;
- Classification of all occupancies into one of eight hazard classifications, in increasing order of hazard;
- Establishment of three levels of required performance for rehabilitated buildings (above the level of hazard elimination noted above) as a function of the relative change in hazard classification involved in the rehabilitation, ranging from a requirement that the level of performance of an existing building not be reduced to full compliance with new construction requirements; and
- Explicit encouragement of accepting equivalent alternative solutions whenever compliance with new construction requirements is specified.

The Massachusetts approach is based on the philosophy that the existing building's actual level of performance prior to rehabilitation establishes the level to be complied with after rehabilitation, except for the elimination of a few specified hazards and when changing occupancy to one of a substantially greater hazard. In other words, the Massachusetts approach to rehabiliation requires compliance with many different potential levels of performance (potentially the number of levels is the number of existing buildings).

There is not yet enough experience to judge the efficacy of this approach and, specifically, the basing of levels of compliance on a single number hazard index of occupancies.

Massachusetts Article 22 is published in Appendix 5.

4.2
Partial Approaches

Partial approaches to regulatory innovation related to building rehabilitation address a specific problem, be it a single hazard (e.g., seismic loading), a single building component (e.g., electrical system), a single class of buildings (e.g., residential), or any other problem for rehabilitation.

Four examples of partial approaches to regulatory innovation are discussed below.

STATE OF CALIFORNIA

The State of California has a statewide mandatory code applicable to residential occupancies. The State Housing Law requires that local jurisdictions adopt regulations which are "substantially the same" as those contained in the Uniform Building Code. Some variance is allowed, based on local conditions.

In 1974, the State Housing Law eliminated the 25-50% Rule, which at that time was still included in the Uniform Building Code. It did not address the change of occupancy regulation, which would include a change of use within the residential occupancy class (e.g., apartment to hotel, single family dwelling to apartment house) or a change from an occupancy class not governed by the State Housing Law into housing. The 1974 Law

affected this change by means of several interrelated regulations (see Appendix 6):

- Explicitly defining "substandard building" as defined in the Uniform Housing Code (Chapter 10), but excluding (within limits) room and space dimensions from that definition (Uniform Housing Code, Chapter 10, Sec. 1001(b)9, 1979 Edition), and somewhat liberalizing the definition of hazardous wiring, plumbing and mechanical equipment (ibid, Sec. 1001(e),(f),(g)). This liberalization is achieved by stating that if wiring, plumbing, and mechanical equipment has been maintained in good and safe condition and is "working properly", it "shall be deemed to have conformed to applicable law in effect at the time of installation" (Health and Safety Code, Section 17920(f)).

- Adoption of specific regulations related to structural fire safety and fire resistant exits in existing multiple story residential buildings (California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 7). These regulations are a slightly more lenient version of the 1979 Uniform Building Code, Appendix Chapter 12 for Existing Buildings.

- Specifically stating that state or local regulations governing the alteration and repair of existing buildings and moving of apartment houses and dwellings shall permit the replacement, retention, and extension of original materials and methods, so long as the building does not become a substandard building as defined by the Law.

The State Housing Law also establishes several other detailed requirements related to specific building elements.

The State of California has also enacted a State Historical Building Code (Health and Safety Code, Section 18950), the intent of which is "to provide a means to preserve the historical value of designated buildings and concurrently to provide reasonable safety from fire, seismic forces or other hazards to occupants". (Note that this statement of intent omits the usual additional reference to the safety of the general public.)

The State of California Department of Housing and Community Development is currently preparing two documents entitled "Residential Rehabilitation Guidelines" and "A User's Residential

Rehabilitation Guide", which amplify and explain the relevant parts of the State Housing Law and related laws and regulations, and provide guidance in defining electrical, mechanical, and plumbing hazards.

CITY OF LOS ANGELES RULE OF GENERAL APPLICATION ON STRUCTURAL CHANGES REQUIRED BY CHANGE OF OCCUPANCY

This regulatory innovation deals only with seismic loads, but it illustrates a conscious reduction in requirements applicable to rehabilitation involving a change in occupancy. The City of Los Angeles has developed a "Rule of General Application" (RGA) to determine when buildings undergoing a change of occupancy or an increase in the occupant load must be made to conform to current structural requirements. A copy of the rule is included as Appendix 7.

The Rule only applies to buildings constructed prior to October 6, 1933, because all buildings constructed in the City of Los Angeles subsequent to that date were required to be designed for earthquake forces. This provision is based upon buildings located in areas subject to seismic forces of the magnitude anticipated in Seismic Zone 4. The rule recognizes that the level of seismic design force would not be as required under the current building code. However, the building should perform in such a manner as to minimize life loss in the event of an earthquake.

The RGA contains a list of occupancies arranged in order from the least hazardous to the most hazardous. An occupancy or use is generally considered more hazardous as the occupant load or the length of time the building will be occupied are increased.

Note that an occupancy hazard listing based on structural performance may not be applicable for consideration of fire safety of the occupants.

STATE OF CALIFORNIA SEISMIC SAFETY COMMISSION, DRAFT LEGISLATION RELATING TO SEISMIC HAZARDS

Unreinforced masonry buildings which have not been designed for seismic effects may be subject to severe damage in moderate

earthquakes. For this reason, the Seismic Safety Commission of the State of California is developing legislation related to buildings which would be a hazard if subjected to the level of seismic forces which could be encountered in the state. A draft of the proposed legislation is contained in Appendix 8.

This regulatory innovation, a form of a hazard abatement code, is intended to eliminate the problem of complying with the relevant portions of the new construction code when removing a particular hazard. A part of the draft states this directly:

"This bill would authorize a city, city and county, or county to establish construction standards for reconstruction of existing buildings determined, as specified, to be a hazard to life in the event of an earthquake, which standards are as specified in the bill and would eliminate the problem of complying with the latest building code governing new construction when rehabilitating older buildings."

DETROIT ELECTRICAL CODE, CHAPTER 10

This Chapter was developed by the City of Detroit and has been proposed for the National Electrical Code. It reflects the city's need to rehabilitate large numbers of single family houses.

Chapter 10 addresses the rewiring of existing, inadequately wired, dwelling type occupancies. It describes the evidence of inadequate wiring and defines minimum illumination and power requirements for each room or space of the dwelling.

Chapter 10 represents a regulatory innovation because the National Electrical Code does not specifically address existing buildings, and its requirements only establish levels of performance for new construction. Chapter 10 establishes lower levels of performance which would be safe and acceptable for existing buildings.

Chapter 10 of the Detroit Electrical Code has been set out in Appendix 9.

Chapter 2
Identifying Existing Conditions in a Community

The purpose of this Chapter of the guideline is to provide policy-makers or other interested community groups with a procedure for examining the existing community conditions to determine what problems, if any, the existing regulatory system creates for building rehabilitation and reuse. This procedure makes reference to the general introduction and background discussions in Chapter 1 of the guideline and consists of three steps:

- Defining the existing regulatory system;
- Defining pertinent characteristics of building rehabilitation in the community; and
- Identifying potential problems.

Once problems have been identified, policymakers can proceed to Chapter 3 of the guideline, which contains recommendations for amending the existing regulatory system.

1
Defining the Existing Regulatory System

Buildings in a community may be regulated by a variety of regulations, as discussed in Chapter 1 above. That discussion concentrated on the model codes, but the concepts are equally valid whether a particular community may use model codes, modified model codes, or codes of its own. It is necessary to define how buildings are regulated in a particular community. In doing so, it will be useful to make use of the conceptual diagrams of required building performance presented in Chapter 1.

The definition of the existing regulatory system consists of four parts:

- Define those requirements imposed on all existing buildings, and their enforcement;

- Define new construction requirements and their enforcement;
- Define provisions covering building rehabilitation and reuse; and
- Compare criteria levels.

1.1 Define Those Requirements Imposed on All Existing Buildings, and Their Enforcement

HAZARD ABATEMENT CODE

Determine whether a code for the abatement of dangerous buildings, or a similarly titled document, is in effect as a hazard abatement code in the community. Note that similar provisions may be part of the building code.

If such a code or provisions are in effect, determine whether they include explicit criteria for various enforcement options by the authority having jurisdiction. Such criteria may be found in inspection manuals or similar ancillary documents as well as in the regulations themselves. Specifically, determine whether the code contains a workable definition of an "imminent hazard" that would warrant immediate remedial action by local authorities. If the criteria are defined by reference to another code (e.g., building code, electrical code), the explicit criteria should still be identified.

Exhibit the criteria for "imminent hazard" and other hazards covered by the hazard abatement code, into the categories of structural safety, fire safety, health and hygiene, and any further breakdown of these categories as appropriate.

Determine how the hazard abatement code is enforced and by what agency. Specify whether its enforcement is a function of geographical location within the community; if so, specify how. Specify whether the code is enforced differently in different occupancies or types of buildings.

Determine how enforcement of the hazard abatement code is triggered. Specify if it is triggered uniformly for all buildings or classes of buildings, or whether it is triggered by actions other than the mere presence of the hazard, such as an application for a building permit.

BUILDING MAINTENANCE CODES (PROPERTY MAINTENANCE/ HOUSING/HEALTH/FIRE PREVENTION)

Determine whether a housing code, property maintenance code, fire prevention code, health code, or any other regulation which may similarly cover the maintenance, operation, and use of buildings are in effect in the community. Some of these provisions may be part of building, mechanical, plumbing, or electrical codes. For all such codes in effect, determine whether they include explicit criteria for various enforcement options by the authority having jurisdiction. Such criteria may be found in ancillary inspection manuals or may be specified by reference to the building, mechanical, plumbing, or electrical codes.

Exhibit the criteria for various enforcement actions contained in these codes, into the categories of structural safety, fire safety, health and hygiene, and any further breakdown of these categories as appropriate.

Determine how each of these maintenance codes is enforced and by what agency. Specify whether each code's enforcement is a function of geographic location within the community (e.g., target neighborhoods for housing code enforcement). Specify whether each code's enforcement is varied as a function of occupancy or building type (e.g., active housing code enforcement in nursing homes, active fire prevention code enforcement in public assembly occupancies).

Determine how the enforcement of each maintenance code is triggered. Specify how violations of these codes are brought to the attention of the authorities and whether the codes' enforcement is triggered uniformly for all buildings, classes of buildings, neighborhoods, or similar classifications, or whether it is triggered by actions independent of the normal operation, maintenance, and use of existing buildings, such as applying for a building permit.

RETROACTIVE REGULATIONS

Identify all retroactive regulations currently applicable to existing buildings in the community.

For each retroactive regulation, identify the unsafe or undesirable conditions which the regulation is intended to correct. Specify

whether the regulation applies to all buildings, to specific occupancies or building types, or to any other limited category of buildings.

For each regulation, determine the criteria which must be met for compliance. These criteria may be established by reference to the building code or some other code.

Exhibit the criteria for compliance with each retroactive regulation, into the categories of structural safety, fire safety, health and hygiene, and any further breakdown of these categories as appropriate.

Determine how each retroactive regulation is enforced and by what agency. Specify whether the enforcement is a function of geographic location within the community or of any categorization of buildings (e.g., by occupancy, type, age, condition).

Determine how the enforcement of each retroactive regulation is triggered. Specify how deficiencies are brought to the attention of the authorities. Determine whether the enforcement is triggered by actions which are independent of the presence of the specific deficiencies, such as applying for a building permit.

1.2 Define New Construction Requirements and Their Enforcement

Identify all existing codes currently applicable to new construction in the community. These may include a building code, mechanical code, plumbing code, electrical code, various specialty codes, life safety codes, and special regulations. For each code, determine whether it is locally promulgated, or whether it is a statewide code. If the latter, determine whether it is a mandatory code and whether it may be amended at the community level.

Determine the occupancy and use categories into which buildings are classified by the codes. Determine fire districts or other locational categories into which buildings are classified by the codes.

Determine the criteria for each building classification which must be met for compliance.

Categorize these criteria into the same or similar categories utilized for displaying the codes and regulations applicable to existing buildings, as specified in the preceding section. Display the criteria in these categories to the extent and level of detail possible.

Describe how the new construction codes are enforced and by what agencies. Include in this description any cross referencing or interagency coordination involved in the enforcement. If code enforcement is carried out by various levels of government (state, county), it should be fully described. Determine the mechanisms for triggering code enforcement activities, such as application for building permits, mechanical permits, electrical permits, etc.

1.3
Define Provisions Covering Building Rehabilitation

25-50% RULE

Determine whether the building code includes a 25-50% Rule or similar rule covering building repair and alteration. Determine whether a similar rule is included in the mechanical, plumbing, and electrical codes.

Determine how the building code addresses additions to existing buildings.

If the 25-50% Rule or similar rule is in effect, determine the compliance criteria when rehabilitation work falls into each of the following or similar categories:

- Under 25%;
- 25-50%; or
- Over 50%.

Determine whether reference is made to any other codes (e.g., the code under which the building was originally built) in establishing these criteria.

Display the criteria for compliance into the same categories as those utilized in the preceding section.

If the 25-50% Rule or similar rule is in effect, determine how it is enforced. Specify how the value of the numerator (value of repair and alteration work) is determined in terms of work items covered and cost estimates. Specify how the value of the denominator (value of the existing building) is determined.

Determine whether the 25-50% Rule is enforced uniformly for all buildings, or whether its enforcement differentiates between classes of buildings on any basis.

Determine whether the 25-50% Rule discriminates against certain building owners or certain neighborhoods in the community, resulting in the imposition of different criteria for similar rehabilitation of similar buildings.

CHANGE OF OCCUPANCY

Determine the current regulations governing code compliance of existing buildings involved in a change of occupancy. This regulation is usually part of the building code.

Determine whether the change of occupancy regulation requires full compliance with the new construction code requirements of the occupancy proposed or whether only partial compliance is required. If partial compliance is included in the regulation, determine whether it is based on a systematic ordering of occupancies in terms of hazard or a similarly defined analytical procedure.

If partial compliance is included, determine the criteria which are established for each category of occupancy change, and display the criteria into the same categories as those utilized in the preceding section.

Determine how the change of occupancy regulations are enforced, and whether they are enforced uniformly throughout the community.

OTHER REHABILITATION PROVISIONS

Identify all other provisions which may affect building rehabilitation in the community. These may include landmark and historic district ordinance provisions, historic preservation waivers, regula-

tion of moved buildings, general building rehabilitation provisions, etc. Some of these may be included in the building code, in ancillary inspection manuals, or similar documents.

Determine what criteria are specified for compliance with any such special provision, and display them into the same categories as those utilized in the preceding section.

Determine how these special provisions are enforced, including use of advisory boards, review panels, appeals boards, etc.

1.4
Compare Criteria Levels

Compare the displays of the various sets of criteria included in all the elements of the existing building regulatory system which were defined and displayed under Parts 1.1-1.3 of this Chapter. This comparison may take the form of the conceptual diagram discussed in Chapter 1 of the guideline. Under this approach, the criteria for new construction are likely to define an upper limit of performance. The requirements imposed on existing buildings are likely to define a lower limit of performance. The current regulations governing building rehabilitation will define where, between these two limits, different categories of rehabilitation are required to fall.

This comparison and display of criteria levels will identify for policymakers the extent of upgrading required for rehabilitated buildings under the existing regulatory system, and it will enable them to determine whether this upgrading is consistent with local rehabilitation policies.

2
Defining Pertinent Characteristics of Building Rehabilitation in the Community

Building rehabilitation in a community is a function of many factors. Among them:

- Physical characteristics of the community;
- Age and condition of the building stock;

- Economic conditions of development;
- Socio-economic conditions in the community;
- Regulatory system and its history; and
- Public policy at the federal, state, and local levels of government.

It is necessary to define the following pertinent aspects of building rehabilitation and their relationship to some of the above factors:

- Define occupancies involved or potentially involved in rehabilitation;
- Define building age and types involved or potentially involved in rehabilitation;
- Determine extent of illegal rehabilitation; and
- Define existing rehabilitation policies.

2.1 Define Occupancies Involved or Potentially Involved in Rehabilitation

Determine whether the building rehabilitation in the community principally involves the upgrading or reusing of existing occupancies (e.g., residential rehabiliation, commercial rehabilitation) or whether it involves a change of occupancies (e.g., commercial to residential, residential to commercial, residential to assembly). This can be determined by studying current rehabilitation projects as well as identifying potential candidates for rehabilitation.

It is important to define those occupancies presently or potentially involved in rehabilitation, because the building regulatory system is likely to treat rehabilitation involving a change of occupancy very differently from that in which no change is involved. Rehabilitation involving a change of occupancy will likely require higher levels of performance in the rehabilitated building. For this reason, it is necessary to determine the extent to which the occupancy classifications identified in Part 1.2 above correspond to, or fit with, the actual uses of buildings

being rehabilitated. If this correspondence, or fit, is not clear, then the regulatory system will be ineffective in dealing with change of occupancy rehabilitation.

Furthermore, occupancy changes involved in rehabilitation are often related to the process of neighborhood and community change. This process is subject to the three factors of economic conditions of development, socio-economic conditions, and physical characteristics of the community.

2.2 Define Building Age and Types Involved or Potentially Involved in Rehabilitation

Determine the age and principal characteristics (structural, architectural, mechanical) of buildings presently or potentially involved in rehabilitation work in the community. This can be determined by studying current projects as well as identifying potential candidates for rehabilitation.

While the age and principal characteristics of buildings are mainly a part of the general physical characteristics of the community, they must also be analyzed in relation to the history of the building regulatory system in the community. Such an analysis will determine the extent of the disparity between the characteristics and performance of the existing building stock and the current code requirements for new construction. For example, a community where most of the buildings are 25 years old, and where there have been very few code changes during that period, will have very different problems regulating rehabilitation than a community with buildings over 50 years old and with a history of numerous code changes. Washington, D.C. and San Francisco fall into the latter category, which may explain the specific nature of their regulatory approach to rehabilitation (as discussed in Chapter 1 of the guideline).

2.3 Determine Extent of Illegal Rehabilitation

Illegal rehabilitation is the practice of carrying out building repairs and alterations without obtaining the permits or approvals required for such work under a community's regulatory system. It is necessary to determine the extent and nature of such rehabilitation and to identify the classes of buildings in which it is

occurring, because the scope of the problem may indicate the effectiveness of the regulatory system in dealing with rehabilitation. The extent and nature of this phenomenon may also help in identifying potential problems of safety, health, and hygiene which need to be addressed by the regulatory system for rehabilitation.

2.4
Define Existing Rehabilitation Policy

Identify all the current policies related to building and neighborhood rehabilitation which are in effect in the community. These policies may be federal (expressed by the community's acceptance of federal assistance), state, local, or neighborhood generated.

Specify the building classes or types which are addressed by the rehabilitation policy.

Attempt to determine the relative real costs, or foregone real benefits, which these rehabilitation policies impose upon the community. For example, how much, if any, relative safety, convenience, and other features must the community give up in order to achieve the goals of the rehabilitation policies.

3
Identifying Potential Problems

The following conditions, if found in the community, could indicate problems in need of solution.

a. Conflict between the goals of rehabilitation and the goals of building regulation.

   The health and safety goals of the building regulatory system are usually not explicitly stated by the community. However, a conflict between the goals of rehabilitation and regulation may exist if the community finds that current building regulations impose unacceptable costs on rehabilitation, thereby preventing much rehabilitation from taking place. Current regulations may impose these costs either by forcing the upgrading of rehabilitated buildings to levels of performance

which are too high for the community, or by accepting only design solutions prescribed for new construction.

The community may also determine that such a conflict exists when the enforcement of existing building regulations (hazard abatement codes, property maintenance codes, and retroactive regulations) is triggered only by application for building permits. Such an enforcement system discriminates against rehabilitation activities in the community because these regulations should be applied to all existing buildings.

b. Discrimination of current rehabilitation regulations against a class of buildings or owners.

This condition may occur in a community which applies the 25-50% Rule to rehabilitation (see Chapter 1, Part 2.1 above).

c. Violation of existing regulations.

The existence of extensive illegal rehabilitation work in the community is evidence of this condition (see Part 2.3 above).

To address these problems, it may be necessary to modify the existing regulatory system. Other times, refinements to the existing system will be adequate. These remedial measures may involve one or more of the following:

1. NO MODIFICATION TO THE CURRENT REGULATORY SYSTEM IS NEEDED
2. FLEXIBLE APPLICATION OF THE 25-50% RULE IS NEEDED
3. EXISTING REGULATORY SYSTEM IS IN NEED OF MODIFICATION
4. A DEFINITION OF IMMINENT HAZARDS IS NEEDED

The problems are defined in Chapter 3 of the guideline, where recommendations are made for solutions.

Chapter 3
Recommendations for Amending or Modifying the Regulatory System to Encourage Rehabilitation

A discussion of rehabilitation problems is contained in an article by William J. Tangye, P.E., entitled *Rehabilitation of Existing Buildings: An Achievable Goal.** The article includes several recommendations, including proposed additions or amendments to the Standard Building Code.

The following recommendations are established for each of the four categories of needed modifications identified in the preceding chapter. In general, a community will find that it is faced with one or more of these needs. Communities should also refer to the accompanying *Statutory Guideline for Building Rehabilitation, Guideline for Managing Official Liability Associated with Building Rehabilitation,* and the *Guideline for Approval of Building Rehabilitation* for additional guidance and recommendations.

Communities should consider enacting historic preservation waiver clauses, if they have not already done so.

A community located in a state which has statewide preemptive codes may be constrained in carrying out some or all of the following recommendations. It should determine the extent of such constraints before attempting to amend or modify its regulatory system.

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1
No Modification to the Current Regulatory System is Needed

PROBLEM

The community determines that its current building code provisions applicable to rehabilitation, including the triggering of full code compliance by the 25-50% Rule and change of occupancy regulation, do not conflict with rehabilitation goals, do not intentionally unduly constrain building rehabilitation, and do not discriminate against classes of buildings or owners. Such a community accepts the imposition of new construction standards for much of its rehabilitation. However, the community determines that rehabilitation is unintentionally constrained by the prescriptive nature of many building code requirements.

RECOMMENDATIONS

The community should do the following.

Justify Code Requirements

Explicitly justify, as a matter of public policy, each code requirement applied by current regulations to rehabilitated buildings which is in excess of the current requirements applicable to existing (unrehabilitated) buildings (e.g., hazard abatement code, property maintenance code, and retroactive regulations).

Accept Alternate Materials and Methods

Amend the building code, electrical code, plumbing code, etc. to explicitly mention the acceptability of alternate materials, methods of construction, and designs when dealing with buildings under the 25-50% Rule or undergoing a change of use or occupancy.

Implement Technical Guidelines

Implement the following technical guidelines:

- *Egress Guideline for Residential Rehabilitation*
- *Electrical Guideline for Residential Rehabilitation*
- *Plumbing DWV Guideline for Residential Rehabilitation*

These guidelines suggest alternative solutions recommended for building rehabilitation which provide approximately equivalent performance as specified by current codes for new construction.

Use the *Guideline on Fire Ratings of Archaic Materials and Assemblies.*

Implement Additional Guidelines

Implement technical guidelines similar to those above, which may be developed and published from time to time. A community may also develop and implement its own guidelines.

2
Flexible Application of the 25-50% Rule is Needed

PROBLEM

The community's current building regulations include the 25-50% Rule. The majority of buildings needing rehabilitation in the community do not involve a change in use or in occupancy. The community's goal is to encourage this rehabilitation, and the community is willing to accept a level of performance for rehabilitated buildings which is lower than that required for new construction. However, the 25-50% Rule, as currently enforced, requires full code compliance in more cases than the community finds appropriate and/or discriminates against classes of buildings or owners in the community.

RECOMMENDATIONS

The community should consider the following.

Defining Cost and Value

In a jurisdiction which has the 25-50% Rule and desires to interpret it so as to promote rehabilitation, the objective is to obtain the lowest possible ratio of cost of rehabilitation (numerator) to the value of the building (denominator). The definition of cost, therefore, should be as low as possible. Based upon case studies, the following methods of defining cost are either in use or suggested by building officials. Except where noted, these interpretations may be made by the building official without changing regulations.

a. Defining Cost of Rehabilitation (the numerator)

Objective: Obtain Lowest Possible Value

- Exclude all non-permit items such as painting and decorating, kitchen cabinets, landscaping, architect's fee, and the like.
- Exclude all items which require a separate permit and are normally covered by a separate code not governed by the 25-50% Rule, such as plumbing, electrical, and elevator.

b. Defining Value of the Building (the denominator)

Objective: Obtain Highest Possible Value

- Define value as current replacement cost before rehabilitation.
- Define value as current replacement cost *after* rehabilitation. (This may not be feasible under the Standard Building Code since it requires "the then physical value of the building", presumably before rehabilitation. The Basic Building Code implies replacement value before rehabilitation, although this is not explicitly stated.)

Assessed value is reportedly used in some jurisdictions, but assessed value usually lags behind true replacement value. In addition, assessment practices often assess various occupancies using different methods, which could lead to discrimination.

Varying the Percentages

Consider increasing the percentages (e.g., 33-66% instead of 25-50%). This will allow more rehabilitation before new construction code requirements would be imposed. A code amendment is required to implement this change.

Reducing the Time Span

The model codes and most local codes require that for purposes of the 25-50% Rule, cost is to be defined as work done within a one year period. Reducing the time span to six months, for example, would allow phased upgrading of buildings. This change also requires a code amendment.

Using Technical Guidelines

Consider the use or possible modification (to reflect acceptable lower levels of performance) of the technical guidelines as suggested in the preceding problem.

3
Existing Regulatory System is in Need of Modification

PROBLEM

The community determines that its current building regulations conflict with its rehabilitation goals. Many or most of its rehabilitated buildings must meet a level of performance that imposes unacceptably high costs, which unduly constrains building rehabilitation. Also, the community may determine that its regulatory system discriminates by enforcing existing building regulations in cases of rehabilitation only.

RECOMMENDATIONS

The community should do one of the following:

- Consider applying or adapting a current regulatory innovation; or
- Develop its own local rehabilitation code, provisions, or guidelines.

Consider Applying or Adapting a Current Regulatory Innovation

Chapter 1 and the Appendices of this guideline contain discussions of various existing comprehensive or partial regulatory innovations. These include:

- Washington, D. C. (Appendix 2)
- San Francisco, California (Appendix 3)
- Denver, Colorado (Appendix 4)
- State of Massachusetts (Appendix 5)
- State of California (Appendix 6)
- City of Los Angeles Rule of General Application on Structural Changes Required by Change of Occupancy (Appendix 7)
- State of California Draft Legislation Related to Seismic Hazards (Appendix 8)
- Detroit Electrical Code, Chapter 10 (Appendix 9)

The community may consider adopting or modifying one or more of these regulatory innovations. Such a community should do the following.

Analyze each innovation in detail from the materials appended to this guideline and from any additional materials obtained locally. This analysis should pay particular attention to the specific local characteristics (physical, social, economic, political, etc.) which led to the development of the regulatory innovation under study.

Since each regulatory innovation was developed to respond to local community conditions and needs, a community considering adopting such a developed regulation must be aware of the similarities and dissimilarities of its own community characteristics in relation to those of the model being analyzed. A level of performance acceptable in one community may not be acceptable in another.

The "complete solutions" of Washington, D. C. and San Francisco use specific, and often prescriptive, provisions applicable to rehabilitation. Therefore, these may have limited transferability to any but very similar cities. The Denver approach deals with every case individually, rather than establish comprehensive provisions. Massachusetts uses an approach in which each building defines its own level of performance to which it must be rehabilitated.

Based upon the analysis, adopt and/or modify one of the model regulatory innovations.

Amend current codes as necessary, including deletion of the 25-50% Rule and/or the change of occupancy provisions. Such deletions require the substitution of specific provisions. Care must be taken when deleting the 25-50% Rule: a community may inadvertently hamper rehabilitation below 25%, which currently enjoys the continuation of nonconforming rights.

Consider the use or possible modification (to reflect acceptable lower levels of performance) of the technical guidelines, as suggested above.

Develop Local Rehabilitation Code or Guidelines

A community that determines that none of the regulatory innovations are responsive to local needs should develop its own rehabilitation code, regulations, or guidelines. It may proceed as follows.

Determine the levels of performance required for all existing buildings under the current hazard abatement code, property maintenance code, and retroactive regulations. As a minimum, all rehabilitated buildings must meet these levels. In the absence of a current definition of "imminent hazard", the recommendations in Part 4 below should be followed.

If the community decides that levels of performance higher than those determined in the paragraph above are to be required for rehabilitated buildings, each such requirement should be individually justified as a matter of public policy. This decision may apply to rehabilitation involving no occupancy change, involving occupancy change, or both. The justification should cover structural safety, fire safety, health, and hygiene.

Amend current codes as necessary, including deletion of the 25-50% Rule and/or the change of occupancy provisions. Such deletions require the substitution of specific provisions. Care must be taken when deleting the 25-50% Rule: a community may inadvertently hamper rehabilitation below 25%, which currently enjoys the continuation of nonconforming rights.

Consider the use or possible modification (to reflect acceptable lower levels of performance) of the technical guidelines, as suggested previously.

A format and methodology for developing a local rehabilitation code is presented in Appendix 10 of this guideline. This technique compares rehabilitation needs with the code requirements for new construction.

4
A Definition of Imminent Hazards is Needed

PROBLEM

The community may have a need to define "imminent hazard". For a community facing any of the problems discussed in Parts 1-3 of this chapter, this problem may be the desire but inability to establish compliance priorities for any level of performance.

For a community facing the problems discussed in Parts 2 or 3 above (i.e., considering acceptance of lower levels of performance for rehabilitated buildings), this problem may be the inability to establish the absolute lowest acceptable level of performance by requiring only the elimination of "imminent hazards" as a requirement attending rehabilitation.

RECOMMENDATION

To assist the community in assessing an "imminent hazard", the following attributes and criteria should be considered.

Structural Safety

A building presents an imminent hazard:

- Whenever the stress in any materials, member or portion thereof, due to all dead and live loads, is more than 1-1/2 times the working stress or stresses allowed in the code for new buildings of similar structure, purpose, or location.

- Whenever any portion thereof has been damaged by fire, earthquake, wind, flood, or by any other cause to such an extent that the structural strength or stability thereof is materially less than it was before such catastrophe and is less than the minimum requirements of the code for new buildings of a similar structure, purpose, or location.

- Whenever any portion or member or appurtenance thereof is likely to fail, or to become detached or dislodged, or to collapse and thereby injure persons or damage property.

- Whenever any portion of a building or any member, appurtenance, or ornamentation on the exterior thereof is not of sufficient strength or stability, or is not so anchored, attached, or fastened in place as to be capable of resisting a wind pressure of 1/2 of that specified in the code for new buildings of similar structure, purpose, or location without exceeding the working stresses permitted in the code for such buildings.

- Whenever any portion thereof has racked, warped, buckled, or settled to such an extent that walls or other structural portions have materially less resistance to winds or earthquakes than is required in the case of similar new construction.

- Whenever the building or structure or any portion thereof because of: a) dilapidation, deterioration, or decay; b) faulty construction; c) the removal, movement, or instability of any portion of the ground necessary for support; d) the dete-

rioration, decay, or inadequacy of its foundation; or e) any other cause, is likely to partially or completely collapse.

- Whenever the exterior walls or other vertical structural members list, lean, or buckle to such an extent that a plumb line passing through the center of gravity does not fall inside the middle 1/3 of the base.

Number of Exits

A building presents an imminent hazard whenever less than two approved independent exitways serve every story (except as modified for single exitways by current building codes or by the *Egress Guideline for Residential Rehabilitation*).

Capacity of Exits

A building presents an imminent hazard whenever any required door, aisle, passageway, stairway, or other required means of egress is insufficient to comply with the current code section on exit capacity or is so arranged as to preclude safe and adequate means of egress (see the *Egress Guideline for Residential Rehabilitation*).

Other

A building presents an imminent hazard whenever conditions exist which in the judgment of the code official would be cause for an otherwise fully code-complying building to be evacuated or padlocked, or for the site or other adjacent areas to be evacuated, barricaded, or otherwise protected.

Appendix 1
Appendix Chapter 12 of the 1979 Uniform Building Code, "Existing Buildings"

Existing Buildings

Sec. 1215. (a) **Purpose.** The purpose of this section is to provide a reasonable degree of safety to persons living and sleeping in apartment houses and hotels through providing for alterations to such existing buildings as do not conform with the minimum safety requirements of this code.

(b) **Scope.** The provisions of this section shall apply exclusively to existing nonconforming Group R, Division 1 Occupancies more than two stories in height.

(c) **Effective Date.** Eighteen months after the effective date of this section, every building falling within its scope shall be vacated until made to conform to the requirements of this section.

(d) **Number of Exits.** Every apartment and every other sleeping room shall have access to not less than two exits. A fire escape as specified herein may be used as one required exit.

Subject to the approval of the building official, a ladder device as specified herein may be used in lieu of a fire escape when the construction features or the location of the building on the property cause the installation of a fire escape to be impractical.

(e) **Stair Construction.** All stairs shall have a minimum run of 9 inches and a maximum rise of 8 inches and a minimum width exclusive of handrails of 30 inches. Every stairway shall have at least one handrail. A landing having a minimum horizontal dimension of 30 inches shall be provided at each point of access to the stairway.

(f) **Interior Stairways.** Every interior stairway shall be enclosed with walls of not less than one-hour fire-resistive construction.

Where existing partitions form part of a stairwell enclosure, wood lath and plaster in good condition will be acceptable in lieu of one-hour fire-resistive construction. Doors to such enclosures shall be protected by a self-closing door equivalent to a solid wood door not less than 1¾ inches thick. Enclosures shall include landings between flights and any corridors, passageways or public rooms necessary for continuous exit to the exterior of the building.

The stairway need not be enclosed in a continuous shaft if cut off at each story by the fire-resistive construction required by this subsection for stairwell enclosures.

Enclosures shall not be required if an automatic sprinkler system is provided for all portions of the building except bedrooms, apartments and rooms accessory thereto.

(g) **Exterior Stairways.** Exterior stairs shall be noncombustible or of wood of not less than 2-inch nominal thickness with solid treads and risers.

(h) **Fire Escapes, Exit Ladder Devices.** 1. Fire escapes may be used as one means of egress, if the pitch does not exceed 60 degrees, the width is not less than 18 inches, the treads are not less than 4 inches wide, and they extend to the ground or are provided with counterbalanced stairs reaching

to the ground. Access shall be by an opening having a minimum dimension of 29 inches when open. The sill shall be not more than 30 inches above the floor and landing.

2. A ladder device when used in lieu of a fire escape shall conform to U.B.C. Standard No. 33-3 and the following:

A. Serves an occupant load of nine people or less or a single dwelling unit or hotel room.

B. The building does not exceed three stories in height.

C. The access is adjacent to an opening as specified for emergency egress or rescue or from a balcony.

D. The device does not pass in front of any building opening below the unit being served.

E. The availability of activating the ladder device is accessible only to the opening or balcony served.

F. The device as installed will not cause a person using it to be within 12 feet of exposed energized high-voltage conductors.

(i) **Doors and Openings.** Exit doors shall meet the requirements of Sections 3303 (b), (c), (d) and 3304 (h). Doors shall not reduce the required width of stairway more than 6 inches when open. Transoms and openings other than doors from corridors to rooms shall be fixed closed and shall be covered with a minimum of ¼-inch plywood or ½-inch gypsum wallboard or equivalent material.

EXCEPTIONS: 1. Existing solid bonded wood core doors 1¾ inches thick or their equivalent may be continued in use.

2. Where the existing frame will not accommodate a door complying with Section 3304 (h), a 1¾-inch-thick solid-bonded wood core door may be used.

(j) **Exit Signs.** Every exit doorway or change of direction of a corridor shall be marked with a well-lighted exit sign having letters at least 5 inches high.

(k) **Enclosure of Vertical Openings.** Elevators, shafts, ducts and other vertical openings shall be enclosed as required for stairways in Subsection (f) or by wired glass set in metal frames. Doors shall be noncombustible or as regulated in Subsection (f).

(l) **Separation of Occupancies.** Occupancy separations shall be provided as specified in Section 503. Lobbies and public dining rooms, not including cocktail lounges, shall not require a separation if the kitchen is so separated from the dining room.

Every room containing a boiler or central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation.

EXCEPTION: A separation shall not be required for such rooms with equipment serving only one dwelling unit.

(m) **Alternates.** No alternate method of obtaining the fire protection and safety required by this section may be used unless the Board of Appeals, including as a voting member for this purpose the chief of the fire department, finds that such alternate method provides protection and safety equivalent to that required herein.

Appendix 2
Washington, D.C.

WASHINGTON, D. C.

General Code Provisions

The District of Columbia uses a locally developed code loosely based on the Basic Building Code format. The code incorporates neither the 25-50% Rule nor the general change in use regulation. It does, however, contain provisions (basically prescriptive) specifically addressing existing buildings and also specific provisions applied when a change in use occurs.

In general, the code provides for several levels of code compliance as follows:

i Code in effect when building was erected.

ii Retroactive provisions:

- o most exclude one and two family,
- o some exclude certain buildings under three stories.

iii Provisions concerning alteration or conversion.

iv Provisions for new construction.

The code also incorporates a hazard ranking by occupancy type and intensity of use. Conversion is defined as a change to a higher hazard use. Alteration is defined as work which affects egress arrangements or fire resistivity.

In general, the provisions concerning alteration or conversion are less stringent than for new buildings in both fire ratings and egress. The retroactive provisions are still less stringent than either category. Both of these classes of provisions cover primarily egress and fire resistivity.

The code provisions were developed over a long period of time and were based essentially on allowing certain deviations from the requirements for new construction for existing, altered or converted buildings.

Following this discussion are the primary sections of the District of Columbia code covering alteration and conversion of existing buildings. These sections include:

- o Section 100.12 - Buildings Altered or Converted (general application)
- o Section 100.13 - Existing Buildings (general application)
- o Section 504 - Buildings Altered or Converted (light, ventilation and space requirements)
- o Section 312 - Buildings Altered or Converted (covers height and area, change in occupancy, projections, fire-resistance requirements)
- o Sections 663-639 - Buildings Altered or Converted (egress requirements)
- o Sections 640-650 - Existing Buildings (egress requirements)
- o Section 629 - Buildings Altered or Converted (fire and flame resistance requirements)
- o Section 1008 - Existing Installations (chimneys, vents and fireplaces)

Operation of the Code

In the absence of a 25-50% Rule, any building may be repaired and rehabilitated complying only with the code in effect when it was erected, plus those retroactive provisions for existing buildings which apply to it. Compliance with the more stringent provisions for altered or converted buildings becomes necessary only when the use of the building is changed to one of greater hazard.

For example, the District of Columbia contains many three-story and basement row dwellings. When a one- or two-family row dwelling is rehabilitated, it need be in compliance only with the code in effect when it was built, e.g., replace with like materials and systems. Note that one- and two-family dwellings are generally excluded from retroactive provisions. If, on the other hand, it is converted to three or four apartments, it must meet the more stringent requirements for conversion, such as enclosure of exits, fire alarms, detectors, etc.

Because of format and references, it is necessary to be familiar with the total code in order to result in the most economical method to meet retroactive provisions or to alter or convert a building. In each instance, several options are generally available. Following is a much simplified example of optional egress requirements for an existing, non-fire resistive construction (Type 3) building with eight dwelling units and two open stairways:

i Retroactive Provisions:

- o Option 1 - Enclose both stairways.
- o Option 2 - Fully enclose one stairway, partially enclose the other.
- o Option 3 - Partially enclose one stairway and provide fire escapes for each apartment.

ii Alteration or Conversion Provisions:

- o Option 1 - Enclose both stairways (may still have to provide fire escapes, depending upon building layout).
- o Option 2 - Enclose one stairway, partially enclose second and provide fire escapes.

iii New Construction:

- o No option - Must have two Class A enclosed stairways.

This concept of specific written provisions for multi-level code enforcement, e.g., existing, retroactive, altered or converted, and new construction, accomplishes several goals:

- o It provides for less stringent requirements than for new construction.
- o It minimizes discretionary authority, and hence, minimizes the legal liability or the preception of such liability, of the inspector or building official.
- o It eliminates value or cost of rehabilitation as a factor--the provisions are based on the need to secure reasonable minimum levels of life safety.

Primary Sections of Washington, D. C. Code
Concerning Existing Buildings, Alterations,
and Conversions

Sec. 100.12 Buildings Altered or Converted.

100.121 Buildings Erected After February 1, 1951. Buildings for which a permit application was filed on or after February 1, 1951, for the purpose of altering or converting, shall comply with all applicable requirements of this Code with respect to such alterations or conversions.

100.122 Buildings Erected Before February 1, 1951. Buildings for which a permit application was filed before February 1, 1951, for the purpose of altering or converting, shall comply with the requirements of Sections 634.0 through 640.0 of Article 6.

Sec. 100.13 Existing Buildings.

Buildings and structures for which application for permit to construct was filed prior to the effective date of this Code, shall be subject to 100.12 on Maintenance, and Sections 641.0 through 650.0 of Article 6.

SECTION 312.0 - BUILDINGS ALTERED OR CONVERTED

Sections
312.1 Increase in Height
312.2 Increase in Area
312.3 Change in Occupancy
312.4 Existing Projections
312.5 Fire-Resistance Requirements

Sec. 312.1 Increase in Height

(1) No building shall be increased in height unless, with the increased height, it meets the fire-resistance requirements of this Code.

(2) Minor variations from such required fire-resistance for the existing part of the building may be allowed by the Director.

Sec. 312.2 Increase in Area.

(1) When a building is increased in area, the new part shall conform with the requirements of this Code for new construction.

(2) In case the required fire-resistance ratings of constructions in the addition differ from those for the existing building by 3/4 hour or more, or the addition is of a different type of construction of a lower fire rating, a fire separation per § 303.5 shall be provided.

Sec. 312.3 Change in Occupancy.

(1) No change in occupancy to one requiring greater fire-resistance for the building or lesser height or area, shall be made unless the building conforms, or is altered to conform with the requirements of this Code for the new occupancy.

(2) Changes in use which present similar fire or occupancy hazards, may be made.

Sec. 312.4 Existing Projections.

No structural alterations shall be made to existing projections which change their projection on public space, unless such projections be made to conform with the requirements of Section 311.0 of this Article.

Sec. 312.5 Fire-Resistance Requirements.

(1) Requirements for Types 1, 2 and 3 Construction. The requirements shall be the same as for new construction except as provided herein.

1. Existing Buildings. When buildings, erected prior to July 1, 1925, are altered or converted, in lieu of the required Type 1 main floor, such main floor shall be protected on the underside with incombustible material having not less

than a one-hour fire-resistance rating, including columns and beams. All floors below the main floor of such buildings shall be subdivided into fire areas not exceeding 1,500 square feet. The above fire protection and subdivision of floors below the main floor is in lieu of a Type 1 main floor. Existing non-fire-resistive exit and public corridors and stair landings shall be covered on top with a minimum of 3/8 inch thickness of incombustible material, or other material of such thickness and type as may be approved by the Director. The soffits of such stairs, both sides of stud partitions, and exit and public corridor ceilings, shall be protected with incombustible material having a fire resistance rating of not less than one hour. The spaces between floor joists running at an angle with the corridor partitions, directly above and below, shall be fire stopped with incombustible materials. The space between stair stringers shall be fire stopped at the top and bottom of the stairs. All stairs extending below the main floor shall terminate in a 2-hour incombustible enclosure with a Class B self-closing door entering thereto. Doors leading from such corridors shall be Class C self-closing. Transoms shall be removed and the openings protected.

(2) Requirements for Type 4 Construction. In general, existing Type 4 Buildings shall not be altered or converted to any use other than L-2, except that existing Type 4 Buildings not over 3 stories or forty feet in height, may be altered or converted to Group E, C or F-4B occupancies under the following conditions:

a. The existing frame exterior walls shall be provided with a nominal 4 inch thick masonry veneer or an exterior surface of incombustible material providing an overall 3/4 hour fire-resistance rating.

b. Existing masonry party walls may remain unchanged. Existing frame party walls shall be provided with a minimum 3/4 hour fire-resistance rating, or the wood lath and plaster removed on one side, stud spaces filled solidly with mineral wool and minimum of 3/4 inch gypsum plaster on metal lath or 1/2 inch gypsum plaster on gypsum lath 1/2 inch of approved fire resistant rated gypsum sheet rock applied to that side.

c. The fire areas within the basements shall be limited to 1500 square feet between fire walls and in all

stories above the basement fire areas shall be limited to 2500 square feet between fire walls.

d. The total capacity of the Building shall not exceed 150 persons with the second floor limited to 75 persons. The Group E, C or F-4B occupancy shall be limited to the basement, first and second floors.

e. All other applicable provisions of this Code, including fire resistivity (other than exterior walls), egress, light and ventilation for altered and converted buildings, shall be in full force and affect.

1. Outside of Fire Limits. Open porches, not projecting into public space, may be enclosed but such enclosure shall constitute an addition and shall comply with all zoning and building code requirements for additions. (For construction of porches on public spaces see § 311.11.)

2. Inside of Fire Limits.

a. Wood frame buildings may be moved within their original lot lines, or may be moved to any area in which such construction is permitted, but shall not be moved to any other site within fire limits, except by approval of the Commissioner.

b. A Type 4 building, deteriorated or damaged beyond one-half of its present reconstruction value, may not be repaired, altered, or rebuilt. The amount or extent of such deterioration or damage, shall be determined by the Commissioner.

c. Enlargement. A Type 4 building depreciated to the extent noted under subsection 2. above, may be enlarged by wood frame construction as follows, provided the requirements for light and ventilation of all rooms affected are complied with, and such construction complies with all applicable requirements of this Code: 1. A one or two-story extension may be added to the rear of an original structure subject to the requirement that the sum of all extensions to the rear of such original structure shall not cover more than 120 square feet of ground area. 2. A second story not exceeding 120 square feet of floor area may be erected on an existing one-story extension, on the rear of an original structure, but in such case no further extension shall be permitted.

d. Increase in Wall Height. Exterior wood frame walls shall not be increased in height except as follows: 1. Where the top story or an attic was constructed and used for human habitation, and the ceiling height is less than required, such walls may be increased sufficiently to provide the ceiling height required by this Code. 2. A flat roof covered with metal or other incombustible material may be substituted for a gable or pitched roof, provided the cubic contents of the top story is not increased.

SECTION 504.00 - BUILDINGS ALTERED OR CONVERTED

Sections
504.1 Skylights
504.2 Ceiling Heights
504.3 Sunporches

Sec. 504.1 Skylights.

In the alteration or conversion of existing habitable rooms having insufficient window area, additional light and ventilation may be provided by means of skylights up to 50 percent of the total area required.

Sec. 504.2 Ceiling Heights.

504.21 Habitable Rooms. In the alteration or conversion of buildings existing prior to July 10, 1942, habitable rooms shall have a clear height of not less than seven feet in at least the minimum floor area required under Section 501.2.

504.22 Occupiable Rooms. In the alteration or conversion of buildings erected prior to January 8, 1952, occupiable rooms shall have a clear ceiling height of not less than seven feet.

504.23 Minimum Headroom. The minimum headroom shall conform with the requirements of Section 501.5.

Sec. 504.3 Sunporches.

In the construction of sunporches on existing single-family dwellings a variation of ten percent will be permitted of the required glazed areas under Section 502.5, when full compliance with the requirements would involve exceptional structural difficulties

SECTION 633.0 - BUILDINGS ALTERED OR CONVERTED

Sections

633.1 Scope
633.2 Applicability
633.3 Grouping of Occupancies
633.4 Conditions for Conversion
633.5 Additions
633.6 Allowable Variance
633.7 Doors Projecting Beyond Building Line

Sec. 633.2 Scope.

The requirements of this Section apply only to the scope of the work contained in the permit.

Sec. 633.2 Applicability.

(1) The provisions under Sections 633.0 through 639.0 of this Article shall apply to buildings which were existing or under construction, or for which an application for a permit to construct, alter or convert was made prior to March 8, 1946.

(2) Where there are no specific provisions in Sections 633.0 through 639.0 applying to the alteration or conversion of any such building, or part thereof (see §§ 633.5 and 633.6), then such building or part thereof shall be made to comply with the pertinent provisions of Sections 601.0 through 632.8 which also apply to alterations, or conversion, in buildings erected after Feb. 1, 1951.

(3) In the enforcement of Sections 633.1 and 633.2(1) and (2), the application thereof to the areas affected shall include all areas in which work is to take place, and if said work imposes a greater burden upon the structure or means of egress, then, in such event, the Director shall include, as a part of the scope of work covered by the application, other areas directly affected as a result of the work performed.

(4) Nothing in this Article shall be construed to waive the requirements of the Act of Congress of June 1, 1910 as amended. (36 Stat. 452.)

Sec. 633.3 Grouping of Occupancies.

In general, the following classification by groups of occupancies, beginning with the most hazardous, shall be used to determine the order in which occupancies shall be considered hazardous to life, but shall not be construed to waive requirements of this Code which may be imposed due to the use, height, size, or capacity for occupancy of any building.

(1) High Hazard Group A buildings.
(2) Institutional Group H-1 buildings.
(3) Institutional Group H-2 buildings.
(4) Theatres, Group F-1 Assembly buildings.
(5) Assembly Group F-2 buildings with capacity of 300 or more.
(6) Assembly Group F-3 buildings with capacity of 300 or more.
(7) Assembly Group F-4A buildings with capacity of 300 or more.
(8) Assembly Group F-4B buildings with capacity of 300 or more.
(9) Residential Group L-1 buildings.
(10) Assembly Groups F-2, F-3, or F-4A buildings with capacity under 300.
(11) Assembly Group F-4B buildings with capacity under 300.
(12) Mercantile Group C buildings.
(13) Industrial Group D buildings.
(14) Storage Group B buildings, including public parking and storage garages.
(15) Business Group E buildings.
(16) Residential Group L-2 buildings.
(17) Miscellaneous uses, the relative hazard of which to be determined by the Director.

Sec. 633.4 Conditions for Conversion.

(1) Any building may be converted, from one type of occupancy to another within any group of occupancies of the same or lesser hazard, without incurring additional requirements within the limits of this Section, provided that fire-resistivity or egress facilities are not reduced, that no increase is made in height or size, that the capacity for

occupancy is not so increased as to require additional egress facilities.

(2) Buildings may be converted to occupancies of greater hazard, but the requirements for fire-resistivity, egress facilities and other applicable requirements for the new occupancy must be fulfilled. See Tables 5 and 6 of Article 2 and Section 312.0 of Article 3.

(3) Existing Type 3B Buildings, not over four stories in height, may have those stories below the top two stories converted to Group C and/or Group F-2 Occupancies; provided, that a minimum of 1-1/2 hours fire separation is provided between the various occupancies.

Sec. 633.5 Additions.

(1) Additions in Area. Additions increasing the floor area of existing buildings shall be considered as new construction and shall comply with all applicable provisions of Sections 601.0 through 632.8 of this Article.

(2) Addition of Stories. No alterations or additions shall be made which increase the number of stories of an existing building unless the stairs and exit corridors directly affected by the addition are made to comply with all applicable provisions of Sections 601.0 through 632.8 of this Article. In connection herewith, the removal of earth adjacent to such building, which changes the status of the ground floor, shall be considered an alteration.

Sec. 633.6 Allowable Variance.

A variance of ten percent in any required dimension or number in relation to egress, will be permitted in the alteration, or conversion, of existing buildings, as defined in this Section unless full compliance is required under Section 633.2. This variance will not be permitted in the case of ceiling height, headroom, slope of ramps, rise and tread of stairs, nor emergency lighting or appliances.

Sec. 633.7 Doors Projecting Beyond Building Line.

Existing doors swinging out 18 inches beyond building line may remain.

SECTION 634.0 - STAIRWAYS FOR BUILDINGS ALTERED OR CONVERTED

Sections

634.1 Interior Stairways
634.2 Exemption from Enclosure
634.3 Closets in and Under Stairways
634.4 Smokeproof Towers
634.5 Exterior Stairs
634.6 Limitations on Use
634.7 General Requirements for Exterior Stairs
634.8 Construction of Exterior Screened Stairways
634.9 Fire Escapes

Sec. 634.1 Interior Stairways.

(1) Stairways and landings may be accepted if their narrowest point be used to determine the number of units of width above that point.

(2) In the alteration or conversion of buildings erected prior to March 8, 1946, a fireman's gooseneck ladder leading from a fire escape or an interior ladder and scuttle leading to the roof, may be accepted or provided, in lieu of extending the interior stairs to the roof.

(3) Stair installations which do not fully conform to the requirements in Section 603.5 on treads, risers, and landings, will be accepted if approved by the Director.

Sec. 634.2 Exemption from Enclosure.

The following are exempt from the requirement that each stairway shall be completely within an enclosure:

(1) Two-story L-2 buildings converted to L-1 uses having rooming units only for not more than 25 persons above the main

floor and having a direct, independent, second means of egress from each rooming unit.

(2) Three-story L-2 buildings converted to L-1 uses having rooming units for not more than 15 persons above the main floor and having a direct, independent, second means of egress from each rooming unit.

Sec. 634.3 Closets in and Under Stairways.

Except in two-story buildings, closets installed in non-fire-resistive stair enclosures shall be fire protected on the inside in accordance with the requirements of Section 606.5(2). Openings between the stairway and the closet shall be protected. In fire-resistive stairways, the doors of each such closets shall be protected.

Sec. 634.4 Smokeproof Towers.

(1) Class B stairs, where permitted by occupancy egress requirements, may be used in smokeproof towers.

(2) Where Fire-Resistive construction is not required, except in places of public assembly, the stairs, landings, and platforms within the tower enclosure may be of wood, if tower is protected in accordance with Section 607.3.

Sec. 634.5 Exterior Stairs.

Required exterior stairs shall consist of exterior screened stairways or fire escapes, and shall be constructed of incombustible materials.

Sec. 634.6 Limitations on Use.

(1) Fire escapes shall not be permitted as a required exit on buildings erected after March 8, 1946.

(2) Fire escapes shall not be permitted as required means of egress on any building, regardless of date of erection, that is altered or converted for use as a school, Group F-4A (see exception in Section 629.2(3) for schools in Business Group E buildings) or in any other Group F Assembly buildings, nor on Group H-2 Institutional buildings.

(3) See Section 634.9(7)3. for fire escapes on buildings over five stories in height.

Sec. 634.7 General Requirements for Exterior Stairs.

The following requirements shall apply to all types of exterior stairs.

(1) Plans and Inspection. Two sets of plans containing details of the construction of each stairway or fire escape shall be submitted to and approved by the Director before their erection is started. Plates and nuts forming interior supports for brackets and rails shall not be concealed until inspected and approved by the Director.

(2) Painting and Maintenance. Required exterior stairs and fire escapes shall be painted before and immediately after erection, and shall be painted thereafter as often as necessary to maintain them in proper condition. They shall be kept clear of all encumbrances and obstructions, and shall be promptly cleared of any accumulation of snow or ice.

(3) Proximity of Ducts or Electric Wires. No ventilating, air conditioning or exhaust duct or opening shall open upon nor within 10 feet directly below a required exterior stairs or fire escape, nor shall electric wires, unless enclosed in rigid conduits or as otherwise approved by the D. C. Electrical Code, be directly above nor within 5 feet of such stairs or fire escapes.

(4) Arrangement and Accessibility.

1. Exterior stairs shall be arranged to lead directly to a street or public alley, or to an approved court or open space leading to a street or public alley, and shall extend to the roof of the building they serve, unless otherwise approved by the Director.

2. The location of exterior stairs shall be such that the occupants of the building served by them shall not be required to pass through a stair enclosure to reach them.

3. Where connecting rooms are always rented as a suite, proper access from any room of the suite will be considered sufficient. The Director may require an affidavit to the effect that such rooms are always rented en suite.

4. Drop ladders when in the raised position, and the brackets of platforms, shall be at least 14 feet above alleys, and at least 12 feet above sidewalks and parkings.

5. If the height between the ground level and the lowest platform exceeds 20 feet, an intermediate platform at least 3 feet in length and of width equal to the width of the stairs it serves, shall be provided. Such intermediate platform shall be at least 14 feet high, if above an alley; at least 12 feet high, if above a sidewalk or parking, and at least 7 feet high, if above private property.

Sec. 634.8 Construction of Exterior Screened Stairways.

(1) Anchorage. All supporting bars which are in tension and which are fastened directly to a building shall pass through the wall and be securely fastened to the framework of the building or by other means giving adequate anchorage for the stress carried by the bars.

(2) Stairs. The width, rise, and tread of stairs shall conform to the requirements for Class B interior stairs.

(3) Platforms, Passageways, and Landings. The minimum clear unobstructed width of platforms, passageways, or landings connecting flights of stairs shall not be less than the width of such stairs. Landings at the head and foot of stairs shall have a minimum dimension not less than the required width of the stairs, and shall extend at least 4 inches beyond the jambs of any exit opening thereon. The vertical distance between platforms, passageways, or landings shall not exceed 12 feet.

(4) Headroom. The minimum headroom at all points on platforms, passageways and stairs shall be 6 feet 8 inches, measured vertically.

(5) Enclosure of solid, slotted, or grille construction, not less than 5 feet high, shall be provided for platforms, passageways, landings, and stairs. For stairs, the height of the enclosure shall be measured vertically from the nosings of the stairs. Roofs, with eaves projecting at least 6 inches beyond the enclosures, shall be provided, and shall be extended

to cover the stairs leading to the ground level, whether such stairs are fixed or are of the swinging type.

(6) Openings for Access. Access to stairways shall be through doors or casement windors, not less than 30 inches wide and 6 feet 6 inches high, the sills of which are not more than 8 inches above the level of the platform or passageway. Such doors or windows shall be fire-protected in accordance with Article 9, Section 915.0, shall swing in the direction of exit travel and be so arranged that they cannot obstruct exit travel on the stairway.

Sec. 634.9 Fire Escapes.

Fire escapes shall be made of steel or wrought iron. Welding shall conform with the requirements of Article 8, Section 842.0 of this Code.

(1) Material Requirements.

1. Steel shall be of grade conforming with the requirements of Article 8, Section 842.0 of this Code.

2. Wrought iron shall conform with the requirements of specifications for Wrought Iron Rolled Bars, ASTM A207-68.

(2) Design Load. Platforms, stairs, and their supports shall be designed for a live load of not less than 100 lbs. per square foot of horizontal projection.

(3) Width. The minimum clear width of stairs and ladders shall be 20 inches and the minimum clear width of platforms, landings, and passageways, shall be at least the width of the stairs they serve.

(4) Rise.

1. The pitch of stairs, and of drop ladders in the "down" position, shall not exceed 60 degrees.

2. The vertical distance between platforms shall not exceed 14 feet.

3. Risers of stairs shall not exceed 12 inches and treads shall not be less than 5 inches in width.

(5) Drop Ladders. Drop ladders shall be used in all locations where fire escapes are suspended above public space, and may be used in other locations.

(6) Vertical Ladders.

1. Vertical ladders, either of the rigid or of the collapsible type, may not be used in locations where the pitched or horizontal type can be used.

2. Vertical ladders of the collapsible type, in locations where permitted, may be used, if of a type and design approved by the Director.

3. Vertical ladders of the rigid type, where permitted, shall have guide rails arranged to keep the ladders close to the edge of the platforms, and to prevent swaying.

(7) Railings.

1. Each platform, landing, and passageway, shall be provided with railings consisting of at least two rails, the top of which shall be not less than 32 inches high.

2. Railings shall be supported by standards of 1-in. pipe, or equivalent, and shall be of sufficient strength to sustain a horizontal pressure against the top rail of 25 pounds per linear foot.

3. On buildings over 5 stories in height, the railings on those portions of fire escapes above the 5th floor level, shall be enclosed to the height of the top rail with metal slats or grills, or mesh construction.

(8) Details of Construction. The details of construction of fire escapes, not herein specified, shall be as approved by the Director.

(9) Openings for Access.

1. Where a room intervenes between a public corridor or hallway and a fire escape, either the door of the room shall be

removed, or an unobstructed passageway leading to the fire escape shall be provided not less than 30 inches wide.

2. Windows may be used as access to fire escapes provided they are not less than 30 inches wide in the clear, 3 feet high and with sill not more than 2-1/2 feet above floor level, unless otherwise approved by the Director.

3. Where a window providing access to a fire escape serves more than two rooms or more than 10 persons, and its sill is more than 18 inches above floor level, one or more steps of equal height shall be provided. Such steps shall be the full width of the window opening and shall have not less than 9-inch treads.

4. For protection of wall openings at fire escapes, see Article 9, Section 929.0.

SECTION 635.0 - EMERGENCY LIGHTINING, SIGNS, AND PROTECTIVE APPLIANCES FOR BUILDINGS ALTERED OR CONVERTED

Sections
635.1 Emergency Lightining and Signs
635.2 Special Protective Appliances

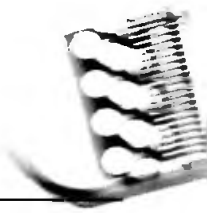
Sec. 635.1 Emergency Lighting and Signs.

(1) The requirements for emergency lighting and signs in connection with exterior screened stairways and fire escapes shall be the same as set forth for other types of exits in Section 613.0 of this Article.

(2) The requirements for lighting other types of exits shall be the same as in Section 613.0 of this Article.

Sec. 635.2 Special Protective Appliances.

The requirements for hand fire extinguishers, fire alarm equipment, standpipes, and automatic sprinklers, or other automatic protection, shall be the same as are specified for new construction in this Code.



SECTION 636.0 - RESIDENTIAL L-1 AND BUSINESS GROUP E OCCUPANCIES FOR BUILDINGS ALTERED OR CONVERTED

Sections
636.1 Stairways

Sec. 636.1 Stairways.

Required stairs for buildings altered or converted for L-1 Residential use of E Business use shall consist of not less than one Class A or B interior stairway or smokeproof tower. If additional means of egress are required, they may be exterior screened stairways. Fire escapes may be permitted if the building was erected prior to March 8, 1946.

SECTION 637.0 - STORAGE B, MERCANTILE C, AND INDUSTRIAL D OCCUPANCIES FOR BUILDINGS ALTERED OR CONVERTED

Sections
637.1 Stairways
637.2 Storage or Parking Garages

Sec. 637.1 Stairways.

(1) In buildings not more than five stories in height, that are altered or converted for B Storage, C Mercantile, or D Industrial use, there shall be not less than one Class A or Class B interior stairway, or smokeproof tower. If additional means of egress are required, they may be exterior screened stairways. Fire escapes may be permitted if the building was erected prior to March 8, 1946.

(2) In such buildings over five stories in height, there shall be at least one Class B interior stairway, or smokeproof tower. If fire escapes are already installed they may be used as additional means of egress subject to the requirements of Section 634.9(7)3..

(3) In such buildings over five stories in height, where fire escapes are not already installed, there shall be at least one Class B interior stairway or smokeproof tower. If additional means of egress are required, they may be Class B interior stairways, smokeproof towers, or exterior screened stairways.

Sec. 637.2 Storage or Parking Garages.

The requirements for buildings altered or converted to parking or storage garages for five or more vehicles, shall be the same as under Section 637.1 above, except that ramps without enclosures may be built in such buildings.

SECTION 638.0 - HIGH HAZARD A OCCUPANCIES FOR BUILDINGS ALTERED OR CONVERTED

Sections
638.1 General Requirements.

Sec. 638.1 General Requirements.

For buildings altered or converted to Group A High Hazard uses, the requirements for means of egress and related facilities shall be the same as for new construction under applicable provisions of Sections 601.0 through 632.8 of this Article.

SECTION 639.0 - ASSEMBLY GROUP F BUILDINGS FOR BUILDINGS ALTERED OR CONVERTED

Sections
639.1 Group F-1, F-2, F-3, and F-4B Assembly Buildings
639.2 Group F-4A Assembly Buildings

Sec. 639.1 Group F-1, F-2, F-3, and F-4B Assembly Buildings.

For buildings altered or converted to Group F-1, F-2, F-3, or F-4B Assembly use, the requirements for means of egress and related facilities shall be the same as for new construction under applicable provisions of Sections 601.0 to 632.8.

Sec. 639.2 Group F-4A Assembly Buildings.

(1) Buildings not over Three Stories. Buildings not more than three stories in height, nor more than 5,000 square feet per floor in area, erected prior to March 8, 1946, which are altered or converted to F-4A Assembly or similar use, shall have not less than two means of egress, one of which shall be an interior enclosed Class A or Class B stairway located next to

an exterior wall. This stairway shall have a window to the outside at each story, except the story in which a door discharges from the stairs directly to the outside. Exterior stairways, if constituting an additional required means of egress, shall comply with no lesser requirements than for exterior screened stairways in Sections 634.7 and 634.8.

(2) Buildings over Three Stories. Buildings more than three stories in height, or having more than 5,000 square feet of area per floor, which are altered or converted to Group F-4A Assembly use, shall be required to conform with all applicable provisions of Sections 601.0 through 632.8 of this Article, except as provided under paragraph (3) below.

(3) Schools in E Business Buildings. Buildings or portions thereof, erected prior to September 16, 1947, which meet all the requirements for E Business use, may be occupied for school uses without further requirements when approved by the Director, provided the following conditions are met:

1. The students be ambulatory persons 18 years of age or over.

2. The population shall not exceed that permitted for E Business purposes.

3. The use of the building for school purposes will not create any hazard exceeding that incident to normal business use.

4. The floors are designed and constructed to support the maximum live loads, including students and such shop, laboratory, or other school equipment as specified in the application for certificate of occupancy.

5. Exit widths shall be not less than those computed on the basis of 60 persons per unit of width per floor occupied for school purposes.

SECTION 640.0 - EXISTING BUILDINGS

Sections

640.1 Statement of Intent and Administrative Procedures

640.2 Applicability
640.3 Board of Appeals and Review

Sec. 640.1 Statement of Intent and Administrative Procedures.

(1) Statement of Intent. It is the intent of Sections 640.0 through 649.0 of this Article to provide a reasonable amount of protection to occupants of existing buildings so that their lives will be safeguarded against the dangers of fire, smoke and panic. It is not the intent of these Sections to impose execessive requirements not commensurate with the benefits derived.

(2) Date of Violation. As provided in Means of Egress Act of December 24, 1942, (Public Law 838, 77th Congress) the text of which is set forth in the Building Code Manual, the Commissioner of the District of Columbia hereby authorizes the Director of the Department of Economic Development, or his representative, to issue notices directing the owner, as defined in said Act, to comply with those items not meeting the requirements of Sections 640.0 through 649.0 of this Article as set forth in said notice, not later than ninety days from the date of service of the notice in the manner specified in the Act, and in addition thereto the Director may when in his opinion, conditions justify, authorize extension or extensions to said notice. Upon the expiration of the time set forth in said notice or any extension or extensions thereto and the failure of the owner to comply with the said notice, it shall be deemed at that date that any further use and/or occupancy of the building is not in compliance with these regulations and thereafter following the expiration of a thirty-day notice in writing from the Director of the Department of Economic Development, served in the manner prescribed in said Act, it shall be a violation of these regulations for the owner to use the building or for any person to occupy the building.

(3) Penalties and Restrictions. As provided in the Means of Egress Act of December 24, 1942, any owner who uses or permits the occupancy of his building in violation of these regulations, as defined in this Section, shall be subject to the following penalties or restrictions:

1. Upon conviction of a violation of these regulations the owner shall be punished by fine of not less than $10.00

nor more than $100.00 per day for each and every day such violation exists; and

2. Without application to court, the Director of the Department of Economic Development is empowered to cause such construction and installations of those items set forth in the notice provided in this Section, and the Commissioner is authorized to assess the costs thereof as a tax against the building on which they are erected and the ground on which the building stands, said assessment to bear interest at the rate and be collected in the manner provided in Section 5 of the Act entitled "An Act Relating to the Levying and Collecting of Taxes and Assessments, and for other Purposes," and approved June 25, 1938; and

3. Upon petition of the District of Columbia filed by the Commissioner in the United States District Court for the District of Columbia, the said Court may issue an injunction to restrain the use or occupation of the building, and the same shall apply to the owner, lessee or occupant thereof.

Sec. 640.2 Applicability.

(1) These requirements shall apply to the following:

1. All existing Institutional H buildings regardless of height or date of erection.

2. All Assembly F buildings of any height erected prior to March 8, 1946, or subsequently erected under permits applied for prior to that date; and

3. All other buildings erected prior to March 8, 1946, or subsequently erected under permits applied for prior to that date, which are three or more stories or over thirty feet in height.

4. The requirements of 1. 2. and 3. above, do not apply to Residential L-2 buildings.

(2) The specific provisions in Sections 640.0 through 649.0 of this Article are applicable to any existing building coming within the limits defined under (1) above.

(3) Where the application of the requirements of Sections 640.0 through 649.0 would result in exceptional or undue hardship by reason of excessive structural or mechanical difficulties or impracticability of bringing the premises affected into compli ance, a variance may be granted by the Director only where, and to the extent, necessary to ameliorate such exceptional or undue hardship; and only when compensating factors are present which, in his opinion, give adequate protection to the public safety, or which will be provided and installed and which will give adequate protection to the public safety, and such variance can be granted without impairing the intent and purposes of Section 640.0 through 649.0.

(4) The Director, in his discretion, may refer requests for variances, without final decision, to the Board of Appeals and Review for the latters' action.

(5) The owner of any premises subject to the provisions of Sections 640.0 through 649.0 who is adversely affected by a determination made by the Director under the authority of Sections 640.0 through 649.0 may file an appeal in writing with the Board of Appeals and Review. Such appeal shall state the error alleged to be contained in any decision, determination or refusal adversely affecting such owner, and shall be filed within the period specified in the notice of violation for compliance therewith. (See Section 640.3.)

Sec. 640.3 Board of Appeals and Review

In applying the provisions of Sections 640.0 through 649.0 and related structural requirements, the Board of Appeals and Review may grant a variance from the application of Sections 640.0 through 649.0, if such Board shall find that the full performance of the requirements of Sections 640.0 through 649.0 and related structural requirements would result in undue hardship by reason of excessive structural or mechanical difficulty or impracticability of bringing the premises affected into full compliance with the requirements of Sections 640.0 through 649.0; provided that a variance will be granted only where, and to the extent, necessary to ameliorate such exceptional and undue hardship and only when the compensating factors are present which give adequate protection to the public safety or which will be provided and installed and which give adequate protection to the public safety; and such variance can be granted

without impairing the intent and purposes of Sections 640.0 through 649.0. Any decision of the Board of Appeals and Review made pursuant to this Section shall be final.

SECTION 641.0 - GENERAL EXIT AND PROTECTION REQUIREMENTS FOR EXISTING BUILDINGS

Sections

641.1 Room Exits
641.2 Permissible Roof Exits
641.3 Boiler Room Exits
641.4 General Stair Requirements
641.5 Stairs to Roof
641.6 Interior Stairways and All Vertical Shafts
641.7 Exterior Stairs
641.8 Stairway Enclosures
641.9 Existing Wood Fire Escapes where Fire Escapes are Required
641.10 Enclosure of Shafts
641.11 Doorways and Doors
641.12 Exit Corridors
641.13 Required Protection

Sec. 641.1 Room Exits.

The number and location of room exits shall be as specified hereinafter except that where exceptional hardship could result, the Director may modify the requirements with the concurrence of the Fire Chief.

Sec. 641.2 Permissible Roof Exits.

At least two exits shall be provided if the occupant capacity on the roof is more than 100 persons. Capacity shall be prominently posted.

Sec. 641.3 Boiler Room Exits.

If more than one exit is required as per § 601.5, then a permanent steel ladder or circular metal stairway with rungs or treads not less than 18 inches long may serve as one of the required exits from boiler rooms.

Sec. 641.4 General Stair Requirements.

Existing stairs, both interior and exterior stairs and fire escapes, shall be accepted with no change provided that the specific provisions of Sections 640.0 through 649.0 are satisfied.

Sec. 641.5 Stairs to Roof.

In lieu of the required extension of an interior stairway to the roof, a permanent steel ladder not less than 22 inches wide and scuttle not less than 2 feet by 3 feet, or extension to the roof of an exterior screened stairway or fire escape ladder protected as required in § 929.2 of Article 9 shall be provided. See also Table 101 of this Article.

Sec. 641.6 Interior Stairways and All Vertical Shafts.

(1) Stairway installations which do not conform to the requirements of Section 603.5 on treads, risers, landings, and tread surfacing, and to Section 603.6 on vertical rise, may be approved by the Director if considered safe by him for the particular locations and use.

(2) Closets may be permitted to remain under stairways if fire-protected as required in Section 634.3.

(3) Stairs in smoke-proof towers may be Class B if having the width required for the location, and stairs, landings, and platforms, within the tower may be of wood for the conditions allowed in Section 634.4.

(4) In these requirements, a smoke-proof tower shall be considered the equivalent of and may be substituted for an enclosed interior stairway if the requirements of maximum length of travel are fulfilled.

(5) The limitations on dead ends of corridors beyond the entrance to stairways or other exits shall not apply.

(6) Moving stairs shall be accepted as providing part of the required exit width to the extent permitted in Section 605.0 of this Article.

(7) All interior stairways, as defined in this Code, shall have at least one handrail or balustrade.

Sec. 641.71 Exterior Stairs.

(1) Exterior screened stairs and fire escapes where permitted under occupancy egress requirements, shall conform with the requirements of Sections 634.7, 634.8 and 634.9 except that if not conforming to these requirements, the Director may approve them if considered safe by him for the particular locations and use, and further provided that previously established access to existing fire escapes through existing rooms by means of a door which has a glass panel that can be broken to gain entrance will be continued to be allowed.

(2) Protection of wall openings at exterior stairways and fire escapes shall conform to the requirements of Section 929.2 of Article 9.

Sec. 641.8 Stairway Enclosures.

The requirement of Section 606.1, that the enclosure shall be so arranged that the line of travel shall be completely within the enclosure, may be modified where allowed by the occupancy egress requirements for existing buildings, Sections 643.0 through 648.0 of this Article, to permit enclosures that serve primarily to prevent communication of fire, smoke, and heated gases from story to story.

(1) For this purpose, the stairway may be enclosed in alternate floors.

(2) Partitions may be placed across the ends of corridors adjacent to stairways.

(3) Stairways shall be enclosed in the attic space.

(4) Enclosure construction shall conform to the requirements of Article 9, Section 909.0 except that the fire-resistance rating need not exceed 3/4 hour incombustible in buildings of Type 1 or Type 2 construction nor 3/4 hour combustible in buildings of Type 3 or 4 construction.

(5) Doors into stairway enclosures from utility rooms, store rooms, commercial kitchens, shop rooms, and other similar or more hazardous uses shall be of not less than unlabeled hollow metal or kalomein construction and shall be set in steel bucks. Doors into stairway enclosures from other locations shall be equivalent to 1-3/4 inch thick solid wood core construction or shall be covered with 26 gage metal on the side leading into the stairway enclosure. Existing wood bucks shall be covered with 26 gage metal on at least the side leading into the stairway enclosure or shall be replaced by steel bucks. All doors leading into stairway enclosures shall be equipped with approved closers.

(6) Enclosures for moving stairs shall conform to the requirements of Section 606.0 of this Article.

(7) Each stairway required to be either fully or partly enclosed shall be provided with ventilation as required for new buildings. See Article 5.

Sec. 641.9 Existing Wood Fire Escapes where Fire Escapes are Required.

All wood fire escapes shall be removed and in lieu thereof there shall be erected a standard fire escape which conforms to the requirements of this Code, or other means of egress shall be provided conforming with the requirements for existing buildings.

Sec. 641.10 Enclosure of Shafts.

(1) Elevator shafts and pipe and vent shafts over 10 square feet in area shall be enclosed with constructions as required in Section 909.0 of Article 9 except that the fire-resistance rating need not exceed one hour in buildings of Type 1 Fire-Resistive construction nor 3/4 hour in buildings of Types 2, 3, or 4 construction. Openings in enclosures shall be protected as required in Section 914.0 of Article 9, except that doors of elevator shafts may be 1-1/2 hours Class B, or 1/1-2 hours BOCA labeled, and doors of other shafts shall conform with the requirements for K or better.

(2) Shafts of 10 square feet or less area shall be enclosed to be smoke-tight in a manner satisfactory to the Director. Doors, frames and trim, if of wood, shall be

covered on the shaft side with not less than 26 gage metal.

Sec. 641.11 Doorways and Doors.

The requirements for doorways, doors, and door hardware shall be as required for new construction in Sections 611.1 through 611.7, 617.5(1), 626.8 and Sections 910.0 through 914.0 of Article 9 except as herein provided:

(1) Swinging Doors.

1. No landing need be provided where a door opens on a flight of steps, Section 611.2(8), but the first tread of the stair shall be on a level not more than one inch below the threshold.

2. Existing exit doors required to swing outward may swing beyond the building line but not beyond the outer line of adjoining show windows, bay windows or other authorized projections, nor more than 18 inches where there are no projections.

3. Unless otherwise provided, no change need be made in existing doorways and doors from rooms to public corridors, if conforming from the standpoint of location, number, units of width, headroom, openability, fire resistivity and swing, with the requirements for new construction, except that where such doors do not comply with the requirements for fire resistivity they shall be as fire-resistant as 1-3/4 inch solid wood core door, or shall be covered with at least 26 gage metal on the room side as shall the door jambs, or both sides of the doors,jambs and trim shall receive a coating of an approved paint which will provide a fire-retardant flame spread rating. Such doors from the storage and utility rooms shall be covered on the room side with at least 26 gage metal. In L-1 buildings, undercut doors or louvres with approved fire dampers may be permitted in transom space above doors, in walls, or in doors from dwelling units to public corridors where existing air conditioning systems require louvres for return air through corridor. Existing slat and/or louvred doors in L-1 Residential Buildings where fresh air is supplied to the dwelling units from the public corridor may remain. All existing vertical ducts must have approved fire dampers. In addition, smoke alarms shall be installed in each and every duct returning air

from a floor to the circulating fan such that the alarms will turn the circulating fan off. Fire dampers shall be in accordance with Section 1109.31 of Article 11.

(2) Revolving Doors. Existing revolving doors may be permitted to remain in use and serve as a means of egress, provided that they are not less than 5 feet 6 inches in diameter and that the width of opening is not less than 3 feet 0 inches.

(3) Approval and Labels. Existing doors in locations requiring labeled openings may be approved by the Director, provided that when they were originally installed, these types of doors were accepted and aporoved as meeting the requirements for labeled openings.

Sec. 641.12 Exit Corridors.

In buildings of Type 1 and 2 construction the walls, floor system, and ceilings of exit corridors shall be of incombustible construction with a rating of not less than 1 hour for Type 1 nor 3/4 hour for Type 2 construction. In buildings of Type 3 or 4 construction only, the walls, floor system, and ceilings of exit corridors may be of combustible construction, but shall have a rating of not less than 3/4 hour. For purposes of this section only, existing wood lath and plaster may be removed on the corridor side of partitions of Type 3 or 4 buildings, the stud spaces fully filled with mineral wool batt insulation, and the plaster replaced by an approved 3/4 hour material. Doors from utility rooms, store rooms, kitchens, shop rooms and other similar or more hazardous uses shall be of not less than unlabelled hollow metal or kalomein construction and shall be set in steel bucks with approved closers. Doors from other rooms shall be equivalent to 1-3/4 inch thick solid wood core construction or shall be covered with 26 gage metal on the room side and shall be equipped with approved closers. Existing wood bucks shall be covered with 26 gage metal on the room side or shall be replaced by steel bucks. Where in the judgment of the Director it is determined that existing low hazard uses adjacent to lobbies used as exit corridors are of such nature as to meet the intent of Sections 617.5, 617.9 and 620.6, when applied to Business E and L-1 Residential buildings the relaxation in the requirements permitted by these sections may be applied.

Sec. 641.13 Required Protection.

(1) Main Floor. Required protection of the main floor shall be 3/4 hour.

(2) Transoms. All transoms over door openings between rooms and public corridors, exit corridors or lobbies in all buildings of Group A, F, H and L-1 occupancies shall be made unopenable and glazed with 1/4" thick wire glass or covered with 26 gage metal or 3/8" thick gypsum board.

SECTION 642.0 - EXIT LIGHTS, SIGNS AND SPECIAL PROTECTIVE EQUIPMENT FOR EXISTING BUILDINGS

Sections

642.1 Exit Lights and Signs
642.2 Automatic Sprinkler Equipment
642.3 Fire Extinguishers
642.4 Fire Alarm Equipment
642.5 Standpipe Systems

Sec. 642.1 Exit Lights and Signs.

Existing buildings shall conform with the requirements of Section 613.0 of this Article on exit lights and signs, as modified by occupancy egress requirements for new buildings, except that in L-1 Residential occupancy buildings where accommodations are provided above the main floor for not more than 15 persons, emergency lighting appliances shall not be required, provided that the stairway is enclosed or that there is an open stairway and an independent second exit from every room.

Sec. 642.2 Automatic Sprinkler Equipment.

(1) Automatic sprinklers shall be provided only as required by occupancy egress requirements for existing buildings, and required installations shall conform with the requirements of Sections 1200.0 and 1201.0 of Article 12.

(2) Existing automatic sprinkler installations shall be considered acceptable if conforming substantially with generally accepted requirements when installed.

Sec. 642.3 Fire Extinguishers.

Fire extinguishers shall be provided and conform with the requirements for new construction under Article 12, Section 1202.0, except as exempted under the same conditions as for emergency lighting in Section 642.1, and as further provided in Section 642.5(4).

Sec. 642.4 Fire Alarm Equipment.

Fire alarm equipment shall be provided as required by Section 1203.1 of Article 12 for new construction, except as exempted under the same conditions as for emergency lighting in Section 642.1.

Sec. 642.5 Standpipe Systems.

(1) No new standpipe systems or additions to such systems will be required in existing buildings.

(2) In buildings six stories or more in height, any existing standpipe system having pumper connection for use by the Fire Department shall remain, in use, provided, that if the standpipes are found to be nonconforming in strength, hose thread, and similar essential details as determined by the Fire Chief, they shall be made conforming.

(3) In buildings less than six stories in height, any existing nonconforming standpipe system having pumper connection for use by the Fire Department, which upon tests made in the presence of the Fire Chief, is found to be of inadequate strength to serve the building shall be made to conform or shall be removed or capped.

(4) Standpipes for small hose without pumper connection which are used in lieu of fire extinguishers shall be continued in use if pressure and flow test made at the top outlets indicate adequacy for the location. If found inadequate, fire extinguishers shall be provided, or means shall be provided to increase the water pressure or supply, or the height of the standpipes shall be cut to the level where they are indicated as adequate, such tests and determinations to meet the requirements of and be made in the presence of the Fire Chief.

SECTION 643.0 - RESIDENTIAL L-1 AND BUSINESS E OCCUPANCIES FOR EXISTING BUILDINGS

Sections

643.1 Width of Stairways
643.2 Single Stairway
643.3 Type and Enclosure of Stairways
643.4 Egress from Stairs

Sec. 643.1 Width of Stairways.

Stairways may be Class A, B or C. See Section 604.1.

Sec. 643.2 Single Stairway.

Three story and higher buildings shall have not less than two interior stairways, or one interior stairway and a smoke-proof tower or fire escape, from each egress area (Section 601.1), except that one stairway will be permitted under the conditions set forth in Table 100 for L-1 Buildings and Table 101 for Business E Buildings.

Sec. 643.3 Type and Enclosure of Stairways.

In requirements under this Section, no distinction from the standpoint of enclosure requirements is made between required interior stairways and those not required, except as provided for Business E buildings in Section 606.3 and Section 643.2 and for Residential L-1 buildings in Section 643.2. The requirements for stairs in Business E and Residential L-1 buildings requiring more than one means of egress shall be in accordance with Table 102 and Table 103 respectively.

Sec. 643.4 Egress from Stairs.

Not less than one required exit stairway shall discharge directly to the outside or to an exit corridor leading thereto. The remaining stairways may discharge through a lobby or foyer on the main floor, provided adjacent occupancies are cut off from such lobby or foyer as provided in Sections 617.5 and 620.6.

SECTION 644.0 - INSTITUTIONAL GROUP H OCCUPANCIES FOR EXISTING BUILDINGS

Sections
644.1 General Requirements
644.2 Exit Requirements

Sec. 644.1 General Requirements.

(1) Fire Protective Features. All buildings of Group H Occupancy shall be required to be fully sprinklered and shall have stairways of a width and design approved by the Director, except those of Type 1 or 2A construction, or those of Type 2B, 3A, 3B, or 3C construction wherein persons are housed on the first floor only, if the entrance to such first floor is at a grade or within 6 feet of grade, or those buildings used as day nurseries in which less than 15 fully ambulatory children are accommodated on the first floor or first and second floors only. All buildings of Type 4 construction used for Group H occupancy, regardless of the number of stories, shall be fully sprinklered. Where other compensating fire protective features or egress features, or fire protective features and egress features, are provided in combination with the consideration of the number of occupants and the height of the building, a variance consistent with the requirements set forth in Section 640.2(3), (4) and (5) may be permitted, and if such variance is granted such building shall not be required to be fully sprinklered. Where buildings are required to be fully sprinklered, the sprinkler system shall be indirectly connected to D. C. Fire Alarm Headquarters through a private central office, or the fire alarm system shall be directly connected to the D. C. Fire Alarm Headquarters, or there shall be provided at least one non-coin operate public telephone in such a location as to be readily accessible at all times. The Director and the Fire Chief shall approve the location of such telephone, rules limiting the use thereof, and such signs or placards as are found to be necessary to properly explain the sending of emergency messages thereby.

(2) Buildings which are fully sprinklered will be excused from =

1. Rearranging the required means of egress so that they open directly to street or public alley or to an open air or fire resistive passage leading thereto.

2. Providing the second approved means of egress for each room or suite of rooms on all floors.

3. Providing access to the roof.

4. Fire protecting corridor partitions and ceilings.

5. Providing self-closing fire doors between rooms and exit corridors or passages.

6. Providing fire doors between rooms and public corridors.

7. Terminating basement stairs in proper enclosure.

8. Fire-protecting entire basement ceiling.

9. Removing all non-conforming partitions from the building.

Sec. 644.2 Exit Requirements.

(1) Institutional H-1 Buildings. The egress requirements for existing H-1 Institutional buildings shall comply, as far as practicable, with the requirements for new construction as in Section 619.1 of this Article.

1. Stairways. Stairways shall be enclosed, except that in those buildings where the surveillance of the occupants is a requisite or where there are to be found other special operating conditions affecting the restraint or protection of occupants, or where there are present other compensating factors as set forth in Section 640.2(3), a variance to allow an open stairway will be considered.

2. Egress Plans and Certification. The Director may require a plan and description of the exit facilities provided, and a certificate of their adequacy, signed by the responsible official in charge of the occupancy.

(2) Institutional H-2 Buildings.

1. Number and Type of Exits. Except as exempted under Section 644.1(2), or where the total number of occupants does

not exceed 15 (in which case the Director may, with the concurrence of the Fire Chief, permit but one exit), there shall be not less than two exits of the following types:

a. Horizontal exits.
b. Doors leading directly to the outside of the buildings.
c. Enclosed ramps.
d. Enclosed or partly enclosed interior stairways.
e. For special conditions, as described hereinafter, exterior screened stairways.

2. Enclosure of Stairways. The requirements for stairways, whether partly or fully enclosed, shall be in accordance with Section 641.8. All stairways shall be fully enclosed, except as follows:

a. Stairways not serving as required means of egress may be partly enclosed.
b. In buildings of Type 1 or 2A construction, of any height, stairways serving as required means of egress may be partly enclosed when used in conjunction with two or more fully enclosed stairways, horizontal exits, or ramps, the travel to which may pass by but not through the partial enclosure.
c. In buildings of Type 1 or 2A construction, not over three stories high, stairways serving as required means of egress may be partly enclosed when used in conjunction with at least one fully enclosed stairway, exterior screened stairs, horizontal exit, or ramp, the travel to which may pass by but not through the partial enclosure.
d. In buildings required to be fully sprinklered, partly enclosed stairways will be permitted.
e. In buildings wherein the use is limited to the first floor, or where the building is used as a day nursery where less than 15 fully ambulatory children are accommodated on the first floor or first and second floors, a partial enclosure shall be provided in the first or second stories.

3. Exterior Screened Stairway. In buildings not over four stories high, an exterior screened stairway may serve the purpose of one enclosed stairway, ramp, or horizontal exit required for new construction.

SECTION 645.0 - INDUSTRIAL GROUP D AND MERCANTILE GROUP C OCCUPANCIES FOR EXISTING BUILDINGS

Sections
645.1 Industrial Group D Occupancies
645.2 Mercantile Group C Occupancies

Sec. 645.1 Industrial Group D Occupancies.

(1) Type and Enclosure of Stairways.

1. An existing building three or four stories in height if of Type 3 construction, or not over five stories in height if of Type 1 or Type 2A construction, may be served by one or more stairways, partly enclosed per Section 641.8 and one or more exterior screened stairways of fire escapes, the number of interior stairways depending on the required exit width, and this number as well as that of exterior stairways, depending also in the allowed maximum travel to an exit. (See Sections 621.3 and 622.3.)

2. If the building is equipped throughout with an automatic sprinkler system, the height limitation under 1. above shall not apply.

3. Buildings of any height in which two or more enclosed stairways or smokeproof towers are required for new construction may be served by one fully enclosed stairway, in conjunction with one or more stairways partly enclosed per Section 641.8, or one or more exterior screened stairways or fire escapes.

Sec. 645.2 Mercantile Group C Occupancies.

(1) Type and Enclosure of Stairways.

1. Buildings three stories in height of Type 3 construction, or three or more stories in height of Type 1 or Type 2A construction, shall have not less than one fully enclosed stairway in conjunction with one or more exterior screened stairways or fire escapes. All stairways shall be fully or partly enclosed except as exempted from Group C occupancy buildings in Section 606.3.

2. If a building is other than Type 4 construction and is equipped throughout with a fully automatic sprinkler system, the height limitations under 1. above, shall not apply, and in addition the stairways may be partly enclosed.

(2) Egress from Stairways. Not less than one requires exit stairway shall discharge directly to the outside or to an exit corridor leading thereto. The remaining stairways may discharge through a lobby or foyer on the main floor, provided such lobby or foyer is separated from the remainder of the floor. See Section 622.6(2).

SECTION 646.0 - STORAGE GROUP B OCCUPANCIES FOR EXISTING BUILDINGS

Sections

646.1 Partly Enclosed Stairways
646.2 One Fully Enclosed Stairway
646.3 Parking and Storage Garages

Sec. 646.1 Partly Enclosed Stairways.

(1) A storage building three or four stories high if of Type 3 construction, or not over five stories high if of Type 1 or Type 2A construction, may be served by one or more stairways partly enclosed per Section 641.8 in conjunction with one or more exterior screened stairways or fire escapes.

(2) If the building is equipped throughout with an automatic sprinkler system, the requirements under (1) above, either on the height limitation of the building or on the requirements for exterior stairways, shall be waived.

Sec. 646.2 One Fully Enclosed Stairway.

(1) A storage building of any height may be served by one fully enclosed stairway in conjunction with one or more partly enclosed stairways, or one or more exterior screened stairways or fire escapes.

(2) If the building is equipped throughout with an automatic sprinkler system, the requirements for exterior stairways under (1) above shall be waived.

Sec. 646.3 Parking and Storage Garages.

A parking or storage garage, the use of which has not been changed, and the lines of travel of the original stairways which have not been altered, will not be required to provide additional means of egress, if it has not less than one fully enclosed stairway.

SECTION 647.0 - HIGH HAZARD GROUP A OCCUPANCIES FOR EXISTING BUILDINGS

Sections
647.1 Width and Location of Exits
647.2 Enclosure of Stairways
647.3 Exterior Stairways

Sec. 647.1 Width and Location of Exits.

No change shall be required in width of exits when one unit of exit width or more for each 3,000 sq. ft. of the largest floor area served is provided.

The distance to exits may be 100 feet in buildings protected with an automatic sprinkler system and 60 feet in buildings not thus protected.

Sec. 647.2 Enclosure of Stairways.

Stairways not serving as a required means of egress may be partly enclosed per Section 641.8.

Sec. 647.3 Exterior Stairways.

Exterior stairways may be exterior screened stairways or fire escapes.

SECTION 648.0 - ASSEMBLY GROUP F OCCUPANCIES FOR EXISTING BUILDINGS

Sections
648.1 Exit Layout

648.2 Emergency Stairways
648.3 Grandstands, Stadiums, Reviewing Stands, and Other Outdoor Assembly Places.
648.4 Outside Stairways

Sec. 648.1 Exit Layout.

Any layout of exit facilities, including exit widths, seating arrangements, aisles, ramps, and steps, may be accepted by the Director, with the concurrence of the Fire Chief, subject to such modification as in their judgment are essential for safety.

Sec. 648.2 Emergency Stairways.

Emergency stairways may be either fully enclosed interior stairways, smokeproof towers, or exterior screened stairways. Required interior stairway enclosures shall be in accordance with Section 641.8 of this Article.

Sec. 648.3 Grandstands, Stadiums, Reviewing Stands, and Other Outdoor Assembly Places.

Egress stairways and ramps need not be enclosed irrespective of the height of the structure, if the construction is of Type 1 or Type 2 with solid floor or deck.

Sec. 648.4 Outside Stairways.

Outside stairways need not conform with the requirements of Section 612.0 of this Article, except for railings under Section 612.1(5).

SECTION 649.0 - MULTIPLE OCCUPANCIES FOR EXISTING BUILDINGS

Sections
649.1 Multiple Occupancy

Multiple occupancy separations in existing buildings shall be accepted if being constructed of, or having a fire resistance rating equivalent to a double wall of metal lath and plaster. Any layout of exit facilities, including exit widths, may be accepted by the Director with the concurrence of the Fire Chief, subject to such modifications as in their judgment are essential for safety.

SECTION 650.0 - BUILDINGS AFFECTED BY THE TEMPORARY REGULATIONS

Sections
650.1 Applicability

Sec. 650.1 Applicability.

(1) Those buildings for which certificates of occupancy were issued under the authority of Commissioners' Order dated May 28, 1943, E. D. 210583-54 and Commissioners' Order dated November 24, 1943, E. D. 236470-27 known as the "Temporary Regulations" for the war emergency and wherein the certificate of occupancy is desired to be continued, shall meet the following:

1. All buildings, three or more stories in height, shall meet all applicable provisions of Sections 640.0 through 649.0 of this Article.

2. All buildings, two stories in height, having rooming or dwelling units for more than 25 persons above the main floor shall, in addition to a direct, independent second means of egress from each such unit, have a fully or partially enclosed stairway accessible to each rooming or dwelling unit and shall meet the other applicable provisions of Sections 640.0 through 649.0 of this Article pertaining to L-1 occupancies.

3. All buildings, two stories in height, having rooming or dwelling units for not more than 25 persons above the main floor and having a direct, independent second means of egress from each rooming or dwelling unit will not be required to have a fully enclosed stairway, but all other applicable provisions of Sections 640.0 through 649.0 of this Article pertaining to L-1 occupancies shall apply.

SECTION 929.0 - BUILDINGS ALTERED OR CONVERTED

Sections
929.1 Fire-Resistive Doors, Windows, and Shutters
929.2 Openings on Exterior Stairs or Fire Escapes

Sec. 929.1 Fire-Resistive Doors, Windows, and Shutters.

When buildings are altered or converted the requirements for fire-resistive doors, windows, and shutters shall be the same as

for new construction. The Director may allow minor variations where the required degree of fire safety is substantially obtained.

Sec. 929.2 Openings on Exterior Stairs or Fire Escapes.

Where exterior screened stairs or fire-escapes are approved in connection with the alteration or conversion of buildings, the windows and doors opening onto them, or within ten feet under them shall be protected in accordance with the following:

929.21 Double-hung or single-hung windows shall have the upper half of the sash glazed with wired glass, 1/4 inch thick, and shall be properly counterbalanced or shall be permanently fixed

929.22 Casement windows shall be glazed with wired glass 1/4 inch thick.

929.23 Doors shall be covered on the inside with metal not thinner than 26 gage, and if glazed, shall be glazed with 1/4 inch wired glass; jambs and trim may be unprotected on the ground floor.

929.24 Show windows on the ground floor either projecting or in the walls of the building, need not be protected.

SECTION 10008.0 - EXISTING INSTALLATIONS

Sections
1008.1 General Requirements
1008.2 Correction of Deficiencies

Sec. 1008.1 General Requirements

When new equipment is to be connected to an existing masonry chimney which does not have an approved lining in good condition, an approved lining shall be installed. This may consist of Type B gas vent, U.L. approved chimney, or other lining of the type required for the equipment to be connected or may be made of approved stainless steel welded throughout.

Sec. 1008.2 Correction of Deficiencies

Correction of unsafe conditions due to defective chimney, flue, fireplace or incinerator installations shall be required.

Appendix 3
San Francisco, California

SAN FRANCISCO, CALIFORNIA

The following concepts are involved in San Francisco's approach to regulating rehabilitation:

a) Residential Buildings (SFHC)

1. Limiting areas of concern. (Section 105 and 309 SFHC)

2. Providing less strict construction standards, than for new construction, for areas of concern.

3. Providing a legal means for developing and implementing regulations "supplemental to this code and not in conflict therewith." This enables the creation of FIM. (Section 104 (f) SFHC and 204.2 SFBC)

4. Developing a manual (FIM) based upon commonly found conditions so as to provide both equity and uniform enforcement of alternatives and interpretations.

b) Change in Use or Occupancy (SFBC)

The SFBC criteria primarily relate to the degree to which the proposed change may generate additional public hazard (Sections 104.E-3, 502.1(e), SFBC). The SFBC requires changes involving large public assemblies, schools and hospitals to virtually fully meet the present standards. It does not require this for most changes involving commercial or residential usage. These more common changes, as well as all others, are subject to one of three levels of possible building code application, indicated in Table No. 5.1, SFBC. This Table was developed based upon an evaluation of the potential increase or decrease in public safety from fire, panic and other hazards that may result from the proposed change.

These three levels are: (See Table No. 5.1 SFBC footnotes)

Level 'P' - This level requires only that the exits, ventilation, sanitation and fire fighting elements meet the SFBC. Seismic upgrading, per Section 104.F SFBC only applies when the occupant or floor load increases (e.g., a warehouse change to office building, or a garage converted to a heavy manufacturing plant), provided however that no seismic upgrading is required per Section 104.E-3 SFBC unless the change involves more than 30% of the building area. This latter provision was added so as to avoid minor changes causing extensive or costly work on the building.

Level 'PS' - This level requires that specific evaluation of the proposed change be made by the Bureaus of Building Inspection and Fire Prevention so as to determine what other SFBC provisions (other than those required for Level 'P') may be required to adequately protect the public.

"Blank" Space - This level requires that the change must fully meet the present SFBC requirements since the hazard level increase warrants such compliance for public safety.

c) Alterations, Additions and Extensions (SFBC)

1. When substantially the entire interior of the building undergoes change ("gut job"), it is anticipated that there will be sufficient funds involved to warrant invoking seismic upgrading requirements for public safety. (Section 104.C-4, SFBC).

2. When virtually all walls are undergoing change (75% or more) all remaining walls on the floor involved have to be also upgraded. This is also based on the substantial financial involvement. (Section 104.C-3, SFBC).

3. When more than 30% of the building is involved in structural changes, the seismic provisions of Section 104.F, SFBC are invoked. (Section 104.B-3, SFBC).

Following are the pertinent sectionsof the San Francisco Building Code (SFBC) and Housing Code (SFHC).

San Francisco Building Code

Sec. 104.A. Application to Existing Buildings, General. Buildings or structures to which additions, alterations, or repairs are made, or in which the occupancy of all or a portion of the building is to change from that for which a permit has been issued, shall comply with all requirements for new buildings or structures except as specifically provided in Sections 104.A through 104.H and as required in the Housing Code.

→ The term "portion of the building" shall mean the floor or floors that are affected by the change in use.

Notarized certifications describing the extent of all previous substantial alteration work and/or previous changes of occupancy shall be submitted by the owner and the designer of a proposed alteration or change of occupancy when required by the Superintendent. ←

For construction in Fire Zones, see Article 16.

Sec. 104.B. Alteration Work, Structural. In any alteration, repair, installation, or change or reconstruction of any building, the new work and any part of the building which becomes an integral part of, or is directly affected by such work, shall meet the structural requirements of this Code, → for vertical loads.

For the purpose of this section, a floor of a building shall include all the structure supporting a level of the building between the underside of said structure and the underside of the structure supporting the level of the building next above.

The extent of an existing building that is considered as being directly affected by the new work, with regard to structural considerations, shall be determined using the following criteria:

1. When structural alteration work is to be done on a floor or floors of a building or structure, the work on the floor or floors involved shall comply with the structural requirements of this Code. The structure above and below the floor or floors involved shall be im-

proved, if and as required, so that they are not adversely affected by the structural work proposed.

2. When the floor loading is increased on the floor or floors of a building or structure, the floor or floors involved shall meet the structural requirements of this code and all structure below the floor or floors with increased loading shall not be adversely affected.

3. When more than 30%, cumulative since the building was built, of the above grade area of the building or structure are involved in substantial structural alteration work, the entire building or structure shall comply with the structural requirements of Section 104.F. ←

Sec. 104.C. Alteration Work, Architectural. In any alteration, repair, installation, or change in or reconstruction of any building, the new work and any part of the building which becomes an integral part of, or is directly affected by the new work, shall meet the requirements of this Code.

The extent of an existing building that is considered as being directly affected by the new architectural alteration work shall be determined, using the following criteria in addition to the provisions of Section 502.1:

1. All new work added to the building that did not previously exist in the building.

2. All portions of the building that are removed and replaced by new construction.

3. When 75% of the existing interior walls or partitions, as measured by the lineal footage of such interior wall and partition, are removed on a floor or when new interior walls or partitions are added which exceed 75% of the total lineal footage of the combined existing and new interior walls and partitions that would then be in place on a floor, all interior walls and partitions on the floor involved shall comply with this Code.

→ 4. Whenever alteration work involves extensive changes to elements such as walls, partitions, ceilings, etc. in substantially all portions of the structure, the structure as a whole shall comply with Section 104.F. ←

→ Sec. 104.D. Additions to Buildings. 1. Vertical Extensions. Buildings may be extended vertically subject to the following requirements:

a. Building shall be used for the same occupancy classification as originally built or for less hazardous occupancy classification as determined from Table No. 5-1. The occupancy of the vertical extension shall comply with the requirements of this Code.

b. Way of departure facilities for the entire structure shall be of sufficient width for the total occupancy load of the building, including the vertical extension, and shall be computed on the basis of occupant loads as assigned in the code in effect at time of the original building erection.

c. All new construction work involved in the vertical extension shall conform to the requirements of this code.

d. The structure as a whole shall comply with Section 104.F.

e. All stairways in the building serving 3 or more stories shall be enclosed.

f. For height and area limitations see Article 5.

g. The original building and the vertical extension shall comply with the applicable provisions of Article 38.

2. Horizontal Extensions

a. Building may be used for higher life safety exposure, provided the structure as a whole meets the requirements in this code for such occupancy.

b. See Subsection 1 (b).

c. See Subsection 1 (c).

d. When the cumulative area of additions above grade exceeds 30% of the above grade area of the original building and the additions are structurally interconnected to or inadequately separated from the original building, the entire structure shall comply with Section 104.F.

e. See Subsection 1 (e).

f. See Subsection 1 (f).

g. See Subsection 1 (g). ←

→Sec. 104.E. Change of Occupancy. The exit requirements shall pertain solely to the corridors and vertical enclosures of the floor or floors affected by the change in use, which requirements shall also include the vertical enclosure for the floor next above the affected floor or floors. This exit requirement shall not include the corridors and vertical enclosures for the floors below the affected floor or floors or the corridors above the affected floor or floors, except as otherwise stated herein.

1. Where a change in occupancy classification is proposed, the requirements of Table No. 5-1 shall apply.

2. When the change in use involves an increase in the occupant load of the floor or floors affected or when the change involves Occupancies A, B, C, D and E, the exit requirements shall include the vertical enclosures in accordance with Article 33 from the floor or floors in question to the ground at a street or public space. The exit requirements shall include the corridors of the floor or floors affected by the change in use and shall not include the corridors for the floors above or below the affected floor or floors.

3. Whenever the cumulative areas involved in change of occupancy to a greater life safety exposure from that for which the building was originally designed exceed 30% of the original above grade area of the building, the entire building shall be made to comply with Section 104.F.

EXCEPTIONS: 1. When the occupancy change is to a Group A, B Div. 1 or B Div. 2 classification and Group B Div. 3 classification with an occupant load over 300, the entire building shall be made to comply with Section 104.F.

2. When the occupancy change is to a Group C classification the entire building shall be made to comply with the requirements of footnote 1 of Table No. 5.1 as well as with Sec. 104.F. ←

TABLE NO. 5.1

OCCUPANCY CHANGES PERMISSIBLE WITHOUT CONFORMING TO ALL PROVISIONS OF PRESENT CODE

From \ To	OCCUPANCY GROUP																		
	A	B-1	B-2	B-3	C[1]	D-1	D-2	D-3	E-1	E-2	E-3	E-4	F-1[2]	F-2	F-3	G	H	I	J-1
A	P	P	P	P	P		PS	PS					PS	P	PS	PS		PS	P
B-1	PS	P	PS	P	P		PS	PS					PS	P	PS	PS		PS	P
B-2	PS	PS	P	P	P		PS	PS					PS	P		PS		PS	P
B-3				P	P		PS	PS					PS	P		PS		PS	P
C				PS	P	PS	PS	PS					PS	P		PS	PS	PS	P
D-1				PS		P							PS	P		PS	PS	PS	P
D-2				PS	P		P	P					PS	P		PS	PS	PS	P
D-3				PS	P			P					PS	P		PS	PS	P	P
E-1									P	P	P					PS		PS	P
E-2									PS	P	P	P	PS			PS		PS	P
E-3									P	PS	P		PS			PS		PS	P
E-4												P	PS			PS		PS	P
F-1													P	P		PS		PS	P
F-2					PS			PS					PS	P		PS	PS	PS	P
F-3													PS	PS	P	PS			P
G												PS			PS	P			P
H				PS	PS	PS	PS	PS						P		PS	P	P	P
I					PS									PS			PS	I'	P
J-1																			P

LEGEND for Table No. 5.1
P — Occupancy change permitted subject to the requirements of Sections 302.1 and 1706.A, except for ducts, Tables No. 5-C, 5-D, and 5-E, and Article 38.
PS — Occupancy change permitted subject to requirements as set forth by the Superintendent, and the Bureau of Fire Prevention and Public Safety for those occupancies under their jurisdiction.
Where square is blank, change in occupancy requires substantial conformance with all present code provisions.
[1] Shall require conformance with Article 23 for seismic provisions. Same as used by State OAC. [2] Not including service stations and gasoline filling stations.

TABLE NO. 5

OCCUPANCY CLASSIFICATIONS

Group or Class	Division	Description of Occupancy	Article Reference
F	1	Gasoline filling and service stations, factories and workshops using material not highly flammable or combustible, large garment shops. Furniture warehouses and similar not more hazardous warehouses	11
	2	Wholesale and retail stores, office buildings, printing plants, municipal police and fire stations, public assembly with an occupant load of less than 50, small garment shops, paint stores without bulk handling, day care of children	
	3	Public Parking Structures and storage garages Type A—Drive-in Type B—Mechanical parking Type C— →Drive-in or← Mechanical parking—Type 4 construction	
G		Ice plants, power plants, pumping plants, cold storage and creameries. Factories and workshops using incombustible and non-explosive materials. Storage and salesrooms for incombustible and non-explosive materials	12
H		Hotels, motels, and apartment houses; dormitories for more than six persons in aggregate; convents, monasteries and similar buildings containing six or more sleeping rooms	13
I		One and two family dwellings and lodging houses	14
J	1	Private garages. Sheds and minor buildings used as accessories, fences over six feet high, tanks and towers	15
	2	Stables	

Group or Class	Division	Description of Occupancy	Article Reference
A		Any assembly building with a stage and an occupant load of 1000 or more	6
B	1	Any assembly building with a stage and an occupant load of less than 1000	7
	2	Any assembly building without a stage and with occupant load of 1000 or more	
	3	Any assembly building without a stage and with occupant load of less than 1000	
	4	Stadiums, reviewing stands and amusement park structures not included in Group A nor Group B, Division 1, 2, and 3 Occupancies	
C		Any building used for school purposes involving assemblage for instruction, education or recreation	8
D	1	Jails, prisons, reformatories, houses of correction and buildings where personal liberties of inmates are similarly restrained, mental hospitals	9
	2	Nurseries for children under six, kindergartens, orphanages, hospitals, sanitoriums, nursing homes and similar buildings (each accommodating more than 6 persons) with non-ambulatory patients	
	3	Nursing homes for ambulatory patients, homes for children of kindergarten age or over (each accommodating more than 6 persons not including employees)	
E	1	Manufacture, storage and handling of hazardous and highly flammable or explosive gases, liquids and materials other than flammable liquids	10
	2	Storage and handling of flammable liquids	
	3	Shops and factories where loose combustible fibers or dust is manufactured, processed, or generated Warehouses where loose combustible material is stored	
	4	Public repair garages. Heliports. Storage and parking garage for trucks and buses*	

→Sec. 104.F. Lateral Force Design Requirements. The provisions of Sec. 2308 and Sec. 2314.D through .H shall apply to the entire building or structure. It shall be demonstrated that the entire building or structure is capable of resisting these forces and safeguarding the occupants and the public.

Consideration shall be given to all aspects of construction which may affect safety; including but not necessarily limited to the adequacy of connections between structural members, the adequacy of building separation and the security of unreinforced filler walls as well as parapets and appendages.←

Sec. 204.2 Director may adopt Rules and Regulations. The Director of Public Works may adopt and promulgate rules and regulation supplemental to this Code and not in conflict with the intent therewith. → Such rules and regulations shall be generally accepted or approved methods and practices for the public health and welfare and safety of life, subject to re-examination and change if at any time such rules and regulations are found to be not in conformance with the intent or requirements of the Municipal Code.

The Director may administratively authorize the processing of applications involving Housing Code compliance actions initiated by the Department of Public Works, in a manner other than set forth in this Code, so as to effect said compliance most expeditiously; provided however that due process is assured all applicants. In this regard, the Director may reduce the time periods set forth in Sections 301.C.3, 302.D and 302.D.2 as they apply to a second application required by the Director to effect full compliance with the Housing Code if by so doing compliance with the Housing Code would be more expeditiously accomplished.

Sec. 502.1. Minimum Requirements Applicable for Change of Occupancy.

In addition to the requirements of Tables No. 5-D and 5-E, and the specific requirements of the new occupancy as set forth in Articles 6 through 15, where the change of occupancy is permissible under Table No. 5.1, the following requirements shall in all cases be met for the new occupancy in compliance with this Code:

(a) Exit requirements per Article 33 to the public way

(b) Ventilation

(c) Sanitation

(d) Fire extinguishing equipment and protection devices per Article 38.

(e) Lateral force provisions of Section 104.F, if the change of occupancy results in an increased occupant load or floor load.

San Francisco Housing Code

Section 104. Scope.

(f) It is further provided that the Director of Public Works may adopt and promulgate rules and regulations supplemental to this Code and not in conflict therewith, provided they are the most generally accepted or approved methods and practices for public welfare and safety of life and property. Such rules and regulations shall be subject to reexamination and change if at any time such rules and regulations are found by any enforcement agency not to be in conformance with the intent or requirements of the Municipal Code.

SEC. 105. EXISTING BUILDINGS. All buildings erected after July 26, 1958 shall comply either with the codes in effect at the time of construction or the present Building, Electrical, and Plumbing Codes at the discretion of the owner.

All buildings erected prior to July 26, 1958 shall comply with the requirements as set forth in the codes in effect at the time of construction except as otherwise provided herein. The retroactive provisions in Article 3 shall take precedence over any Code provision in effect at the time of construction.

All buildings altered or converted prior to July 26, 1958 which do not conform to the codes in effect at the time of the alteration or conversion and the provisions of this Code shall be reconverted back to the original approved state and brought into compliance with the retroactive requirements applicable to the original structure, or conform to all the applicable requirements outlined in the present codes.

SEC. 801. WAYS OF DEPARTURE. See Articles 1, 13 and 14 of the Building Code.

Way of departure facilities for buildings constructed, altered or converted after July 26, 1958 shall comply with the codes in effect at the time of construction, alteration or conversion, or the provisions of Section 3302.A.1, 3320 and 3320.1 of the Building Code, whichever is the less restrictive, as is applicable to that occupancy.

Way of departure facilities for buildings constructed, altered, or converted prior to July 26, 1958 shall meet the following minimum requirements or the provisions of Sections 3302.A.1, 3320 and 3320.1 of the Building Code, whichever is the less restrictive.

Each of the following buildings, now in existence shall be provided with access for each dwelling unit or guest room to two means of egress which shall be accessible either directly or through a public hallway and shall be so located that if access to one be denied, the other shall be available:

(1) In apartment houses, hotels (and two-family dwellings per Section 3320.1 of the Building Code.).

Where exits are arranged so that one way of departure must be passed to get to the other, intervening doorways between any exit doorway on a dead end corridor more than 20 feet in depth and the main exit corridor shall be provided with a ¾-hour opening protector or a sprinkler head located on the room side of the doorways as well as in the dead end corridor.

(2) Every single family dwelling having more than two floors of occupancy in which there are rental units, shall have not less than two ways of departure from the uppermost stories to a floor of occupancy below which has two ways of departure to the exterior of the building.

SEC. 807. SMOKE BARRIERS. In buildings in which an existing Group H occupancy is located on three or more stories and which does not have a way of departure directly accessible from within each apartment or guest room without entering an exit corridor, every interior public stairway shall be enclosed as set forth in Section 806 of this Code or shall be provided with a smoke barrier and smoke stop door, as hereinafter described, to prevent fire and smoke from spreading, thereby cutting off the way of departure.

An automatic sprinkler system installed in an exit corridor and stairwell and exitway to exterior of building, in accordance with the provisions of Article 38 of the Building Code, will be acceptable in lieu of a smoke barrier.

When a hotel room or apartment opens directly upon the stairway so that the smoke barrier does not afford said room or apartment protection, said hotel room or apartment shall have a one and three-eighths inch solid core wood door, an incombustible surfaced door or other similar approved door construction. Doors shall be equipped with an approved self-closing device.

The smoke barrier and smoke stop door shall be located where directed by the Superintendent and shall be constructed as follows:

(1) In Type 3 and 5 buildings, the smoke barrier may consist of partitions containing wire glass with solid core wood smoke stop doors. The doors shall be not less than one and three-eighths inch thick, three feet wide, and six feet eight inches high equipped with an approved self-closing device. The smoke barrier may be of any approved similar construction except that wood panels and similar combustible materials shall not be permitted.

(2) In other than Type 3 and 5 buildings, the smoke barrier partitions shall be entirely of incombustible construction except for the smoke stop door and the trim and except that wire glass lights in the partition shall be permitted. The smoke stop door may be an unrated, solid-core wood door not less than one and three-eighths inch thick, three feet in width and six feet eight inches in height equipped with an approved self-closing device and may have wire glass lights therein.

SAN FRANCISCO
FIELD INSPECTION MANUAL
FOR EXISTING RESIDENTIAL BUILDINGS

Introduction

This manual is to be used as a guide for inspection of residential buildings built prior to July 26, 1958 in determining whether the building is substandard as defined in Article 4 of the 1975 San Francisco Housing Code. This manual does not pertain to non-residential buildings or occupancies except in the case of a mixed occupancy building, then only as violations affect the residential occupancy.

The retroactive provisions of the Housing Code are to be applied to all buildings whenever built, altered, or inspected. See Section 309 of the Housing Code for the list of retroactive sections.

If a requirement other than those retroactive is neglected on permit work done within the last twenty years, it should be provided only when a most serious hazard would result from its absence. The following shall be used as examples of a most serious hazard, but is not intended to be all inclusive: unsafe or obstructed egress; an excess floor of occupancy exists; substantial structural inadequacy exists caused by sagging or deteriorated structural members, or the absence of lateral supports; lack of light and ventilation, the absence of toilet or bath facilities within the dwelling unit, substantial overloading of electrical service or exposed wiring; lack of sprinkler system where required.

If a building was built or converted before twenty years ago under a permit, but some code requirements were neglected, they must be provided if their absence constitutes a hazard, including those listed above.

If a building was built or altered without a permit, it must meet the Code standards of the day of its construction or alteration as modified herein, and as provided in the retroactive section of the Housing Code.

Appendix 4
Denver, Colorado

DENVER, COLORADO

General Code Requirements

Denver, Colorado operates under a local code based primarily on the 1973 Uniform Building Code which includes the 25-50% Rule, and the general change of use regulation. In December 1976, Denver enacted Chapter 31, "Rehabilitation of Older Buildings," into its code. Cahpter 31 excludes from the 25-50% Rule and

from the change of use regulation all buildings erected before 1950 of the following occupancies:

- assembly less than 300;
- educational and day-care centers;
- business (including retail stores);
- hotels;
- apartments;
- lodging houses; and
- residences.

Reportedly, passage of Chapter 31 came about because of recognition on the part of community and building officials that it would not be economically feasible to rehabilitate older buildings under the 25-50% Rule, or when changing occupancy or increasing intensity of use. Hence, Section 3101 (b) states:

> "It is hereby declared as a matter of public policy, that the rehabilitation, preservation, and restoration of older buildings located within the city is a public necessity, and is required in the general interests of the people."

The chapter further establishes a "Rehabilitation Advisory Panel" of twenty-five (25) persons from the building community. This panel was established to develop guidelines for use by the building official in approving requested deviations from the code for new construction for rehabilitation work. The guidelines identify the clauses of the code for which the building official shall consider deviations, but does not define specific requirements. (See below.)

Provision is made for subpanels consisting of four (4) to eight (8) members of the Rehabilitation Advisory Panel to advise the building official on single applications. The subpanel recommendations are advisory. The building official makes the final decision.

The City of Denver has actually created two paths to code compliance with Chapter 31. It is up to the applicant to determine if the Chapter 31 route is used; otherwise, the 25-50% Rule and

change of use regulation apply. The applicant chooses the Chapter 31 route by submitting a special application form noting the deviations from new code requirements requested.

Operation of the Code

In 1978 Chapter 31 was used about thirty times and is being used at about twice that rate in 1979. The system is reportedly working well. It is being used primarily for buildings which are quite old--late 1800's and early 1900's--and often with a change in use. Apparently, the building official does not always follow the subpanel recommendations.

Chapter 31 creates a dichotomy; that is, the building types covered in Chapter 31 do not have to meet the 25-50% Rule when being rehabilitated, while all other types do. Thus, there is a lack of uniformity in code treatment of the two classes of building. Nevertheless, the concept that public safety, at least in the selected building types, can be secured to a reasonable degree through the use of the "Preliminary Guidelines" is worthy of further consideration. It is clear from a reading of the Preliminary Guidelines that they represent an attempt to set a standard for existing buildings that is less stringent and more flexible than that for new buildings in the categories covered. This concept is illustrated in the following example.

Part (d) of the "Preliminary Guidelines" allows consideration and approval of stairs not meeting the width, rise and run dimensional limits specified for new construction. Code requirements for new buildings demand a minimum 36" exit stair in all circumstances. Using Part (d) 1, it is now possible to approve a stair somewhat narrower, but of sufficient width to still adequately provide for the safe exit of building occupants. Underpinning this approach is the concept that specific non-complying dimensions and attributes of an existing building can be accepted, if as a whole the building provides adequate public safety, while not meeting each new building requirement. It is unclear from this example, however, whether the Denver approach is one of equivalency or one of reduced performance.

The Denver approach is essentially a policy statement showing commitment to rehabilitation, followed by an administrative technique for approving deviations from the code for new construction on a case-by-case basis. It does provide for advice to the building official, but it is the building official who makes the final decision. To that extent, the system operates similarly to those

rehabilitation projects falling in the 25% to 50% range. The guidelines do indicate to the user and building official those areas in which deviations will be considered.

If the deviations granted under Chapter 31 were recorded and catalogued, they might form the basis for a rehabilitation "code" but there is no indication that this is being done.

SECTION 3101. GENERAL.

(a) Scope. This Chapter shall govern the rehabilitation of buildings, structures, and utilities in Group B-3, C,F,H,I and J occupancies which were built prior to January 1, 1950, and shall supersede all the requirements of this Building Code which are in conflict with the provisions of this Chapter.
EXCEPTION: This Chapter shall not supersede the requirements of Chapter 1 relating to unsafe buildings, structures, or utilities.

(b) Declaration. It is hereby declared, as a matter of public policy, that the rehabilitation, preservation, and restoration of older buildings located within the City is a public necessity and is required in the interest of the general welfare of the people. Special consideration shall be given to buildings that are Denver Landmarks or buildings on the National Register of Historic Places and National Historic Districts.
EXCEPTION: Existing buildings, structures, or utilities may be granted an exception allowing the repair, rehabilitation, or change of occupancy of a building where the planned repairs, rehabilitation, or change of occupancy would not comply with the provisions of this Building Code. No exception shall be authorized hereunder unless the Director shall find the following conditions exist:

1. The building was constructed prior to January 1, 1950.
2. The building, structure, or utility is structurally sound and the proposed repair, rehabilitation, or change of occupancy will substantially improve the use, safety, and welfare of the occupants.
   A. The Director, in making this determination, may request an Engineer's or Architect's report to determine the condition of the building, structure, or utility.
3. The proposed repair or rehabilitation of a building, structure, or utility for residential use does not violate the provisions of the Housing Code, Article 631, Revised Municipal Code.
4. The Fire Department concurs in an alternative method, utility, appliance, or system related to fire safety.

SECTION 3102. REHABILITATION ADVISORY PANEL.

(a) Creation. An Advisory Panel of 25 persons, with experience in the rehabilitation of buildings, structures, or utilities shall be appointed by the Mayor. Individual members of City Council may submit names to the Mayor for consideration for appointment to the Advisory Panel. Their term of office shall be as follows:
1. Five persons shall be appointed for a term of 1 year.
2. Five persons shall be appointed for a term of 2 years.

3. Five persons shall be appointed for a term of 3 years.
4. Five persons shall be appointed for a term of 4 years.
5. Five persons shall be appointed for a term of 5 years.

After the initial appointments are made, each appointment shall be made for a 5 year term. The Advisory Panel shall serve without compensation.

(b) Composition of Advisory Panel. The Advisory Panel shall consist of the following:
1. Three members shall be Architects.
2. Three members shall be Engineers.
3. Two members shall be holders of a Class A or B Construction License.
4. Two members shall be holders of a Plumbing Contractor's Class A License; and one member shall be the holder of a Plumbing Journeyman's Certificate.
5. Two members shall be holders of a Heating and Ventilating Contractor's Class A License; and one member shall be the holder of a Heating and Ventilating Journeyman's Certificate.
6. Two members shall be holders of a Steam and Hot Water Contractor's Class A License; and one member shall be the holder of a Steam and Hot Water Journeyman's Certificate.
7. Two members shall be holders of an Electrical Contractor's Class A License; and one member shall be the holder of an Electrical Journeyman's Certificate.
8. The remaining five members of the Advisory Panel shall be appointed from the real estate and financial field.

(c) Vacancy. Should a vacancy occur on the Advisory Panel during a member's term, the Mayor may fill the vacancy for the unexpired term. Any member of the Advisory Panel, after serving a complete term, may be reappointed to another full term.

(d) Guidelines. The Advisory Panel shall adopt guidelines for use by the Director in determining compliance with this Chapter.

(e) The Advisory Panel may adopt rules, procedures, and organization.

SECTION 3103. COMPLIANCE. The Director, in determining compliance with the conditions set forth in this Chapter, may or shall, upon request of the applicant, establish a Sub-Panel consisting of 4 to 8 members of the Advisory Panel; a member of the Department of Health and Hospitals; and the Fire Department.

SECTION 3104. CONSIDERATION. The requirements of this Building Code shall be met in the rehabilitation of all buildings, structures, and utilities; but consideration for an exception may be given to existing buildings, structures, and utilities deemed safe and useable by the Department.

PRELIMINARY GUIDELINES FOR USE BY THE DIRECTOR

The preliminary guidelines are established in order to direct committees attention to areas of special concern. The panel directs committees appointed hereunder to consider all areas and to report any required revisions in these guidelines. It is the intent of the panel to review

the preliminary guidelines and revise them within 60 days.

Guidelines for use by the Director and the Advisory Panel in determining compliance with Chapter 31 of the Denver Building Code are herein itemized. In considering the following items it must be kept in mind that the building, structure or utility must be structurally sound and the proposed repair, rehabilitation, or change of occupancy must substantially improve the use, safety and welfare of the occupants.

(a) Fire Protection Systems. (Chapter 38)

1. Standpipes, Pumps and Connections.

   A. The use of existing fire protection appliances, when approved by the Department and Fire Department to determine that they are serviceable.

   B. The distance to standpipes not meeting the precise locations of Chapter 38.

2. Fire Detection and Fire Alarm Systems.

   A. Partial fire detection systems and manual fire alarm and central stations.

   B. Smoke detection systems in lieu of other requirements.

3. Openings.

   A. Window openings (size, number and location)

   B. Vertical openings (stairways, escalator opening, elevator shafts).

4. Pressures. Requirements for pressure standards.

(b) Heating, Cooling and Venting Systems. (Chapter 37, 31, 32, and 38).

1. Access to cleanouts in crawl spaces. Chapter 37.

2. Depth of cleanout wells in chimneys of less than 12 inches. Chapter 37.

3. Clearances for chimneys and vents. Chapter 57.

4. Utilization of existing duct systems which do not provide conforming weights and gauge. Chapter 52.

5. Existing systems that do not meet the clearance requirements. Chapter 52.

6. Outside air intakes. Chapter 52.

7. Steam, hot water and process piping do not meet the requirements of Chapter 58 and when no safety hazard is apparent.

(c) Electrical. (Chapter 53)

1. Required wiring method when it serves only outlets and equipment for which it was originally designed.

2. Grounding and bonding when it meets the minimum standards for personnel protection, fire safety and is compatible with occupancy and the environment it serves.

3. Knob and tube wiring and ungrounded non-metallic cable wiring.

4. Panels in boiler rooms or heating rooms.

(d) Stairs, Exits and Occupant Loads. (Chapter 33)

1. Stairs and exits not meeting the specific minimum requirements of Chapter 33 (width, rise and run).

2. Stairs and exits not meeting the specific number and precise location requirements of Chapter 33 (distance between, occupancy loan, etc).

3. Reduced floor loading. Chapter 23

4. Secondary exits not in complete compliance with Chapter 33.

7. Rise more than, and run less than that required in Chapter 33.

8. Distances between landings (vertical) more than required

in Chapter 33.

9. Ramps with width less than those required in Chapter 33.

   EXCEPTION: Contemplation of wheel chair use.

10. Open stairs.

(e) Plumbing. (Chapter 50)

1. Use of existing operating leadwork, trap and venting systems or replacement and duplication of old system with new materials.

2. Variance in use of, support of, cleanout requirements, sizing, venting and methods of connection of serviceable drain piping regardless of material or installation method. Alternate methods of testing where impractical to pressure test.

3. Variance in types, sizes and materials of water piping, method of connection, location, frost line depth and requirements for individual control valves.

4. Variance in practices, materials, or installation of plumbing where alteration would require unnecessary, difficult, or impractical changes in plumbing, piping or connection to conform to plumbing code.

Appendix 5
State of Massachusetts

Code Provisions

Prior to June 1, 1979, Massachusetts had a mandatory State building code based upon the BOCA Basic Building Code which incorporated the 25-50% Rule. On June 1, 1979, a new section of the State code became effective. It is labeled Article 22, and is entitled "Repair, Alteration, Addition and Change of Use of Existing Buildings," replacing the 25-50% Rule and the change of occupancy regulation. A copy of Article 22 and Appendix T, Reference Data, are reproduced below.

Article 22 is based on the Rehabilitation philosophy that anything can be done to an existing building that increases or does not reduce the performance of the building as it exists with the provision that certain minimum standards must be met with regard to structural adequacy, and number and capacity of exits.

Article 22 discards completely any reliance on the value of the building or the work to be done. Instead, the requirements are based on ranking the various occupancy classifications in order of increasing hazard. Briefly, three levels of compliance are specified as a function of the hazard classification:

- If a building is rehabilitated (altered or repaired) with no change in use or with a change in use to an equal or lower hazard, regardless of the amount of work to be performed, if the work does not adversely affect the performance of the building, it may be accomplished with materials equivalent to those already in place. New systems should conform to the code for new construction "to the fullest extent practical," while encouraging the acceptance of equivalent alternatives. With a change in use to an equal or lower hazard, specific requirements for exit lighting, signs, alarms, and a smoke-proof but unrated stair enclousure must be complied with.

- If the use is to be changed a single step in the more hazardous direction, the entire building must meet the requirements of the code for new construction, with eight specified exceptions in the fire safety and structural areas. Equivalent compliance alternatives are encourgaged.

- If the use is changed two or more steps in the more hazardous direction, the building must be made to comply in all respects with the code requirements for new construction but still explicitly encouraging equivalent compliance alternatives.

Ordinary repairs (as defined in the Massachusetts code) are exempted from Article 22.

Operation of the Code

A set of guidelines (Appendix T) has been published to aid building departments and applicants in the use of Article 22.

The single number hazard index for ranking occupancies, as adopted in Article 22, has been criticized by some building officials and by the model code groups. It is stated that the rankings do not account for all hazards and risks, and could lead to increased hazard without rising on the hazard index.

Article 22 is an extremely interesting and innovative approach to the problem of regulating existing buildings. Since it has only been in use a short period of time, no definitive conclusions can yet be drawn on the effectiveness of this approach.

Article 22

REPAIR, ALTERATION, ADDITION, AND CHANGE OF USE OF EXISTING BUILDINGS

SECTION 2200.0 SCOPE

2200.1 General: The intent of these provisions is to provide for the public safety, health and general welfare by permitting repair or alteration of, additions to, and change of use of, existing buildings and structures or parts thereof without requiring the existing building or structure to comply with all of the requirements of this code for new construction except where otherwise specified in this article. This article is not intended to prevent conformance with the requirements of this code for new construction.

Note: Specialized codes, rules, regulations and laws pertaining to repair, alteration, addition or change of use of existing structures promulgated by the various authorized agencies may impact upon the provisions of this article. Specialized state codes, rules, regulations, and laws include, but are not limited to, those listed in Appendix P.

SECTION 2201.0 DEFINITIONS

2201.1 General: Definitions shall be construed as being the same as defined in Article 2 except as follows.

Building system: Any mechanical, electrical, structural, egress, or fire protection system.

Existing building or structure: Any completed building or structure.

Hazard index: The rating of a use group for relative hazard as listed in Table 2203.

SECTION 2202.0 APPLICATION

2202.1 General: Where there are not specific provisions in this article applying to the repair, alteration of, additions to, and changes of use of any existing building or structure or part thereof, then such building or part thereof shall be made to comply with the pertinent provisions of this code for new buildings or structures. The provisions of this article shall apply to existing buildings and structures which have been occupied and/or used for a period of at least two (2) years.

For any proposed work covered by this article, the building owner shall cause the existing structure to be investigated and evaluated. The investigation shall provide sufficient information to satisfactorily determine the performance level of the existing structure with the proposed work incorporated.

2202.2 Repair or alteration: The repair or alteration of existing buildings and structures shall comply with the requirements of this article, except for ordinary repairs as provided for in Section 102.0.

2202.3 Additions to existing buildings: Additions to existing buildings and structures shall comply with the requirements of Section 2203.4.

2202.4 Change in existing use

2202.4.1 Continuation of existing use: The legal use and occupancy of any building or structure may be continued without change, except as may be specifically covered in Sections 405.1 and 405.2 of this code, or as may be deemed necessary by the building official for the general safety and welfare of the occupants and the public.

2202.4.2 Change in use: A change shall not be made in the use group of any building which would place the building in a different use group unless such building is made to comply with the requirements of this article.

2202.4.3 Part change in use: If a portion of the building is changed to a new use group, and that portion is separated from the remainder of the building with the required vertical and horizontal fire separation as-

semblies complying with the fire grading in Table 902, or with approved compliance alternatives, then the portion changed shall be made to conform to the requirements of this article.

If a portion of the building is changed to a new use group, and that portion is not separated from the remainder of the building with the required vertical and horizontal fire separation assemblies complying with the fire grading in Table 902 or with approved compliance alternatives, then the provisions of this article applying to each use shall apply to the entire building; and if there are conflicting provisions, the requirements securing the greater public safety shall apply.

2202.5 Historic buildings: Historic buildings shall meet the applicable provisions of Article 4 of this code.

2202.6 Reference standards: The building official may use Appendix T when determining compliance with this article.

2202.7 Permit application: In addition to the requirements specified in Article 1, the application for a building permit shall include items of non or partial compliance with the requirements of this article, and compliance alternatives, if any are proposed, for approval by the building official. The building official shall respond to the acceptability of any proposed compliance alternatives within thirty (30) days of the filing of the building permit application.

2202.8 Documentation: Whenever action is taken on any building permit application to repair, make alterations, or change the use or occupancy of an existing structure, and when said application proposes the use of compliance alternatives, the building official shall insure that one (1) copy of the proposed compliance alternatives, including applicable plans, test data or other data required for evaluation, be submitted to the Commission, along with a copy of the building permit application and the building official's decision regarding the proposed compliance alternatives.

SECTION 2203.0 REQUIREMENTS

2203.1 Buildings exceeding code requirements for new construction: Existing buildings and structures which, in part or as a whole, exceed the requirements of this code, may, in the course of compliance with this article, reduce or remove in part or total, features not required by this code for new construction, provided, however, that such features were not a condition of prior approval.

2203.2 Buildings not meeting code requirements for new construction: Provided their present degree of compliance to the code is not reduced, existing buildings and structures which, in part or as a whole, do not meet the requirements of this code for new construction may be altered

or repaired without further compliance to the code by utilizing the provisions of this article.

2203.3 Compliance alternatives: Where compliance with the provisions of this code for new construction, required by this article, is impractical because of construction difficulties, acceptable compliance alternatives may be used. Appendix T contains some acceptable compliance alternatives. The building official may accept compliance alternatives other than those listed in Appendix T.

2203.3.1 File: In accordance with Section 2202.8, the building official shall provide the Commission with information regarding compliance alternatives accepted or rejected by him. It is the intent of the Commission to amend those acceptable compliance alternatives listed in Appendix T.

2203.4 Additions: Additions to an existing building shall comply with all code requirements for new construction. The combined height and area of the existing building and new addition shall not exceed that permitted by this code for new construction. Where a fire wall complying with Section 907.0 is provided, the addition may be considered as a separate building. However, the existing building shall comply with Sections 2203.1 and 2203.2.

The addition shall not impose loads either vertical or horizontal which would cause the existing building to be subjected to stresses exceeding those permitted by this code for new construction.

2203.5 Increase in floor load: Any proposed increase in floor loading shall be investigated to determine the adequacy of the existing floor system to support the increased loads. If the existing floor system is found to be inadequate, it shall be modified to support the increased loads or the proposed allowable floor loading shall be reduced and posted.

2203.6 Hazardous conditions: The conditions or defects described in Sections 2203.6.1 through 2203.6.3 below shall be deemed to be hazardous and shall be corrected. This section shall not be construed to limit the authority of the building official under Section 123.0.

2203.6.1 Structural: Any building or structure or portion thereof which is in imminent danger of collapse because of, but not limited, to the following factors:

1. dilapidation, deterioration, or decay;
2. faulty design and/or construction;
3. the removal, movement or instability of any portion of the ground necessary for the purpose of supporting such building; and
4. the deterioration, decay or inadequacy of the foundation.

2203.6.2 Number of exits: Less than two (2) approved independent exitways serving every story, except in one- and two-family dwellings and as modified in Sections 417.0 and 418.0 and 609.3.

2203.6.3 Capacity of exits: Any required door, aisle, passageway, stairway or other required means of egress which is not of sufficient width to comply with Section 608 and is not so arranged as to provide safe and adequate means of egress.

2203.7 No change in use

2203.7.1 Minor alterations and repairs: Alterations or repairs which do not adversely affect the performance of the building may be made with the same or like materials.

2203.7.2 New systems: When the proposed alteration does not involve a change in use group then further compliance with the requirements of the code for new construction is not required, except that any new building systems shall conform to the code for new construction to the fullest extent physically practical in accordance with Section 2203.3 of this article.

2203.7.3 Increase in occupancy load: If an increase of greater than fifteen (15) per cent in the occupancy load is involved, the building shall comply with this code for new construction with regard to egress requirements. Existing exitway facilities may be used in contributing to the total calculated egress requirements.

2203.7.4 Increase in number of dwelling units: If the number of dwelling units in buildings of use group R (residential) is increased, the building shall comply with Sections 2203.8.1.1 through 2203.8.1.5 inclusive.

2203.7.5 Places of assembly: Provisions herein contained shall not prohibit the alteration of a building heretofore occupied as a place of public assembly for such continued use provided the seats, aisles, passageways, balconies, stages, appurtenant rooms and all special permanent equipment comply with the requirements of Sections 417.0 and 418.0.

2203.8 Change in use group: Any change in use to use group I (Institutional) shall comply with the requirements of this code for new construction. For all other changes in use, the building official shall first determine whether the alteration results in a lesser, equal, or greater hazard in accordance with Table 2203. Change in use group shall be evaluated relative to the last known legal occupancy of the building.

2203.8.1 Equal or lesser hazard: When the proposed use is of equal or lesser hazard, further compliance with the code for new construction is not required except as specified herein. Alterations or repairs to an existing building or structure which do not adversely affect the performance of the building may be made with like materials. Any proposed change to the existing building or change in type of contents of the existing building shall not increase the fire hazard to adjacent buildings or structures. If the fire hazard to adjacent buildings or structures is increased, then the requirements of Table 214 for exterior walls shall apply.

2203.8.1.1 New systems: Any new building system shall conform to this code for new construction to the fullest extent practical in accordance with Section 2203.3 of this article.

2203.8.1.2 Exit signs and lights: Exit signs and lights shall be provided in accordance with Section 623.0.

2203.8.1.3 Means of egress lighting: Means of egress lighting shall be provided in accordance with Section 624.0.

2203.8.1.4 Fire alarm systems: Fire alarm systems shall be provided in accordance with Sections 1216.0 and 1217.0.

2203.8.1.5 Enclosure stairways: Open stairways shall be enclosed except as otherwise permitted by Article 6. For the purpose of this section only, there shall not be a minimum fireresistance rating for the enclosure. All doors in the enclosure shall be self-closing.

2203.8.1.6 Places of assembly: All buildings of use group A (assembly) shall comply with Sections 417.0 and 418.0.

2203.8.2 Greater hazard

2203.8.2.1 Increase in one hazard index number: When the proposed change in use results in a use group one (1) hazard index number higher than its present use group as defined in Table 2203, the entire building must meet the requirements of the code for new construction with the following exceptions.

a. Compliance is required with Sections 213.0 and Table 902 except that floors providing horizontal separation in buildings of Types 3 and 4 construction equipped with a fire suppression system shall have a fireresistance rating of not less than one (1) hour.
b. Further compliance is not required with Section 302.2.
c. Further compliance is not required with Sections 305.2 and 305.3, e.g. a change in use is allowed in an existing structure even if it exceeds the area and height limits of Table 305.
d. Further compliance is not required with Section 315.1.
e. Compliance is required with Section 616.0 except that existing exitway stairways may be used as part of the required egress for the new use, provided that the width is of sufficient capacity for the occupancy load, they are structurally sound, and that the enclosures in buildings of Types 3 and 4 construction shall have a fireresistance rating of not less than one (1) hour. Enclosures in buildings of Type 1 and 2 construction shall have a fireresistance rating of not less than two (2) hours. Where stair exitway doors are doors to an apartment or office, they need not swing onto the landing.
f. For earthquake resistance and liquefaction, further compliance to Sections 718.0 and 723.0 is not required. Structural alterations may be made to existing buildings and other structures, but the resistance to lateral forces shall not be less than that before such altera-

tions were made, unless the building or structure as altered meets the requirements of this code for earthquake loads.

g. Further compliance is not required with Section 815.0.

h. Further compliance is not required with Sections 868.0 and 907.0. The height above the roof of existing fire, party and exterior walls need not comply with these sections.

2203.8.2.2 *Increase of two or more hazard index numbers:* When the proposed change in use results in a use group two (2) or more hazard index numbers higher than its present use group as defined in Table 2203, the entire building must meet the requirements of this code for new construction.

Table 2203
HAZARD INDEX

Scale: 1-8 (1 is lowest, 8 is highest hazard)

Use group*	Description	Index no.
A-1-A	Theatre with stage	6
A-1-B	Theatre without stage	5
A-2	Night club	7
A-3	Restaurant	5
	Lecture halls, recreation centers, museums, libraries, similar assembly buildings	4
A-4	Churches and schools	4
B	Business	2
F	Factory and industrial	3
H	High hazard	8
I-1	Institutional restrained	5
I-2	Institutional incapacitated	4
M	Mercantile	3
R-1	Hotels, motels	2
R-2	Multi-family	2
R-3	1 and 2 family	2
S-1	Storage, moderate hazard	3
S-2	Storage, low hazard	1

*See Sections 203.0 thru 212.0 and Appendix T.

SECTION 2204.0 OTHER CODE SECTIONS PERTAINING TO EXISTING STRUCTURES

2204.1 **General:** The following is a list of some additional code sections which may pertain to repair, alteration, addition, or change of use of existing structures.

101.1 Applicability
102.0 Ordinary repairs
103.0 Installation of service equipment
104.0 Maintenance
105.0 Change in existing use
106.0 Alterations and repairs

108.5.1	Duties and powers of the building official and state inspector, inspection and certification, specified use groups
111.1	Preliminary inspection
111.5	Inspection, existing buildings
116.0	Demolition of structures
117.0	Moved structures
119.2	Certificate of use and occupancy, buildings or structures hereafter altered
120.0	Posting structures
121.0	Violations
123.0	Unsafe structures
124.0	Emergency measures
302.0	Restrictions within the fire limits
309.0	Street encroachments
403.0	Fire prevention code
405.0	Existing buildings
417.2.2	Places of public assembly, superimposed theatres
417.2.3	Places of public assembly, frame construction
424.2	Group residence, existing buildings
435.2	Summer camps for children, new and existing occupancies
436.0	Historic buildings
505.0	Existing buildings (light, ventilation and sound transmission control)
600.1	Means of egress, scope
600.2	Modification of exitway requirements
605.0	Maintenance of exitways
621.0	Fire escapes
705.0	Structural and foundation loads and stresses, existing buildings
716.6.7	Earthquake loads, minor alterations
804.4	Heretofore approved materials
924.6	Exterior trim restrictions, existing combustible construction
926.2	Roof coverings, existing roofs
1005.0	Chimneys, flues, and vent pipes, existing buildings
1103.0	Mechanical equipment and systems, existing buildings
1200.3	Fire protection systems, maintenance
1200.8	Fire protection systems, periodic inspections and tests
1201.1	Fire protection systems, plans and specifications required
1201.2	Fire protection systems, plans and specifications approved by other agencies
1212.7	Standpipes for buildings under demolition
Article 13	Precautions during building operations
1403.0	Unsafe and unlawful signs, notices
1404.0	Existing signs
1405.0	Signs, maintenance and inspection
2001.3	Energy conservation, existing buildings
2001.4	Energy conservation, exempt buildings

2002.0 Energy conservation, existing buildings
2015.0 Lighting power limits for existing buildings
2100.2.4 Building code provisions for one and two-family dwellings, alterations to existing buildings

APPENDIX T

REFERENCE DATA FOR REPAIR, ALTERATION, ADDITION AND CHANGE OF USE OF EXISTING BUILDINGS

PART ONE—GUIDELINES FOR APPLICATION

T-101.0 Purpose

T-101.1 Intent of Article 22: The purpose of this guideline is to provide guidance to users of the Massachusetts State Building Code as to techniques of acceptable practice which can be used to assess the acceptability of various methods of meeting the intent of the code provisions of Article 22 on a case-by-case basis. The purpose of the code provisions in Article 22 and this guideline is to allow repair, alteration, addition and change of use of existing buildings without requiring the entire building to be brought up to new construction requirements, while still providing for the public health, safety and general welfare. The provisions of Article 22 and this guideline recognize that the provisions of the Massachusetts State Building Code for new construction reflect the latest improvements in materials, construction techniques, standards of living and safety and therefore may preclude the repair, alteration, addition, or change of use of existing buildings that have demonstrated their usefulness and safety.

T-102.0 Scope

T-102.1 Techniques: This guideline is intended to demonstrate techniques of analysis and compliance with Article 22 of the Massachusetts State Building Code in the repair, alteration, addition, and change of use of existing buildings.

T-103.0 Statement of concept

T-103.1 General Conditions: Conceptually, it is the intent of Article 22 and these guidelines to allow repair, alteration, addition, or change of use of existing buildings without meeting all new construction requirements under the following general conditions:

1. all hazardous conditions must be corrected;
2. the existing building becomes the minimum performance standard; and
3. the degree of compliance of the building after changes must not be below that existing before the changes, except that nothing in this section will require compliance with requirements more stringent than that required for new construction.

T-104.0 Implementation

T-104.1 Framework: Implementation of the above concept requires that a framework be established for evaluating the condition of the building; deter-

mining the potential for modification; and establishing the acceptability of proposed changes.

T-104.2 Evaluation of existing building: Evaluation of existing conditions in a structure is required to determine the existence of any hazardous conditions, which must be corrected; and to provide a basis for evaluating the impact of the proposed changes on the performance of the building.

The following list of evaluation tools described in Sections T-104.2.1 through T104.2.7 of this appendix can be used for determining the condition of the structure. However, this list is not necessarily complete and the use of other methods should not be precluded.

T-104.2.1 Available documentation of existing building: Prime sources of design information for existing buildings are the architectural and engineering drawings and specifications used in the construction of the building. Although the passing of time often obscures the identities of depositaries of such documents, the following are likely prospects in attempting to locate such information.

1. If the building is currently in use, an individual or office responsible for its management may have retained drawings and specifications to facilitate maintenance. A building manager, resident engineer, superintendent, custodian, stationary engineer or plant engineer may be the most direct contact at the building site.
2. Other potential sources (especially if the building is not in use) include the original designer-architect or engineer.
3. The building department which issued the permit for construction may have documentation.
4. Documentation may have been retained by the general contractor or numerous subcontractors. This presents the possibilities of the mason, carpenter, plumber, electrician, HVAC installer, steel erector, etc., as well as manufacturers of component parts.
5. In the case of large corporations or government agencies, a separate contracting officer may have developed a technical file on the erection of a building.
6. In some cases, individual consultants are contracted to serve as "clerk-of-the-works" and pursue the inspection of a building project from start to finish with the keeping of a file likely.
7. Insurance companies sometimes maintain drawings or records of their insured buildings.
8. Historical or archaeological societies may have considered a building to be important enough to develop a file of documentation.

T-104.2.2 Field surveys: Having drawn upon available documentation to help evaluate a building's condition, such documentation may be augmented by on-site data acquired through field survey. The most obvious approach is to make use of detailed visual examination to confirm and/or alter any previously available information pertaining to the building.

T-104.2.3 Testing: Testing is a tool that may be used in evaluating the condition of a building or structure or parts thereof when other methods of evaluation will not suffice. Testing may be initiated voluntarily on the part of the permit applicant or may be required by the building official in the absence of approved rules as indicated in Section 800.6 of the code. This section points

out that ". . . the building official shall make or cause to be made the necessary tests and investigations, or he shall accept duly authenticated reports from recognized authoritative sources." The costs of all such tests are to be borne by the permit applicant and should therefore be required by the building official *only when other methods of evaluation prove inadequate or insufficient.* Such testing should be conducted by an approved testing agency under the supervision of a registered architect or engineer. The report of the tests shall be submitted to the building official and shall include the details of test procedures, references to any accepted test standards used, the results of the tests and any conclusions drawn from the test results.

T-104.2.4 Field tests: Both non-destructive and destructive test procedures can be applied to evaluate the condition of a building.

T-104.2.5 Non-destructive testing: This includes techniques where the structural integrity of the building is not affected, such as the following:

1. analyzing various portions of the building to determine dimensions, types and condition of materials, etc.;
2. portable apparatus for impact testing;
3. load application short of failure to determine capacity of materials and components;
4. magnetic methods for detecting flaws in ferrous metals;
5. proximity magnetometers (locating rebars in concrete, concealed ferrous fasteners, etc.);
6. electronic means for measuring the sonic modulus of elasticity of concrete and masonry in assessing its soundness;
7. ultrasonic transmission or reflective methods in detecting flaws in various materials; and
8. x-ray or infrared-ray photographic techniques used to evaluate portions of elements whose integrity is questionable.

T-104.2.6 Destructive testing: In destructive testing a sample of the building could be removed and tested (e.g., concrete core), or components of the building could be reconstructed and tested in the laboratory.

T-104.2.7 Laboratory analysis: In some cases, tests can be performed in the laboratory. Such tests might include the following:

1. chemical or metallurgical tests;
2. optical or electronic microscopic examination which can help identify and evaluate the soundness of materials where decay or other molecular degradation is involved;
3. conventional laboratory tests for determining physical properties (strength, ductility, absorption, solubility, permeability, strength, stiffness, etc.); and/or
4. testing of a scale model of the building (computer model, wind tunnel model, etc.).

T-104.3 Evaluation of change in performance level: It is necessary to determine if the level of performance of the building after alteration is below that which existed before the change. The hazard level could be increased for certain attributes (such as fire safety) while decreased for other attributes (such as floor loads) for a given alteration. The evaluation of the change in hazard

levels of each attribute can be accomplished using various tools singly or in combination as described below in Sections 104.3.1 through 104.3.5.

T-104.3.1 Data on archaic systems: Performance data on architectural and structural systems being encountered in existing buildings in the Commonwealth are tabulated in part four of this appendix. This data can be compared to the proposed altered systems to determine if the performance is being adversely affected.

T-104.3.2 Compliance alternatives: Alternate solutions tabulated in part two of this appendix were developed from appeal data and from accepted practice. The list is not all-inclusive and should not preclude consideration of other alternatives.

T-104.3.3 Analysis methods: Analytical methods based on good engineering practice may be used to determine changes in performance levels.

T-104.3.4 Test methods: Test procedures as discussed in Sections T-104.2.3 through T-104.2.6 of this appendix can be used to evaluate the performance of existing construction.

T-104.3.5 Professional judgment: Professional judgment based on previous experience with similar buildings should be used to the fullest extent possible.

PART TWO—SUGGESTED COMPLIANCE ALTERNATIVES

T-201.0 Purpose and scope

T-201.1 Purpose: The purpose of this reference is to assist the building official and those regulated by this code in judging the acceptability of compliance alternatives to specific code provisions required by the code.

T-201.2 Application: This reference contains generally acceptable compliance alternatives and examples. The examples are solely for the purpose of illustrating principles which can be applied to the solution of code compliance problems and are not necessarily acceptable under all circumstances. It is recognized that all building systems interact with each other. Therefore, any consideration of compliance alternatives must take into account all existing and proposed conditions to determine their acceptability. The principles applied can be used for the solution of similar compliance problems in other buildings and occupancy groups. Commentaries are provided where the philosophy in establishing the alternatives is not obvious. The examples were developed from appeal data and accepted practice. They are not all-inclusive and should not preclude consideration of other alternatives.

Note: It is anticipated that additional compliance alternatives will be added to this reference through the mechanism of appeal decisions and from results of research being conducted by various organizations in the field of relative performance of life safety systems.

T-202.0 Compliance alternatives for egress requirements

T-202.1 Number of exits

T-202.1.1 General compliance alternatives

1. Provide connecting fire balconies.
2. Provide alternate egress facilities (windows, etc.).
3. Provide a fire escape.
4. Provide fire rated areas of refuge.

T-202.1.2 Examples: Example 1 involves a five-story "row house" of occupancy group B without a fire suppression system and with only one means of egress.

Solution A. Add one or more fire escapes as may be necessary to provide all tenants with reasonable access to two means of egress in separate directions. Access to a street, public way or area of refuge shall be provided at the termination of the fire escape.

Solution B. Add connecting fire balconies across fire walls if the above solution is impractical due to construction difficulties.

Example 2 involves a building of group R-2 occupancy with an apartment in the basement. There is only one means of egress from the basement.

Solution A. Provide egress windows in each apartment that comply with Section 609.4.

T-202.2 Travel distance

T-202.2.1 General compliance alternatives

1. Add detection system.
2. Add a partial fire suppression system.
3. Add smoke doors.
4. Increase fireresistance rating of corridor walls and doors.

T-202.2.2 Examples: This example involves a four-story building of occupancy group R-2 without a fire suppression system. The length of exitway access travel is 150 feet.

Solution A. Add a partial fire suppression system off the domestic water supply (if adequate) in the exit access corridor.

Solution B. Subdivide corridor into segments less than 100 feet with smoke doors.

Solution C. If not required by other sections of the code, install smoke and fire detectors with audible alarms in the corridor.

Solution D. Increase the fireresistance rating of the exit access corridor from one hour to two hours and provide 1¼ hour "B" label self-closing or automatic closing fire doors in all openings into the corridor.

T-202.3 Enclosure of exitways

T-202.3.1 General compliance alternatives

1. Improve enclosure of exitway.
2. Add a partial fire suppression system.
3. Add a detection system.

T-202.3.2 Examples: This example involves a four-story row building of occupancy group R-2 with connecting fire balconies and an interior stair. The stair is enclosed with wood lath and plaster on wood stud partitions and panel doors.

Solution A. Cover partitions on the apartment side with ⅝" Type X gypsum wallboard or its equivalent. Replace or build up panel doors until minimum solid portion is 1¾" and install self-closers.

Solution B. Provide a heat and smoke detection system in the stairwell with an alarm audible to all tenants. Provide self-closers on all stairwell doors.

Solution C. Provide a partial fire suppression system in the stairwell off the domestic water supply (if adequate). Provide self-closers on all stairwell doors.

T-202.3.3 Commentary: The above example, while pertaining to a four-story group R-2 building, can also be applied to other buildings of various height and occupancies. The principle that the degree of compliance may not be reduced should be remembered. If the existing enclosure is of fireresistive construction, it must be maintained. The primary principle to remember, in the required enclosure of exitway, is that an enclosure must be provided, whether fireresistive or not, so as to provide a smoke barrier. The purpose of providing a smoke barrier is to prevent the passage of smoke from a fire on one floor to the exitways and exit access corridors of other floors and thus rendering them unusuable for egress. This principle is illustrated by solutions A, B, and C in the above example.

T-203.0 Compliance alternatives for fire hazards

T-203.1 Fire separations and partitions

T-203.1.1 General compliance alternatives

1. Improve fire separation.
2. Add a fire suppression system.
3. Add a detection system.

T-203.1.2 Examples: Example 1 involves a three-story, Type 3A building, of occupancy group M on the first floor and occupancy group B on the second and third floors. The required separation is three hours.

Solution A. Add a fire suppression system to the first and second floors.

Solution B. Add ⅝" Type X gypsum wallboard or its equivalent to the underside of the second floor and install a system of smoke and heat detectors with audible alarms on the first and second floors.

Example 2 involves the separation between two tenants of wood lath and plaster on a wood studs partition. The required separation is one hour.

Solution A. Add ⅝" Type X gypsum wallboard or its equivalent to either side of the existing partition.

Example 3 involves a building of occupancy B with unrated exit access corridors.

Solution A. Install a partial fire suppression system in the exit access corridors.

Solution B. Add ⅝" Type X gypsum wallboard or its equivalent to either side of the corridor partition and install self-closers on all corridor doors.

Solution C. Install a smoke and heat detection system in the corridor with an alarm audible to all tenants on the floor and install self-closers on all corridor doors.

T203.2 Openings and exterior wall protection

T-203.2.1 General compliance alternatives

1. Add fire suppression system.
2. Improve fireresistance.
3. Remove or improve openings.

T-203.2.2 Examples: Example 1 involves a two-story Type 4B building, of occupancy M on the first floor with the basement and upper floors used for storage. The distance between the building and the side lot line is five feet and between it and the adjacent building is ten feet. The adjacent building is of Type 4B construction and of occupancy group R-2. The former occupant was a grocery store; the new occupant is a hardware store.

Solution A. Install a deluge sprinkler system along the interior side of the wall affected.

Solution B. Add ⅝" Type X gypsum wallboard to interior side of the wall affected.

Example 2 is the same as example 1 but with doublehung wood windows in affected wall.

Solution A. Remove windows and close opening with one-hour fire-resistive construction.

Solution B. Remove windows and install fire windows.

Solution C. Install a deluge sprinkler system as in solution A to example 1.

PART THREE—DETAILED CLASSIFICATION OF OCCUPANCY BY HAZARD INDEX NUMBER AND USE GROUP

This part provides a more detailed guide for users of the code to determine hazard index numbers and use groups for various types of occupancies. It supplements Article 2 and Table 2203 contained in Article 22.

Table T-1
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Advertising displays manufacture including billboards	3	S-1
Airport or other aircraft landing or service facility (see also: Helicopter rooftop landing facility)	3	F
Amusement park, indoor	4	A-3
Animal		
Crematoruim	3	F
Hospital, kennel, pound	2	B
Apartment (see Residences)		
Appliances		
Manufacture	3	F
Sales	3	M
Arenas	4	A-3
Asphalt		
Processing and products manufacture	8	H

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Athletic equipment		
Manufacture	3	F
Sales	3	M
Auditoriums	6, 5 or 4	A-1-A, A-1-B, A-3
Automobile & other motor vehicles		
Gasoline service station	2	B
Rental agency within a building	2	B
Repair	3	S-1
Repair incidental to auto sales with limitations	3	S-1
Sales within a building	3	M
Wrecking	3	F
Washing	3	S-1
Awning manufacturer	3	F
Baked goods shop	3	M
Bakeries	3	F
Banks	2	B
Banquet halls	5	A-3
Barber shops	2	B
Beauty shops	2	B
Beverages		
Bottling	3	F
Manufacture		
Alcoholic	8	H
Less than 0.5% alcohol @ 60°	3	F
Bicycle		
Manufacture	3	F
Rental or repair conducted within a building	3	S-1
Sales	3	M
Billiard parlor	4	A-3
Blacksmith shops	3	F
Blueprinting, etc., establishments	3	F
Boarding house	2	R-1 or R-2
Boats or ships		
Building or repair of boats	3	F
Bone distillation	3	F
Bowling alleys	4	A-3
Broom or brush manufacture	3	F
Building materials		
Wholesale business in roofed structures	3	M or S-1
Bus terminals or stations	4	A-3
Business schools or colleges	4	A-4
Camera & other photo equipment		
Manufacture except film sales	3	F
Sales	3	M
Canvas or canvas products		
Manufacture or repair	3	F
Carpet & rug		
Cleaning establishments	8 or 3	H, F
Manufacture or repair	3	F
Catering for outside consumption	3	F

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Cemeteries		
Crematory in cemetery	3	F
Mausoleum, crypt, columbarium	1	S-2
Mortuary chapel in cemetery	4	A-4
Ceramic products manufacture		
Including pottery, small glazed tile, & similar items	3	F
Charcoal, fuel, briquettes, or lampblack manufacture	8	H
Chemicals		
Packaging	8 or 3	H or F depending on nature of materials involved
Manufacture	8 or 3	H or F depending on nature of materials involved
Churches or other places of worship	4	A-4
Circuses, temporary	4	A-3
Cleaning (see Drycleaning & dying; Laundries; Automobiles, washing)		
Clothing		
Manufacturing	8 or 3	H or F depending on nature of materials involved
Rental Establishment	3	M
Retail sales	3	M
Tailoring, custom manufacture or repair (see also Feathers; Felt; Fur; Leather)	3	M
Clubs		
Private	4	A-3 without residence
Nightclubs (see Eating & drinking establishments)		
Coal, coke or tar products, manufacture	8	H
Colleges & universities		
Classroom buildings	4	A-4
Dormitories	2	R-1
Fraternities or sororities	2	R-1
Community centers	4 or 2	A-3 or B
Convalescent homes (see Nursing homes)		
Convents	2	R-1
Cosmetics or toiletries manufacture	8	H
Cotton ginning	8	H
Cotton wadding or linters manufacture	8	H
Courthouses	2 or 4	B or A-3
Crematoriums		
Animal	3	F
Human	3	F
Dance halls	7	A-2
Day care agencies	4	I-2 or A-4
Day nurseries	4	I-2
Dental offices (see Medical & dental)		
Department stores	3	M

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Dormitories	2	R-1 or R-2
Dressmaking shops, custom	8	H
Drinking places (see Eating & drinking establishments)		
Drive-in restaurants	5	A-3
Drive-in theaters	4	A-5
Drug stores	3	M
Dry cleaning & dyeing establishment	8 or 3	H or F depending on solvents used B
Dwellings (see Residences)		
Eating or drinking establishments		
Lunchrooms, restaurants, cafeterias, etc. primarily enclosed	5	A-3
Drive-in	4	A-3
With entertainment or dancing	7	A-2
ectric		
Power or steam generating plants	3	F
Substation	3	F
Electrical appliances, bulbs, wiring supplies, etc.		
Manufacture	3	F
Sales	3	M
Electronic components & supplies		
Manufacture or repair	3	F
Feathers		
Curing, dyeing, washing or bulk processing	8	H
Manufacturing exclusive of above	8	H
Felt		
Curing, dyeing, washing or bulk processing	3	F
Products manufacture, exclusive of above	3	F
Fertilizers, manufacture	8	H
Film, photographic, manufacture	3 or 8	F or H
Storage and studios	3 or 8	F or H
Fire station	2	B
Fish processing	3	F
Florida shops	3	M
Food		
Product processing except meat and fish	3	F
Retail sales	3	M
Fraternities or sororities	2	R-1 or R-2
Funeral establishments	4	A-3
Fur		
Curing, dyeing, finishing, tanning	8	H
Products manufacture exclusive of above	3	F
Garage (see Parking garage)		
Garbage incineration or reduction	3	F
Garden supplies, produce or flowers	3	M
Gas		
Manufacture	8	H
Public utility stations for metering or regulating	2	B

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Storage		
2500 cu. ft. or less	3	S-1
More than 2500 cu. ft.	8	H
Gasoline service stations (see Automobiles)		
Gelatin manufacture	3	F
Generating plants, electric or steam	3	F
Gift shops	3	M
Glass products form previously manufactured	3	F
Glue manufacture	3	F
Golf		
Indoor courses or driving ranges	4	A-3
Gymnasiums	4	A-3
Gypsum manufacture	3	F
Grain storage	8	H
Hair		
Curing, dyeing, washing, bulk processing	3	F
Product manufacture exclusive of above	3	F
Hardware		
Manufacture	3	F
Retail sales	3	M
Hat bodies manufacture	3	F
Helicopter landing facility, rooftop	3	S-1
Home occupations	2	B
Homes for the aged	4	I-2
Hosiery manufacture	3	F
Hospitals		
Including convalescent, nursing or rest homes, and sanitariums, provided custodial care is not provided for drug addicts, alcoholics, mentally ill or mentally deficient	4	I-2
For care of drug addicts, mentally ill or mentally deficient	5	I-1
Research or teaching laboratories (see also Animal hospitals)	2	B
Hotels	2	R-1
Ice manufacture (dry or natural)	3	F
Ice skating rinks	4	A-3
Incineration or reduction of garbage, offal, or dead animals	3	F
Industrial uses (see specific items)		
Without resulting noise, vibration, special danger, hazard, dust, smoke, fumes, etc.	3	F
Other than above	3 or 8	F or H
Ink or inked ribbon manufacture	3	F
Jewelry	3	F
Kennels (see Animal)		
Laboratories		
Research laboratory not accessory to school or hospital	2	B
Scientific research or teaching laboratory, non-profit, accessory to school or hospital subject to limitations	2	B

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Laundries		
Hand laundry	2	B
Self service; pick-up and delivery station of laundry or dry cleaner	2	B
Steam laundries without limitations	3	F
Leather		
Curing, dyeing, finishing or tanning	3	F
Product manufacture exclusive of above	3	F
Libraries	4	A-3
Linoleum or oilcloth manufacture	3	F
Liquor sales, package	3	M
Luggage manufacture	3	F
Lumber (see Wood)		
Manufacturing	3 or 8	F or H
Matches manufacture	8	H
Mattress manufacture and renovation	3	F
Meat		
Markets	3	M
Slaughtering or packaging	3	F
Medical and dental		
Offices (See also Laboratories; Orthopedic and medical appliances; Hospitals)	2	B
Meeting hall	4	A-3
Metals, manufacture	3	F
Reduction, refining or smelting	8	H
Monasteries	2	R-1
Motels	2	R-1
Motor freight stations (see Trucking terminals)		
Museums	4	A-3
Musical instruments manufacture	3	F
Newspaper publishing	3	F
Newsstands	3	M
Novelty products manufacture	3	F
Nursing homes	4	I-2
Offices	2	B
Oilcloth manufacture	3	F
Optical equipment or similar precision instruments manufacture	3	F
Orphanages		I-2
Orthopedic or medical appliances manufacture	3	
Paint, turpentine or varnish		F
Manufacture	8	H
Spraying booths	8	H
Paper products manufacture	3	F
Parish houses	4	A-3
Parking garages	3	S-1
Petroleum or petroleum products		
Refining	8	H
Storage	3	S-1
Pharmaceutical products manufacture	3	F
Photography studio	2	B
Plastics		
Products manufacture	8	H
Raw, manufacture	8	H

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard Index number	Use group
Police stations	2	B
Pool rooms	2	A-3
Post offices	2	B
Printing		
Plant	3	F
Printing or newspaper publishing	3	F
Prisons & other correctional or detention institutions	5	I-1
Pumping station or substation, water or sewage	2	B
Radio		
Sales	3	M
Studios with audience	5	A-1-B
Studios without audience	2	B
Railroad		
Freight terminal	3	S-1
Passenger station	4	A-3
Recreation		
Center, indoor	4	A-3
Community center building	4	A-3
Rectories	2	R-1
Residences		
One-family	2	R-3
Two-family	2	R-3
Apartment	2	R-2
Temporary dwelling structure	2	R-3
Boarding or lodging house	2	R-1 or R-2
Dormitory	2	R-1 or R-2
Fraternity or sorority	2	R-1 or R-2
Hotel, motel, apartment hotel with accessory services	2	R-1
Convents, monasteries, rectories	2	R-1
Research laboratories (see Laboratories)		
Restaurant, lunch room, cafeteria or other establishment primarily for eating	5	A-3
Retail business	3	M
Stores with combustible or flammable goods constructing a high hazard	8	H
Rubber		
Manufacture (natural or synthetic), including tires, tubes or similar products	8	H
Products (exclusive or processing) including washers, gloves, footwear, bathing caps and like	3	F
Sanatariums		
Not providing custodial care for drug addicts, alcoholics, mentally ill or mentally deficient	4	I-2
Providing care for above	5	I-1
Schools	4	A-4
Seminaries	4 or 2	A-4 & R-1
Settlement houses (depending on nature of activities)	4 or 2	A-3 or B

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Sewage		
Disposal plant	3	F
Pumping station	3	F
Shoddy manufacture	8	H
Shoes		
Manufacture	3	F
Repair shop	2	B
Silverware, manufacture, plate or sterling	3	F
Size manufacture	3	A-3
Skating rinks	4	A-3
Soap and detergents		
Manufacturing, including fat rendering	8	H
Packaging	3	F
Solvent extracting	8	H
Sporting or athletic goods		
Manufacture	3	F
Stores	3	M
Stables	3	S-1
Stadiums	4	A-5
Wholesale business including accessory storage other than flammable liquids, gases and explosives, in roofed structures	3 or 1	S-1 or S-2 depending on nature of materials involved
Stores (see Retail stores; or specific items)		
Tailor shops, custom	2	B
Tanning (see Leather; Fur)		
Taxidermist shops	3	M
Telephone exchanges		
Automatic	2	B
Non-automatic	2	B
Television		
Sales	3	M
Studios	6	A-1a with scenery
	5	A-1b no scenery
	2	B no audience
Textiles		
Manufacture, including knit goods, yard goods, thread or cordage; spinning, weaving, dyeing and printing	3	F
Shoddy, manufacture	8	H
Theaters	6	A-1a with scenery
	5	A-1b no scenery motion picture
Tires, manufacture	8	H
Tobacco products manufacture including curing	3	F
Tools and hardware		
Manufacture	3	F
Sales	3	M
Toys		
Manufacture	3	F
Trailer park (see also Mobile homes)		
Truck		
Repairs	3	S-1
Sales	3	M

Table T-1 (cont'd.)
HAZARD INDEX AND USE GROUP CLASSIFICATION

Use of structure	Hazard index number	Use group
Trucking terminals	3	S-1
Turpentine manufacture	8	H
Warehouses	8, 3 or 1	H, S-1, or S-2 depending on nature of materials involved
Waterpumping stations	2	B
Wax products manufacture	8	H

PART FOUR—ARCHAIC CONSTRUCTION SYSTEMS

T-401.0 Purpose and scope

T-401.1 Purpose: The purpose of this part of Appendix T is to assist the building official and those regulated by this code in evaluating the properties of archaic construction systems.

T-401.2 Scope: This part of Appendix T contains data on construction systems no longer in general use but which may be encountered in older existing buildings. It is meant to be used for assessing existing conditions when evaluating how proposed changes will impact upon the performance of the building.

T-401.3 Application: In any given problem, all available data should be collected and professional judgment exercised in arriving at decisions. Evaluative judgment should be used when test data does not exist or when applying the data contained in this standard.

T-402.0 Archaic fireresistive systems

T-402.1 General: This part of Appendix T contains a list of fireresistive materials and construction which are not necessarily currently in common use. Some of the hourly ratings contained in the listing predate ASTM E-119 that is in current use. The hourly ratings may be higher or lower if tested according to ASTM E-119. In addition to the data contained herein, see Report BMS92, Building Materials and Structures, dated October 7, 1942, National Bureau of Standards. The data listed below is extracted from the Boston Building Code, circa 1943.

T-402.2 Fireresistive materials and construction

T-402.2.1 Minimum qualities: Materials, to be given the fireresistive ratings specified in this part, shall have the following minimum qualities set forth in Sections T-402.2.2 through T-402.2.19.

T-402.2.2 Class 1 concrete: Concrete of Class 1 shall be so proportioned as to have a strength of at least fifteen hundred (1500) pounds per square inch (psi) and the coarse aggregate shall consist of limestone, trap rock, blast

furnace slag, cinders containing not more than twenty (20) per cent of combustible material, burned clay or shale.

T-402.2.3 Class 2 concrete: Concrete of Class 2 shall be so proportioned as to have a strength of at least fifteen hundred (1500) pounds psi, the coarse aggregate consisting of sandstone, granite, quartzite, siliceous gravel or other similar material not over one (1) inch in size.

T-402.2.4 Masonry: Masonry shall be laid in lime-cement or cement mortar, or approved masonry cement mortar, except that masonry of gypsum tile shall, and masonry of structural clay tile may, be laid in gypsum mortar. Masonry shall be thoroughly bonded by breaking joints in successive courses or by the use of metal ties.

T-402.2.5 Brick: Brick shall be burned clay or shale, concrete or sand-lime brick of Grade C or better.

T-402.2.6 Stone: Stone shall be limestone, marble, slate or equally fire-resistive natural stone. Sandstone, granite or other stone which, because of its crystalline structure or for other reason, is less fireresistive, shall not be considered fire protection for structural metal, but may be used in a masonry wall not less than twelve (12) inches thick required to have fireresistance. Stone masonry shall have the same fireresistive rating as brick masonry.

T-402.2.7 Cast stone: Cast stone masonry shall have the same fireresistive rating as brick masonry.

T-402.2.8 Concrete blocks: Concrete blocks, whether solid or hollow, shall have as coarse aggregate limestone, trap rock, blast furnace slag, cinders containing not more than twenty (20) per cent of combustible material, burned clay or shale.

T-402.2.9 Structural clay tile: Structural clay tile shall conform to the specifications for load-bearing tile, floor tile or partition tile. Where partition tile is specified, load-bearing tile may be used.

T-402.2.10 Gypsum: Gypsum tile or pre-cast gypsum concrete, whether solid or hollow, shall conform to Standard Specifications for Gypsum Partition Tile or Block of the American Society for Testing Materials and shall not contain more than three (3) per cent by weight of wood or other combustible binder or filler.

T-402.2.11 Gypsum concrete: Gypsum concrete shall not contain more than twelve and one-half (12½) per cent by weight of wood or other combustible binder or filler, and shall have a compressive strength of at least five hundred (500) psi. It shall not be used where exposed to the elements.

T-402.2.12 Lath: Expanded metal or wire lath as a base or reinforcement for plastering shall weigh not less than two and two-tenths (2.2) pounds per square yard and shall have not less than two and one-half (2½) meshes per inch.

T-402.2.13 Metal mesh for masonry: Metal mesh reinforcement specified for masonry fire protection of structural metal shall consist of wire lath strips the full thickness of the masonry, laid in the beds thereof, or its approved equivalent.

T-402.2.14 **Metal mesh for concrete:** Metal mesh reinforcement specified for concrete fire protection of structural metal shall consist of wire mesh weighing not less than one and one-half (1½) pounds per square yard with wire spaced not over four (4) inches, or not less than no. 11 gage steel wire spaced not over four (4) inches apart, or its approved equivalent.

T-402.2.15 **Cement plaster:** Cement plaster shall be proportioned of one (1) part Portland cement, and not more than two (2) parts of sand measured by volume dry and loose to which may be added lime putty or hydrated lime not exceeding fifteen (15) per cent of the cement.

T-402.2.16 **Gypsum plaster:** Gypsum plaster, except where otherwise specified, may contain sand not in excess of three (3) times the weight of the gypsum.

T-402.2.17 **Lime plaster:** Lime plaster shall consist of a mixture of one (1) part lime, not over three (3) parts sand, and water.

T-402.2.18 **Pneumatically projected mortar:** Pneumatically projected mortar made of Portland cement, sand and water shall be rated for fire protection the same as Class 1 concrete.

T-402.2.19 **Concrete fill:** Concrete fill, where specified in this appendix in connection with hollow masonry units shall consist of Class 1 or Class 2 concrete poured in the hollow spaces of the units as they are laid.

T-402.2.20 **Reinforced concrete:** Portland cement concrete or gypsum concrete poured in place as fire protection for beams, trusses and other horizontal or inclined members of structural steel and pneumatically projected mortar applied to structural steel as fire protection shall be reinforced with metal mesh reinforcement. Concrete protection for vertical columns of structural metal shall have reinforcing consisting of no. 5 wire spaced not over eight (8) inches apart or its equivalent. Reinforcement shall be wrapped around the structural member and so arranged as to be completely embedded in the fire protection material and to ensure its integrity.

T-402.2.21 **Reinforced plaster:** Plaster used as fire protection or to resist the spread of fire shall be reinforced with metal lath, except plaster less than one (1) inch thick or masonry or concrete.

T-402.2.22 **Replacement material:** In the protection of structural metal including reinforcement, one-half (½) inch of cement or gypsum plaster may replace an equal thickness of poured concrete or pneumatically projected mortar as protective material; and one (1) inch of cement or gypsum plaster reinforced with metal lath may replace an equal thickness of poured concrete, pneumatically projected mortar or masonry protection.

T-402.2.23 **Plaster:** Where plaster is required without other specification, it shall consist of one-half (½) inch of cement or gypsum plaster, except that only gypsum plaster shall be used on gypsum masonry.

T-402.2.24 **Thickness:** In this appendix, except where otherwise specifically stated, the thickness given in a list of materials applies to the next following item only, and not to the total thickness where additional materials are specified.

T-402.2.25 Embedding limitations: Pipes, wires, conduits and ducts shall not be embedded in or placed behind the fire-protective materials required for the protection of structural steel or iron except as otherwise provided in this paragraph. Above fire-protective hung ceilings and within the enclosed space in buildings of Type 1 and Type 2 construction, within which, other than the enclosure, fire protection of steel is not required, pipes, wires, conduits and ducts may be placed, provided they are so arranged and so secured that they will not, either by expanding in the event of fire, or otherwise impair, the effectiveness of the enclosing protective materials. Electric conduits and wires and gas pipes may be embedded in concrete or masonry fire protection of structural steel where the protective material is reinforced with wire mesh, provided they shall have protective covering except over the tops of beams and girders, at least as thick as required for the steel.

T-402.2.26 Damage protection: In factories, garages, warehouses and other buildings in which the fire-protective covering required for steel or iron columns may be damaged by the movement of vehicles, materials or equipment, such covering shall be protected by metal or other material in a manner satisfactory to the building official.

T-402.2.7 Firestopping: Firestopping shall mean the stopping-off or enclosure at the ends and wherever else specified of the spaces between studs of partitions, joists of floors and roofs and other similar spaces to prevent drafts of air and the communication of fire from one such space to another. Firestopping shall consist of wood not less than one and one-half (1½) inches thick, of sheet metal not less than no. 24 gage or of masonry, or a combination of such materials. Firestopping shall be tightly fitted in the space to be filled, about pipes, wires and ducts and, if cut or disturbed in the placement of pipes, wires and ducts, shall be repaired.

T-402.3 Fire protection of steel columns

T-402.3.1 Protective thickness: Structural steel columns required to have fire protection of a given rating shall be covered on all sides with protective material having not less than the thickness necessary for the required rating. Except where "no fill" is specified, re-entrant and other accessible spaces behind the specified outer protection shall be filled with concrete or brick masonry or the material of the outer protection.

T-402.3.2 Fireresistance rating: Materials shall be assumed to afford to steel columns fire protection of the rating indicated in the following Sections T-402.3.3 through T-402.3.6.

T-402.3.3 Four-hour rating

1. Two (2) inches Class 1 concrete.
2. Three (3) inches Class 2 concrete, metal mesh reinforcement.
3. Three and one-half (3½) inches brick masonry.
4. Two (2) layers two (2) inch structural clay partition tile masonry, metal mesh in beds.
5. Two (2) inches structural clay partition tile masonry, concrete fill, metal mesh in beds, three-fourths (¾) inch gypsum plaster.
6. Four (4) inches structural clay partition tile masonry, concrete fill, metal mesh in beds, five-eighths (⅝) inch lime plaster.

7. Four (4) inches structural clay partition tile or concrete block masonry, concrete fill, plaster.
8. Three (3) inches hollow gypsum tile masonry and plaster.
9. Two (2) inches gypsum concrete, metal mesh reinforcement.
10. Two (2) inches solid gypsum tile masonry and plaster.
11. Three (3) inches solid cinder concrete block masonry and plaster.
12. Four (4) inches hollow cinder concrete block masonry and plaster.

T-402.3.4 Three-hour rating

1. One and three-fourths (1¾) inches Class 1 concrete.
2. Two (2) inches Class 2 concrete, metal mesh reinforcement.
3. Two (2) inches gypsum concrete.
4. Two (2) inches solid cinder concrete block masonry and plaster.
5. Two (2) inches structural clay partition tile masonry, concrete fill.

T-402.3.5 Two-hour rating

1. One and one-half (1½) inches Class 1 concrete.
2. Two (2) inches Class 2 concrete, metal mesh reinforcement.
3. One (1) inch Class 1 or Class 2 concrete encased in standard weight steel or wrought iron pipe.
4. Two (2) inches structural clay partition tile masonry and plaster.
5. Two (2) layers plaster, each on metal lath, with three-fourths (¾) inch air space between, two (2) inches total thickness.
6. Two (2) inches gypsum concrete.
7. Two (2) inches solid or three (3) inches hollow gypsum tile masonry.

T-402.3.6 One-hour rating

1. One (1) inch Class 1 concrete.
2. One and one-half (1½) inches Class 2 concrete with metal mesh reinforcement.
3. Two and one-fourth (2¼) inches brick masonry.
4. Two (2) inches structural clay partition tile or concrete block masonry.
5. One (1) inch cement or gypsum plaster on metal lath.

T-402.3.7 Thickness: The thickness of protection on the outer edges of lugs or brackets need not exceed one (1) inch.

T-402.4 Fire protection of cast iron columns

T-402.4.1 Protective thickness: Cast iron columns required to have fire protection of a given rating shall be covered on all sides with protective materials having not less than the thickness necessary for the required rating. Reentrant spaces, if any, on the exterior of cast iron columns, and other accessible spaces behind the specified protection, shall be filled with Class 1 concrete or brick masonry or the material of the outer protection.

T-402.4.2 Fireresistance rating: Materials shall be assumed to afford to cast iron columns fire protection of the rating indicated in the following Sections T-402.4.3 through T-402.4.5.

T-402.4.3 Four-hour rating: Cast iron columns shall not be used where the protection of a four-hour rating is required.

T-402.4.4 Three-hour rating

1. Two (2) inches Class 1 concrete.
2. Three (3) inches Class 2 concrete, metal mesh reinforcement.
3. Two (2) inches structural clay partition tile or concrete block masonry concrete fill.
4. One and one-half (1½) inches cement or gypsum plaster on metal lath and metal furring to form one-half (½) inch air space.
5. One and one-half (1½) inches Class 1 concrete.
6. Two (2) inches Class 2 concrete with metal mesh reinforcement.

T-404.4.5 One-hour rating

1. One (1) inch Class 1 concrete.
2. One and one-half (1½) inches Class 2 concrete with metal mesh reinforcement.
3. One (1) inch cement or gypsum plaster on metal lath.

T-404.5 Fire protection of steel in reinforced concrete columns

T-404.5.1 Protective thickness: The main steel reinforcement, including spiral reinforcement and ties larger than one-half (½) inch, in reinforced concrete columns required to have fire protection of a given rating shall be covered with concrete having not less than the thickness listed in this section for the rating indicated in the following Sections T-404.5.2 through T-404.5.6.

T-404.5.2 Four-hour rating

1. One and one-half (1½) inches Class 1 concrete.
2. Two (2) inches Class 2 concrete.

T-404.5.3 Three-hour rating: One and one-half (1½) inches Class 1 or Class 2 concrete.

T-404.5.4 Two-hour rating

1. One (1) inch Class 1 concrete.
2. One and one-half (1½) inches Class 2 concrete.

T-404.5.5 One-hour rating: One (1) inch Class 1 or Class 2 concrete.

T-404.5.6 Ties less than one-half inch: The thickness of protection on column ties not larger than one-half (½) inch may be one-half (½) inch thinner than that listed above.

T-404.6 Fire protection of steel beams, girders and trusses

T-404.6.1 Protective thickness: Steel beams, girders and trusses or the members of trusses, required to have fire protection of a given rating, shall be covered on all sides with material having not less than the thickness necessary for the required rating.

T-404.6.2 Fireresistance rating: Materials shall be assumed to afford steel beams, girders and trusses, or the members thereof, fire protection of the rating indicated in the following Sections T-404.6.3 through T-404.6.6.

T-404.6.3 Four-hour rating

1. Two (2) inches Class 1 concrete.
2. Three (3) inches Class 2 concrete.

3. Three (3) inches structural clay partition tile or concrete block masonry and plaster.
4. Three (3) inches hollow gypsum tile masonry and plaster.
5. Two (2) inches gypsum concrete.
6. Two (2) inches solid gypsum tile masonry and plaster.

T-404.6.4 Three-hour rating

1. One and three-quarters (1¾) inches Class 1 concrete.
2. Two and one-half (2½) inches Class 2 concrete.
3. Two (2) inches gypsum concrete.
4. Two (2) inches structural clay partition tile, or concrete block masonry and plaster.
5. Two (2) inches solid, or three (3) inches hollow gypsum tile masonry.

T-404.6.5 Two-hour rating

1. One and one-half (1½) inches Class 1 concrete.
2. Two (2) inches gypsum concrete.

T-404.6.6 One-hour rating

1. One (1) inch Class 1 concrete.
2. One and one-half (1½) inches Class 2 concrete.
3. Seven-eighths (⅞) inch or cement or gypsum plaster on metal lath.

T-404.7 Fire-protection of steel in reinforced concrete beams

T-404.7.1 Protective thickness: The main steel reinforcement, including stirrups larger than one-half (½) inch, in reinforced concrete beams, girders and trusses, including the ribs of reinforced concrete ribbed floors or roofs where one or both sides of the ribs, in addition to the soffit, are exposed to fire, required to have fire protection of a given rating, shall be covered on all sides with concrete having not less than the thickness listed in this section for the required rating. Where a reinforced concrete floor or roof has a flush ceiling formed with approved permanent masonry fillers between ribs, the reinforcement shall have the protection required for reinforcing steel of floors and roofs in Section T-404.8.

T-404.7.2 Four-hour rating

1. One and one-half (1½) inches Class 1 concrete.
2. Two (2) inches Class 2 concrete.

T-404.7.3 Three-hour rating: One and one-half (1½) inches Class 1 or Class 2 concrete.

T-404.7.4 Two-hour rating

1. One (1) inch Class 1 concrete.
2. One and one-half (1½) inches Class 2 concrete.

T-404.7.5 One-hour rating: One (1) inch Class 1 or Class 2 concrete.

T-404.7.6 Stirrups less than one-half inch: The thickness of protection on stirrups not larger than one-half (½) inch may be less than that listed by not more than one-half (½) inch.

T-404.8 Fire protection of steel reinforcing in floors and roofs

T-404.8.1 Protective thickness: The steel reinforcement in reinforced concrete floors and roofs with flush or plane ceilings, such that the exposure to fire is on the soffit only, required to have fire protection of a given rating, shall be covered with concrete having not less than the thickness listed in this section for the required rating. In floors or roofs having reinforced concrete ribs where the concrete surrounding the steel reinforcement is exposed to fire on one or both sides in addition to the soffit, such reinforcement shall have the protection specified in Section T-404.7 for steel in reinforced concrete beams.

T-404.8.2 Four-hour rating

1. One (1) inch Class 1 concrete.
2. One and one-fourth (1¼) inches Class 2 concrete.

T-404.8.3 Three-hour rating: One (1) inch Class 1 or Class 2 concrete.

T-404.8.4 Two-hour rating

1. Three-fourths (¾) inch Class 1 concrete.
2. One (1) inch Class 2 concrete.

T-404.8.5 One-hour rating: Three-fourths (¾) inch Class 1 or Class 2 concrete.

T-404.9 Fireresistive floor and roof construction

T-404.9.1 Protective thickness: Floors and roofs required to have resistance of a given rating to the spread of fire shall have such thickness of the materials of which it is constructed, as shall be necessary for the required rating, and structural metal forming a part of such floors or roofs shall have protection against fire of such required rating. Floors and roofs required to have two (2) hour or longer resistance to fire shall be constructed of noncombustible materials. Granolithic, burned clay tile, ceramic tile or other similar incombustible floor finish of a given thickness may be substituted for an equal thickness, and sand, cinder or other incombustible filling material, with or without embedded wooden screeds, may be substituted for two-thirds (⅔) its thickness, of the floor or roof construction material specified in this section, provided that such floors and roofs shall have adequate thickness for structural purposes.

T-404.9.2 Fireresistance rating: Floor or roof construction shall be assumed to afford resistance to the spread of fire of the rating indicated in the following sections T-404.9.3 through T-404.9.6.

T-404.9.3 Four-hour rating

1. Four (4) inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.
2. Four (4) inches solid masonry arches or slabs.
3. Four (4) inches structural clay floor tile masonry arches or slabs with top covering of not less than two (2) inches of solid masonry or reinforced concrete.
4. Five (5) inches combination reinforced Portland cement concrete slab consisting of permanent fillers of concrete block, gypsum or structural clay tile and one and one-half (1½) inches of concrete topping; but if

structural clay partition tiles are used for fillers they shall be plastered on the soffit.

T-404.9.4 Three-hour rating

1. Three (3) inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.
2. Three (3) inches solid masonry arches or slabs.
3. Four (4) inches structural clay floor tile masonry, arches or slabs with top covering of not less than one and one-half (1½) inches of solid masonry or reinforced concrete.
4. Four (4) inches combination reinforced Portland cement concrete slab consisting of permanent fillers of concrete block, gypsum or structural clay tile and one (1) inch concrete topping; but if structural clay partition tiles are used for fillers, they shall be plastered on the soffit.

T-404.9.5 Two-hour rating

1. Two and one-half (2½) inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.
2. Two and one-half (2½) inches solid masonry arches or slabs.
3. Three (3) inches structural clay floor tile masonry, arches or slabs with top covering of not less than one (1) inch of solid masonry or reinforced concrete.

T-404.9.6 One-hour rating

1. Three (3) inches structural clay floor tile masonry, arches or slabs with all joints thoroughly filled with cement or gypsum mortar.
2. Wood floor or roof construction with joists not less than one and five-eights (1⅝) inches in least dimension, firestopped, double board floor, approved asbestos felt between layers of boards, and with a ceiling of at least three-quarters (¾) inch cement or gypsum plaster on metal lath.
3. Steel beams or steel joists not more than thirty-six (36) inches apart on centers with noncombustible floor and a ceiling of at least three-quarters (¾) inch cement or gypsum plaster on metal lath metal furring.

T-404.10 Fireresistive ceiling construction

T-404.10.1 Protective thickness: Ceilings required to afford fire protection of a given rating to the floor or roof framing under which it is supported shall be of fireresistive materials of at least the thickness necessary for the given rating. A fireresistive ceiling and all hangers and fastenings necessary for its support to the protected framing shall be of noncombustible materials. It shall be capable of sustaining its own weight without exceeding allowable stresses. Metal reinforcement in such a ceiling shall be protected from fire as specified in Section T-404.8 for reinforcing in a floor.

T-404.10.2 Fireresistance rating: Ceiling construction shall be assumed to afford to floor or roof framing fire protection of the rating indicated in the following Sections T-404.10.3 through T-404.10.6.

T-404.10.3 Four-hour rating

1. Two and one-half (2½) inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.
2. Two (2) inches precast reinforced gypsum concrete, plastered.

T-404.10.4 Three-hour rating

1. Two (2) inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.
2. Two (2) inches precast reinforced gypsum concrete, lapped or rabbeted joints.

T-404.10.5 Two-hour rating: One and one-half (1½) inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

T-404.10.6 One-hour rating: Three quarter (¾) inch cement or gypsum plaster on metal lath.

T-404.11 Fireresistive bearing walls and partitions

T-404.11.1 Protective thickness: Bearing walls and partitions required to have resistance to fire or the spread of fire of a given rating shall be constructed of fireresistive materials and shall have at least the thickness necessary for the required rating. Walls required to have two (2) hour or longer rating shall be of noncombustible materials. Steel reinforcement in reinforced concrete walls shall have the same protection for the given rating as is required in Section T-404.9 for floors.

T-404.11.2 Fireresistance rating: Bearing walls and partitions shall be assumed to have resistance to fire and the spread of fire of the rating indicated in the following Sections T-404.11.3 through T-404.11.6.

T-404.11.3 Four-hour rating

1. Eight (8) inches solid brick masonry.
2. Twelve (12) inches hollow wall of brick masonry, minimum eight (8) inch masonry thickness.
3. Twelve (12) inches structural clay load-bearing tile masonry with two (2) units and not less than three (3) cells in the thickness of the wall.
4. Eight (8) inches structural clay load-bearing tile masonry with one (1) unit and not less than two (2) cells in the thickness of the wall, plastered both sides.
5. Twelve (12) inches concrete block masonry with one (1) unit and not less than two (2) cells in the thickness of the wall.
6. Eight (8) inches one (1) piece concrete block masonry with shells and webs at least one and one-half (1½) inches thick, plastered both sides.
7. Twelve (12) inches total thickness of brick masonry facing bonded to structural clay load-bearing tile masonry backing.
8. Eight (8) inches solid concrete.
9. Six (6) inches solid reinforced concrete.
10. A steel or reinforced concrete frame bearing wall in which the steel has fire protection of four (4) hour rating, with panel filling as specified in Section T-404.12 for a non-bearing wall of four (4) hour rating.

T-404.11.4 Three-hour rating

1. Eight (8) inches structural clay load-bearing tile masonry with two (2) units and not less than four (4) cells in the thickness of the wall.
2. Twelve (12) inches structural clay load-bearing tile masonry with one (1) unit and not less than three (3) cells in the thickness of the wall.

3. Eight (8) inches one (1) piece concrete block masonry with shells and webs not less than one and one-half (1½) inches thick, plastered both sides.
4. Eight (8) inches one (1) piece concrete block masonry with shells and webs not less than two (2) inches thick.
5. Five (5) inches solid reinforced concrete.
6. A steel or reinforced concrete frame bearing wall in which the steel has fire protection of three (3) hour rating, with panel filling as specified in Section T-404.12 for a non-bearing wall of three (3) hour rating.

T-404.11.5 Two-hour rating

1. Eight (8) inches structural clay load-bearing tile masonry with not less than three (3) cells in the thickness of the wall.
2. Eight (8) inches concrete block masonry with shells and webs not less than one and one-half (1½) inches thick.
3. A steel or reinforced conrete frame bearing wall in which the steel has fire protection of two (2) hour rating, with panel filling as specified in Section T-404.12 for a non-bearing wall of two (2) hour rating.

T-404.11.6 One-hour rating

1. A steel or wooden stud bearing wall covered on both sides with one (1) inch cement or gypsum plaster on metal lath, firestopped if of wood.
2. A steel or reinforced concrete frame bearing wall in which the steel has fire protection of one (1) hour rating, with panel filling as specified in Section T-404.12 for a non-bearing wall of one (1) hour rating.

T-404.12 Fireresistive non-bearing walls and partitions

T-404.12.1 Protective thickness: Non-bearing walls and partitions required to have resistance to fire and the spread of fire of a given rating shall be constructed of fireresistive materials and shall have at least the thickness necessary for the required rating. Walls required to have two (2) hour or longer rating shall be of incombustible materials. Steel reinforcement in reinforced concrete walls shall have the same protection for the given rating as is required in Section T-404.8 for steel in floors.

T-404.12.2 Fireresistance rating: Non-bearing walls and partitions shall be assumed to have resistance to fire and the spread of fire of the rating indicated in the following Sections T-404.12.3 through T-404.12.6.

T-404.12.3 Four-hour rating

1. Eight (8) inches solid brick masonry.
2. Three and one-half (3½) inches solid brick masonry, plastered both sides.
3. Six (6) inches structural clay load-bearing tile, plastered both sides.
4. Six (6) inches solid concrete.
5. Four (4) inches solid reinforced concrete.
6. Any wall which, as a bearing wall, has a three (3) hour or four (4) hour rating in Section T-404.11, except the steel or reinforced concrete frame bearing wall.

T-404.12.4 Three-hour rating

1. Three and one-half (3½) inches sold brick masonry.

2. Four (4) inches structural clay load-bearing tile, plastered both sides.
3. Four (4) inches solid concrete.
4. Three (3) inches reinforced concrete.
5. Any wall which, as a bearing wall, has a two (2) hour rating in Section T-404.11 except the steel or reinforced concrete frame bearing wall.

T-404.12.5 Two-hour rating

1. Three (3) inches gypsum tile masonry plastered both sides except in exterior walls.
2. Eight (8) inches structural clay partition tile masonry, plastered both sides.
3. Eight (8) inches structural clay load-bearing tile, with three (3) cells in the thickness of the wall.
4. Four (4) inches concrete block plastered both sides.
5. Two (2) inches solid neat, fibered, gypsum plaster on metal lath and noncombustible studding.

T-404.12.6 One-hour rating

1. Three (3) inches gypsum tile masonry.
2. Two (2) inches solid gypsum tile masonry plastered both sides.
3. Three (3) inches structural clay partition tile plastered both sides.
4. Two and one-half (2½) inches solid cement or sanded gypsum plaster on metal lath and noncombustible studding.
5. Three (3) inches total thickness of hollow wall, three-quarter (¾) inch cement or gypsum plaster on metal lath and noncombustible studding.
6. Three (3) inches total thickness of hollow wall, three-quarter (¾) inch cement or gypsum plaster on metal lath and wooden studding, fire-stopped.

T-404.13 Fireresistive doors

T-404.13.1 General: Doors which are required to be fire doors, fireresistive doors, or of fireresistive construction shall conform to the requirements of this section and Section T-404.14.

T-404.13.2 Classification: Fire doors shall be classified for the purposes of of this code as Class A, Class B, and Class C.

T-404.13.3 Class A fire doors: Class A fire doors shall be doors of the following construction and as specified in Section T-404.14.

1. Tin-clad, three (3) ply wood core, sliding.
2. Tin-clad, three (3) ply wood core, swinging single leaf, doorway not over six (6) feet wide.
3. Tin-clad, three (3) ply wood core, swinging in pairs, doorway not over ten (10) feet wide.
4. Hollow metal, swinging single leaf, doorway not over four (4) feet wide.
5. Hollow metal, swinging in pairs, doorway not over eight (8) feet wide.
6. Sheet metal, sliding, single, doorway not over ten (10) feet wide.
7. Sheet metal, sliding in pairs, doorway not over twelve (12) feet wide.
8. Sheet metal, swinging single leaf, doorway not over six (6) feet wide.
9. Sheet metal, swinging in pairs, doorway not over ten (10) feet wide.
10. Steel rolling doorway not over twelve (12) feet wide.

11. Steel plate, doorway not over four (4) feet wide.
12. Any other construction equal or superior to a tin-clad three (3) ply wood core door in a standard fire test, for resistance to fire, the spread of fire and smoke, and transmission of heat.

T-404.13.4 Class B fire doors: Class B fire doors shall be doors of the following construction and as specified in Section T-404.14.

1. Tin-clad, three (3) ply wood core.
2. Tin-clad, two (2) ply wood core, sliding, doorway not over ten (10) feet wide.
3. Tin-clad, two (2) ply wood core, swinging single leaf, doorway not over six (6) feet wide.
4. Tin-clad, two (2) ply wood core, swinging in pairs, doorway not over ten (10) feet wide.
5. Hollow metal, sliding, doorway not over eight (8) feet wide.
6. Metal-clad, paneled, swinging single leaf, doorway not over three (3) feet wide.
7. Metal-clad, paneled, swinging in pairs, doorway not over six (6) feet wide.
8. Any other construction equal or superior to a tin-clad two (2) ply wood core door in a standard fire test, for resistance to fire, the spread of fire and smoke, and transmission of heat.

T-404.13.5 Class C fire doors: Class C Fire doors shall be doors of the following construction and as specified in Section T-404.14.

1. Metal-clad, paneled, swinging single leaf, doorway not over four (4) feet wide.
2. Metal-clad, paneled, swinging in pairs, doorway not over eight (8) feet wide.

T-404.13.6 Substitution: A Class A door may be used where Class B or Class C is specified; a Class B door may be used where Class C is specified. Two (2) Class B or Class C doors on opposite sides of the wall may be used where a single Class A or Class B door is specified.

T-404.13.7 Overlap: Fireresistive doors, when closed, shall completely cover the doorways in the walls and partitions or the openings in the floors or roofs to which they are fitted. A swinging fire door shall either overlap both jambs and the head of the opening not less than four (4) inches or be fitted to a fireresistive frame with a rabbet the full thickness of the door and with not less than one half (½) inch overlap on the door. A sliding fire door, except in enclosures about passenger elevators, shall overlap both jambs and the head of the opening not less than four (4) inches. A sliding fire door in an enclosure about a passenger elevator shall overlap jambs, head and adjoining panels not less than one half (½) inch. Fire doors shall fit closely at the floor with clearance of not over one quarter (¼) inch.

T-404.13.8 Thresholds: In buildings with combustible floors, doorways required to have fire doors shall have noncombustible thresholds the full thickness of the wall, extending at least four (4) inches from the face of the wall where a door is hung and extending laterally at least six (6) inches behind each jamb of the doorway. Thresholds may be flush with the floor.

T-404.13.9 Rabbetted frame: The rabbetted frame of a swinging fire door shall be constructed of structural steel built into the concrete, masonry or other fireresistive material of the wall about the opening and secured thereto, except that the rabbeted frame of a Class B or Class C door may be of wood, covered with sheet metal not less than no. 26 gage in thickness, secured to the wall in the opening.

T-404.13.10 Fit: Fire doors when closed shall fit tightly against the wall or frame so as to provide an effective stop for fire and smoke. Except for the metal-covered wooden frame specified in this section, combustible material shall not intervene between the door and the fireresistive material of the wall, floor or roof to which it is fitted.

T-404.13.11 Hardware: Hinge hardware for fire doors shall be of malleable iron or rolled structural steel not less than one quarter (¼) inch thick except that tubular steel track for sliding doors may be not less than one eight (⅛) inch thick. Equivalent thickness of solid bronze or brass may be used. Fire doors shall not depend upon cords, cables or chains to support them in closed position except in elevator shafts.

T-404.13.12 Tracks: Tracks for sliding fire doors shall be so supported that a track hanger comes at each door hanger when the door is closed. Track hangers shall be secured to wood stud walls by screws or bolts, to steel stud walls by bolts or rivets, to masonry walls by through bolts and to concrete walls by through bolts or approved built-in inserts. Expansion shields shall not be used to support fire doors.

T-404.13.13 Hinges: Hinges for swinging fire doors, except in wooden stud walls, shall be riveted or through-bolted to the structural steel frame of the opening, through-bolted to the wall if of masory or concrete or secured by approved inserts in the concrete or built into masonry in an approved manner.

T-404.13.14 Strap hinges: Strap hinges and sliding door hangers shall be secured to fire doors by through-bolting, riveting or welding. Swinging fire doors in rabbeted frames, except tin-clad, wood core doors, may be hung on butts. Other swinging fire doors shall have strap hinges.

T-404.13.15 Straps, locks and latches: Sliding fire doors shall have adequate stops for the closed position. Swinging Class A fire doors shall have surface latches or unit locks. Class B and Class C doors shall have surface latches, unit or mortise locks. The latch bolts of unit or mortise locks on fire doors shall have a throw of three quarters (¾) inch. When mounted in pairs, fire doors shall be rabbeted by means of an astragal or otherwise where they come together. One of a pair of swinging fire doors shall have push bolts at top and bottom with a throw of three quarters (¾) inch and the other shall be held by latch to the first.

T-404.13.16 Opening hardware: Except in detention buildings, fire doors hung in required exits shall be so fitted with hardware that they can be opened from inside without use of a key when the building is occupied.

T-404.14 Fire door construction

T-404.14.1 Fastening: In the construction of fire doors, solder shall not be used except for filling joints. Sheet metal shall be fastened to wood by nailing and to metal frame by bolting, riveting or welding.

T-404.14.2 Glass: Class A doors shall not have glass panels. Class B doors may have glass panels not larger than one hundred (100) square inches in exposed area nor more than twelve (12) inches in width or height. Class C doors may have glass panels not larger than two thousand and sixteen (2,016) square inches in total exposed area, and any single light shall not have an exposed area exceeding twelve hundred and ninety-six (1,296) square inches. Glass in fire doors shall be wire glass not less than one quarter (¼) inch thick and shall be set five eighths (⅝) inch in grooves three quarters (¾) of an inch deep.

T-404.14.4 Tin-clad, two-ply: Tin-clad, two-ply wood core doors shall be constructed in accordance with the specifications of the National Board of Fire Underwriters for such doors in Class B openings and shall bear the label of the Underwriters Laboratories to this effect.

T-404.14.4 Tin-clad, two-ply: Tin-clad, two-ply wood core doors shall be constructed in accordance with the specifications of the National Board of Fire Underwriters for such doors in Class B openings and shall bear the label of the Underwriters Laboratories to this effect.

T-404.14.5 Hollow metals: Hollow metal doors shall have substantial stiles and rails of heavy pressed steel, reinforced for hinges and other hardware. Panels shall be of sheet steel filled with asbestos board or other approved insulating materials. The door shall be assembled by welding or riveting.

T-404.14.6 Sheet metals: Sheet metal doors shall be constructed with a rolled steel rigid frame covered both sides with one sixteenth (1/16) inch asbestos board and no. 26 gage corrugated sheet metal, with corrugations vertical on one side and horizontal on the other, bound on the edges with rolled steel or pressed steel shapes.

T-404.14.7 Steel rolling: A steel rolling fire door shall be constructed of sheet steel interlocking slats, sliding in grooves, counterweighted by springs, with the roller and mechanism enclosed in heavy sheet metal.

T-404.14.8 Steel plate: A steel plate fire door shall be constructed of not less than no. 12 gage steel plate mounted on a rolled steel frame, assembled by welding or riveting.

T-404.14.9 Metal clad: A metal clad, paneled fire door shall have a wood core with stiles and rails not less than one and three quarters (1¾) inches thick covered with no. 26 gage sheet steel; panels three quarters (¾) inch thick covered with no. 26 gage sheet steel, set three quarters (¾) inch in grooves; joints of metal lapped and well nailed.

T-404.14.10 Class A label: A door properly bearing the Underwriters' label certifying that it is suitable for the protection of a Class A opening shall be acceptable as a Class A door.

T-404.14.11 Class B label: A door properly bearing the Underwriters' label certifying that it is suitable for the protection of a Class B opening shall be

acceptable as a Class B door, except that metal clad doors wider than three (3) feet shall not be accepted as Class B doors.

T-404.14.12 Class C label: A door properly bearing the Underwriters' label certifying that it is suitable for the protection of a Class C opening shall be acceptable as a Class C door.

T-404.15 Fireresistive shutters: Shutters required to be fire shutters or fireresistive shutters shall be constructed and hung as specified for Class B fireresistive doors in Sections T-404.13 and T-404.14.

T-404.16 Fireresistive windows

T-404.16.1 General: Windows which are required to be fire windows, fireresistive windows, or of fireresistive construction shall conform to the requirements of this section.

T-404.16.2 Movable: Fireresistive windows may be fixed or arranged to open and close. Fixed fireresistive windows shall be so secured in the walls in which they are placed that they may expand in case of fire without buckling. Movable fireresistive windows shall be opened or closed in one of the following manners.

1. One (1) or more sashes may slide horizontally in a fireresistive frame.
2. One (1) or more sashes may slide vertically with counterweights or with two (2) sashes counterbalanced and hung on chains. If a sash is closed in raised position it shall have a fastening.
3. A sash may be hinged at top, bottom, or either side.
4. A sash may be pivoted at top and bottom or at the sides.
5. A sash may be arranged to open and close in any other approved manner, with approved hardware.

T-404.16.3 Sash: Movable sashs in fireresistive windows shall be fitted to fireresistive frames of the same or similar construction. Both sashes and frames, and metal mullions between window units, shall be so fitted in the walls in which they are placed as to be continuous with the fireresistive material of the wall and so secured that they may expand in case of fire without buckling.

T-404.16.4 Glass: Glass in fireresistive windows shall be wired glass not less than one quarter (¼) inch thick and the area of a single light shall not exceed seven hundred and twenty (720) square inches. Glass shall be set three eights (⅜) inch in grooves at least one half (½) inch deep. Glass shall be secured by glazing angles or moldings screwed to the sash and forming continuous grooves for the glass.

T-404.16.5 Construction: Fireresistive windows shall be of the following construction.

1. Hollow sheet metal sashes and frames fabricated by pressing, welding, riveting or crimping without the use of solder or other fusible alloy, except for filling joints, and bearing the label of Underwriters' Laboratories.
2. Rolled steel or pressed steel sashes fabricated by pressing, welding, riveting or crimping, of a make and style approved by the commissioner.
3. Any other approved constructions as fireresistive as that specified in item 1 above.

T-404.16.6 Hollow sheet metal: Fired fireresistive windows of hollow sheet metal construction shall not exceed seven (7) feet in width nor ten (10) feet in height. Fireresistive windows of hollow sheet metal construction with movable sashes shall not exceed six (6) feet in width nor ten (10) feet in height.

T-404.16.7 Rolled steel: Fireresistive windows of rolled steel construction shall not exceed eighty-four (84) square feet in area nor twelve (12) feet in either height or width.

T-404.16.8 Wind pressure: Fireresistive windows and their fastenings shall be capable of resisting the wind pressure on the wall of the building applied either on the inside or the outside of the window without exceeding allowable stresses.

T-404.16.9 Substitution: Where fireresistive windows are required, wooden windows and plain glass may be substituted provided the openings are protected by fireresistive doors or shutters, or, in buildings of approved occupancy and construction, by an approved system of open sprinklers.

T-404.17 Fireresistive roof covering

T-404.17.1 Classification: Roof covering allowed under this code shall be classified as fire-retardant or ordinary, according to resistance to fire outside, as provided in this section. Fire-retardant roof covering is the more fireresistive and may be used on any building. Ordinary roof covering shall not be used where fire-retardant roofing is specified. Roof covering less fireresistive than ordinary roof covering shall not be used on any building.

T-404.17.2 Fire-retardant roofing: Fire-retardant roofing shall be any roof covering meets the requirements of Class A or Class B roofing under the specifications of the Underwriters' Laboratories, Inc. The following roof covering shall be assumed to meet the requirements for fire-retardant roofing.

1. Built up roofing consisting of successive layers of roofing felt impregnated with asphalt; a final layer of asphalt in which, while molten, is embedded a continuous layer of roofing gravel or slag.
2. Built up roofing consisting of successive layers of roofing felt impregnated with coal tar; a final layer of tar in which, while molten, is embedded a continuous layer of roofing gravel or slag.
3. Built up roofing consisting of successive layers of roofing felt impregnated with asphalt; a final layer of asbestos roofing felt impregnated with asphalt weighing not less than fourteen (14) pounds per hundred square feet, or a final layer of asphalt-saturated prepared roofing coated with granulated slate or other similar material.
4. Built up roofing consisting of successive layers of roofing felt impregnated with tar or asphalt and a finish of burned clay floor tile, stone flagging, cement concrete or other similar material.
5. Sheet metal with locked and soldered joints not less than no. 26 gage in thickness.
6. Shingles of natural slate.
7. Shingles of burned clay tile.
8. Shingles of sheet metal not less than no. 26 gage in thickness.
9. Shingles of asbestos board not less than one-eighth (⅛) inch thick.

10. Shingles of asphalt saturated felt surfaced with granulated slate or other similar material and carrying the Underwriters Class "C" label.
11. Corrugated sheet metal with lapped joints not less than no. 26 gage in thickness.
12. Corrugated asbestos board not less than three-sixteenths (3/16) inch thick.

T-404.17.3 Ordinary roofing: Ordinary roofing shall be any roof covering which meets the requirements of Class C roofing under the specifications of the Underwriters' Laboratories, Inc. The following roof covering shall be assumed to meet the requirements for ordinary roofing.

1. Built up roofing consisting of successive layers of roofing felt impregnated with asphalt, coal tar or other approved material, not equal in fireresistance to a fire-retardant roofing.
2. Prepared roofing consisting of felt or fabric impregnated or coated, or both, with asphalt, tar or other approved material or shingles of such prepared roofing, not equal in fireresistance to fire-retardant roofing.
3. Canvas stretched tightly and coated with paint.

T-404.17.4 Means of securing: Built-up roofing shall be secured to the roof deck in the following manner:

1. Over masonry slab, the first layer shall be laid in molten asphalt or tar mopped on the roof deck, after the deck is properly primed, or by nailing a layer of building paper to nailing inserts other than wood placed in the deck.
2. Over wood decks, the built-up roofing shall be secured by nailing a layer of building paper to the roof deck over which the prepared roofing is to be laid with the first layer laid in molten asphalt or tar.
3. Roofings other than built-up roofings, such as shingles, slates, and tile roll roofing shall be well secured to the deck by nailing, bolting, wiring, or other approved methods.

Appendix 6
State of California

Following are the pertinent sections of the California Administrative Code. Appendix A contains the portion of the California Health and Safety Code with the relevant sections of the State Housing Law.

REVISION RECORD FOR REGISTER 78, No. 26
(July 1, 1978)

TITLE 25. HOUSING AND COMMUNITY DEVELOPMENT

PART I. HOUSING AND COMMUNITY DEVELOPMENT

CHAPTER 1. STATE HOUSING LAW REGULATIONS AND EARTHQUAKE PROTECTION LAW REGULATIONS

SUBCHAPTER 1. STATE HOUSING LAW REGULATIONS

Article 6. Rehabilitation and Repair of Existing Buildings

70. Rehabilitation. Any portion of an existing structure which is subject to the provisions of this subchapter may be altered, repaired or rehabilitated, regardless of the value of the work or the duration of construction period, without the entire structure being made to comply with the requirements of this subchapter for new construction.

72. Plumbing. (a) Any plumbing system may have its existing use, maintenance or repair continued if the use, maintenance or repair is in accordance with the original design and location and no hazard to the public health, safety or welfare has been created by such system. (17922(c) Health and Safety Code, effective date January 1, 1975)

(b) **Alterations.** In existing buildings or premises in which plumbing installations are to be altered, repaired or renovated, the enforcement agency has discretionary powers to permit deviation from the provisions of this subchapter, provided that such a proposal to deviate is first submitted to the enforcement agency for proper determination in order that health and safety requirements as they pertain to plumbing shall be observed. (17922(c) Health and Safety Code, effective date January 1, 1975)

(c) **Building Sewers.** Existing building sewers and building drains may be used in connection with plumbing alterations or repairs if such sewers or drains have been properly maintained and were installed in accordance with the applicable laws in effect at the time of installation. (17922(c) Health and Safety Code, effective date January 1, 1975)

(d) **Existing Plumbing Systems.** Any plumbing system shall be deemed to have conformed to applicable law in effect at the time of installation and to have been maintained in good condition if currently in good and safe condition and working properly. (17922(c) Health and Safety Code, effective date January 1, 1975)

74. Mechanical Equipment. Existing mechanical equipment may be used in connection with alterations or repairs if such mechanical equipment has been properly maintained and was installed in accordance with the applicable laws in effect at the time of installation. Any mechanical equipment in existence shall be deemed to have conformed to applicable law in effect at the time of installation and to have been maintained in good condition if currently in good and safe condition and working properly. (17922(c) Health and Safety Code, effective date January 1, 1975)

Except as otherwise noted in Section 17922(c) Health and Safety Code, all alterations, repairs, or additions of mechanical equipment shall conform to Section 48 of this subchapter.

76. **Electrical Equipment.** Exisiting electrical systems may be used in connection with alterations or repairs if such electrical systems have been properly maintained and were installed in accordance with the applicable laws in effect at the time of installation. Any electrical system in existence shall be deemed to have conformed to applicable law in effect at the time of installation and to have been maintained in good condition if currently in good and safe condition and working properly.

Alterations, repairs, or additions of electrical equipment shall conform to Section 50 of this subchapter.

78. **Regulations for Existing and Relocated Buildings.** Regulations governing the alteration and repair of existing and relocated buildings shall be as set forth in Sections 17958.8 and 17958.9 of the Health and Safety Code which reads as follows:

17958.8. HSC. Local ordinances or regulations governing alterations and repair of existing buildings shall, after July 1, 1975, permit the replacement, retention and extension of original materials and the use of original methods of construction as long as the hotel, lodginghouse, motel, apartment house or dwelling, or portions thereof, or building and structure accessory thereto, complies with the rules and regulations of the commission or alternative local standards adopted pursuant to Section 17920.7 and does not become or continue to be a substandard building. (Added Stats. 1974, c. 1268)

17958.9. Local ordinances or regulations governing the moving of apartment houses and dwellings shall, after July 1, 1978, permit the retention of existing materials and methods of construction so long as the apartment house or dwelling complies with the rules and regulations of the commission or alternative local standards adopted pursuant to Section 17920.7, complies with the standards for foundation applicable to new construction, and does not become or continue to be a substandard building.

Article 7. Structural Fire Safety in Existing Buildings

80. **(a) Authority.** This article is adopted pursuant to the provisions of Section 17920.7 of the Health and Safety Code.

(b) Purpose. The purpose of these regulations is to provide a reasonable degree of safety to the occupants and the general public in existing multiple-story structures let for human habitation.

82. **Application and Scope.** Except as otherwise provided in Section 17920.7 of the Health and Safety Code and this subchapter, the provisions of this article shall apply to all existing multiple-story structures let for human habitation including, and limited to, apartment houses, hotels, and motels wherein rooms used for sleeping are let above the ground floor.

84. High Rise Structures. The provisions of this article shall not apply to any existing apartment house, hotel or motel having floors (as measured from the top of the floor surface) used for human occupancy located more than 75 feet above the lowest floor level having building access which is subject to the provisions of Sections B1733 through B1747, Part 2, Title 24, California Administrative Code relating to existing high rise buildings. (T25-84)

86. Inspection of Existing Buildings. The enforcement agency shall inspect every building reported to be in violation of this article, and in addition shall inspect buildings when deemed appropriate to obtain compliance with the regulations. A building which does not comply with the provisions of this article shall be declared to be a substandard building. The enforcement agency shall institute abatement proceedings to correct or abate a substandard building in accordance with the provisions of Section 114 to 144 inclusive of this subchapter.

88. Number of Exits. Every apartment and every other sleeping room shall have access to not less than two exits. A fire escape may be used as one means of egress, if the pitch does not exceed 60 degrees, the width is not less than eighteen inches (18"), the treads are not less than four inches (4") wide and they extend to the ground or are provided with counterbalanced stairs reaching to the ground. Access shall be by an opening having a minimum dimension of twenty-nine inches (29") when open. The sill shall be not more than thirty inches (30") above the floor and landing. (T25-88)

90. Stair Construction. All stairs shall have a minimum run of nine inches (9") and a maximum rise of eight inches (8") and a minimum width exclusive of handrails of thirty inches (30"). Every stairway shall have at least one handrail. A landing having a minimum horizontal dimension of thirty inches (30") shall be provided at each point of access to the stairway. (T25-90).

92. Interior Stairways. Except as provided herein, every interior stairway shall be enclosed with walls of not less than one-hour fire-resistive construction.

Where existing partitions form part of a stairwell enclosure, wood lath and plaster in good condition will be acceptable in lieu of one-hour fire-resistive construction. Doors to such enclosures shall be protected by a self-closing door equivalent to a solid wood door not less than one and three-fourths inches (1¾") thick. Enclosures shall include landings between flights and any corridors, passageways, or public rooms necessary for continuous exit to the exterior of the building.

The stairway need not be enclosed in a continuous shaft if cut off at each story by the fire-resistive construction required by this Subsection for stairwell enclosures.

Enclosures shall not be required if an automatic fire-extinguishing system is provided for all portions of the building except bedrooms, apartments, and rooms accessory thereto.

Interior stairs and vertical openings need not be enclosed in two-story buildings. (T25-92)

94. Exterior Stairways. Existing exterior stairs of noncombustible materials or of wood not less than two-inch (2") nominal thickness with solid treads and risers may be continued in use provided they are properly maintained. (T25-94)

96. Existing Circular Stairways. Existing circular stairways may be used as an exit when adequately maintained and providing the minimum width of run is not less than 10 inches, and the smaller radius is not less than twice the width of the stairway. The width of treads and height of risers within any flight shall have identical dimension with a ¼ inch tolerance. (T25-96)

98. Existing Winding Stairways. Existing private winding stairways may be used when adequately maintained, provided the required width of run is provided at a point not more than 12 inches from the side of the stairway where the treads are the narrower, but in no case shall any width of run be less than 6 inches at any point. (T25-98)

100. Doors and Openings. Exit doors shall swing in the direction of exit travel, shall be self-closing, and shall be openable from the inside without the use of key or any special knowledge or effort. Doors shall not reduce the required width of stairway more than six inches (6") when open. Transoms, and openings other than doors, from corridors to rooms shall be fixed closed and shall be covered with a minimum of three-fourths inch (¾") plywood or ½ inch gypsum wallboard or equivalent material. (T25-100)

102. Swing. Exit doors shall swing in the direction of exit travel when serving any hazardous area or when serving an occupant load of 50 or more. Double acting doors shall not be used as exits serving a tributary occupant load of more than 100; nor shall they be used as a part of a fire assembly, nor equipped with panic hardware. A double acting door shall be provided with a view panel of not less than 200 square inches. (T25-102)

104. Exit Signs. Every exit doorway or change of direction of a corridor shall be marked with a well-lighted exit sign having letters at least 5 inches high. This section shall apply only when the occupant load is in excess of 50. (T25-104)

106. Enclosure of Vertical Openings. Elevators, shafts, ducts, and other vertical openings shall be enclosed as required for stairways in Section 96, or by wired glass set in metal frames. Doors shall be noncombustible, or as regulated in Section 96. (T25-106)

108. Separation of Occupancies. (a) Occupancy separations shall be provided as specified in this subchapter. Lobbies, and public dining rooms not including cocktail lounges, shall not require a separation if the kitchen is so separated from the dining room. Boiler rooms or heater rooms containing a central heating plant using solid or liquid fuel shall be separated from the rest of the building by a One-Hour Fire-Resistive Occupancy Separation.

(b) Equivalent Protection. In lieu of separation of occupancies required by Subsection (a), equivalent protection may be permitted when approved by the enforcement agency. (T25-108)

110. Portable Fire Extinguishers. Portable fire extinguishers shall be provided and maintained in every apartment house and hotel in accordance with requirements set forth in this article.

112. Number and Type. The number and type of portable fire extinguishers to be installed shall be determined by the enforcement agency. However, the minimum requirements shall be as set forth in Title 19, Chapter 1, Subchapter 3, California Administrative Code.

Note: See Section 17920.7, of the Health and Safety Code, which in pertinent part reads: ". . . It is the intention of the Legislature that this section and the rules and regulations adopted by the commission pursuant to this section shall not be more restrictive than the requirements for new construction contained in the Uniform Building Code . . ."
Therefore this article is not applicable to two-story buildings with an occupant load of no more than 10 above ground floor. (See Uniform Building Code, Paragraph 3302(a) 1970 Edition.)

APPENDIX A

Health and Safety Code
Division 13. Part 1.5
State Housing Law

CHAPTER 1. GENERAL PROVISIONS

17912. Rules and regulations promulgated pursuant to the provisions of this part, relating to the erection or construction of buildings or structures, shall not apply to existing buildings or structures or to buildings or structures as to which construction is commenced or approved prior to the effective date of the rules or regulations, except by act of the Legislature, but regulations relating to use, maintenance, and change of occupancy shall apply to all hotels, motels, lodginghouses, apartment houses, and dwellings, or portions thereof and buildings and structures accessory thereto, approved for construction or constructed before or after the effective date of such rules or regulations. (Amended Stats. 1974, c. 1268)

CHAPTER 2. RULES AND REGULATIONS

17920. As used in this part:
(f) "Substandard building" means any building or any portion of a building including, but not limited to, any dwelling unit, guest room, or suite of rooms, or the premises on which the same is located, in which there exist any of the conditions listed in Chapter 10 of the Uniform Housing Code, latest edition, including inadequate structural resistance to horizontal forces, to an extent that endangers the life, limb, health, property, safety, or welfare of the public or the occupants thereof.
However, a condition which would require displacement of sound walls or ceilings to meet height, length, or width requirements or ceil-

ings, rooms, and dwelling units shall not by itself be considered sufficient existence of dangerous conditions making a building a substandard building, unless the building was constructed, altered, or converted in violation of such requirements in effect at the time of construction, alteration, or conversion.

Any wiring, plumbing, or mechanical equipment, including vents, shall be deemed to have conformed to applicable law in effect at the time of installation and to have been maintained in good condition if currently in good and safe condition and working properly.

17920.6. As used in this part, "housing appeals board" means the board or agency of a city or county which is authorized by the governing body of the city or county to hear appeals regarding the requirements of the city or county relating to the use, maintenance, and change of occupancy of hotels, motels, lodginghouses, apartment houses, and dwellings, or portions thereof, and buildings and structures accessory thereto, including requirements governing alteration, additions, repair, demolition, and moving of such buildings if also authorized to hear such appeals. In any area in which there is not such a board or gency, "housing appeals board" means the local appeals board having risdiction over such area.

17920.7. (a) The commission shall adopt, amend, repeal, and ex- pt as otherwise provided in this part, enforce rules and regulations r the provision of structural fire safety and fire-resistant exits in exist- ng multiple-story structures let for human habitation including, and limited to, apartment houses, hotels and motels wherein rooms used for sleeping are let above the ground floor. The rules and regulations shall provide adequate safety to the occupants and the general public, and shall impose the same requirements as are contained in subdivisions (d), (e), (f), (g), (h), (i), (k), and (l) of Section 1313 of Chapter 13 of the appendix of the Uniform Building Code, 1970 edition, as adopted by the International Conference of Building Officials.

The commission, after consultation with the State Fire Marshal, may adopt reasonable exceptions to subdivisions (e) and (g) of Section 1313 to permit the continued use of existing stairs and to subdivision (l) of Section 1313 to permit equivalent protection in lieu of occupancy separations. However, such exceptions shall not impair occupant safety and shall be consistent with the legislaive intent of this section.

Interior stairs and vertical openings need not be enclosed in two story buildings.

(b) Notwithstanding the provisions of subdivision (a), any city, county, or city and county may adopt standards for structural fire safety and fire-resistant exits in structures subject to the provisions of this section, provided that such standards are substantially equivalent in fire safety to the standards adopted by the commission pursuant to subdivision (a). Each city, county, or city and county adopting such alternative standards shall submit a detailed statement, with supporting data, to the Director of Housing and Community Development demonstrating the equivalency of the alternate standards to the state standards. The Director of Housing and Community Development shall make a finding as to the equivalency of alternate local standards to state standards. It

is the intention of the Legislature that this section and the rules and regulations adopted by the commission pursuant to this section shall not be more restrictive than the requirements for new construction contained in the Uniform Building Code, 1970 edition, as adopted by the International Conference of Building Officials.

17921. The commission shall adopt, amend, repeal, and, except as hereinafter provided, the department shall enforce rules and regulations for the protection of the public health, safety, and general welfare of the occupant and the public governing the erection, construction, enlargement, conversion, alteration, repair, moving, removal, demolition, occupancy, use, height, court, area, sanitation, ventilation and maintenance of all hotels, motels, lodginghouses, apartment houses, and dwellings, and buildings and structures accessory thereto. Such rules and regulations may include a schedule of fees to pay the cost of enforcement by the department under Sections 17952 and 17965. (Amended Stats. 1974, c 1268)

17922.

(c) Regulations governing alteration and repair of existing buildings and moving of apartment houses and dwellings shall permit the replacement, retention, and extension of original materials and the continued use of original methods of construction as long as the hotel, lodging house, motel, apartment house, or dwelling, or portions thereof, or building and structure accessory thereto, complies with the rules and regulations of the commission or alternative local standards adopted pursuant to Section 17920.7 and does not become or continue to be a substandard building. Building additions or alterations which increase the area, volume, or size of an existing building, and foundations for apartment houses and dwellings moved, shall comply with the requirements specified in this part, or in rules and regulations adopted pursuant to this part, for new buildings or structures. However, such additions and alterations shall not cause the building to exceed area or height limitations applicable to new construction.

Chapter 4. Application and Scope

17958.8. Local ordinances or regulations governing alterations and repair of existing buildings shall, after July 1, 1975, permit the replacement, retention and extension of original materials and the use of original methods of construction as long as the hotel, lodging house, motel, apartment house or dwelling, or portions thereof, or building and structure accessory thereto, complies with the rules and regulations of the commission or alternative local standards adopted pursuant to Section 17920.7 and does not become or continue to be a substandard building. (Added Stats. 1974, c. 1268)

17958.9. Local ordinances or regulations governing the moving of apartment houses and dwellings shall, after July 1, 1978, permit the retention of existing materials and methods of construction so long as the apartment house or dwelling complies with the rules and regulations of the commission or alternative local standards adopted pursuant to Section 17920.7, complies with the standards for foundation applicable to new construction, and does not become or continue to be a substandard building.

Appendix 7
City of Los Angeles Rule of General Application on Structural Changes Required by Change of Occupancy

SUBJECT: STRUCTURAL CHANGES REQUIRED BY CHANGE OF OCCUPANCY OR INCREASE IN OCCUPANT LOAD

Changes of Occupancy

Section 91.0315(b) requires a building be made to conform in all respects whenever the occupancy is changed to a different subgroup.

Section 91.0315(b) allows the Superintendent to issue a new certificate without equiring complete compliance if he finds that the change in occupancy will esult in no increased hazards to life, limb, health, property, or public welfare. Under this authority, changes of occupancy may be made without establishing that a building complies with current structural requirements of the Building Code under any of the following conditions:

1. In buildings constructed on or after October 6, 1922, a change in occupancy may be made to establish any occupancy classification provided the building is not substantially altered.
2. In buildings constructed prior to October 6, 1933, a change may be made from one occupancy to another of a lesser hazard as listed in the following table and, except for the assembly buildings, hospitals and schools, a change may be made to another occupancy within the same hazard groups. A change to a higher hazard occupancy, or assembly buildings, hospitals and schools occupancy, shall not be made in buildings constructed prior to October 6, 1933, except for Type I (or Class A) buildings as provided for in Item 3.

1. Private garages, carports (least hazardous).
2. One and two family dwellings.
3. Gas stations and parking garages.
4. Businesses, factories, restaurants (less than 50 occupants) and hazardous materials occupancies.
5. Hotels and apartments.
6. Assembly buildings, hospitals and schools (most hazardous).

3. In Type I (or Class A) buildings constructed prior to October 6, 1933, a change to a higher hazard classification (as listed in Item 2) or to an assembly, hospital or school occupancy will be individually considered taking into account the general structural requirements in effect at the time the building was constructed, the structural system used in the building, the condition classification, the occupant load and other pertinent conditions.

For the purpose of this Rule, the Occupancy classification of interconnected assembly rooms shall be based upon the total of all occupants in such rooms. The provisions of this Rule shall not be presumed to waive the requirements of Section 91.0315(a) which provides that any assembly, hospital or school occupancy, housed in buildings constructed prior to 1934, which have been discontinued for a period of more than six months, must comply with all code requirements prior to being reoccupied.

Increases in Occupancy Load (Without a Change of Occupancy)

Increases in occupant load, within existing floor space, that do not cause a change in occupancy may be made to any occupancy in any building without verifying that the building complies with current structural requirements of the Building Code except where Section 91.0315(b) applies. Section 91.0315(b) prohibits an increase in occupant load in assembly occupancies located in buildings constructed prior to 1934 unless the entire building conforms to the current structural design provisions of the Building Code.

Appendix 8
State of California Seismic Safety Commission, Draft Legislation Relating to Seismic Hazards

DRAFT LEGISLATION RELATED TO HAZARDOUS BUILDINGS FOR SUBMISSION IN THE 1979-80 REGULAR SESSION

LEGISLATIVE COUNSEL'S DIGEST

(1) Existing law authorizes a city, city and county, or county to establish construction standards for any building, except specified unoccupied buildings, rural one and two family dwellings, farm buildings, buildings under construction on and prior to May 26, 1933, and other described rural buildings,constructed in this state to meet lateral forces acting upon the building, as specified in regulations adopted by the Department of Housing and Community Development, and authorizes a city, city and county,or county to adopt construction standards more strict than such specified standards for earthquake protection. Such provisions apply when buildings are constructed or altered after adoption of the standards.

This bill would authorize a city, city and county, or county to establish construction standards for reconstruction of existing buildings determined, as specified, to be a hazard to life in the event of an earthquake, which standards are as specified in the bill and would eliminate the problem of complying with the latest building code governing new construction when rehabilitating older buildings. The bills would authorize the city, city and county, or county to adopt higher standards than as provided in the bill. However, the bill would prohibit a building from being declared a seismic hazard to life after reconstruction pursuant to a later adopted ordinance unless the building no longer meets the seismic hazard standards under which it was reconstructed.

The bill would also require the Seismic Safety Commission to recommend changes to such provisions of the bill by June 30, 1985.

(2) This bill would provide that there is no appropriation made for the reimbursement to local agencies for costs incurred by them by this bill pursuant to Section 2231 of the Revenue and Taxation Code for a specified reason.

SEC. 1. Article _____ (commencing with Section _____ is added to Chapter _____ of Part _____ of Division _____ of the Health and Safety Code, to read:

Article _____. Earthquake Hazardous Building Reconstruction

_____. The Legislature finds and declares that:

(a) Because of the generally acknowledged fact that California will experience moderate to great earthquakes in the foreseeable future, increased efforts to reduce earthquake hazards should be encouraged and supported.

(b) Tens of thousands of buildings subject to severe earthquake hazards continue to be a serious danger to the life and safety of hundreds of thousands of Californians who live and work in them in the event of an earthquake.

(c) Improvement of safety to life is the primary goal of building reconstruction to reduce earthquake hazards.

(d) A building may be hazardous to life in the event of an earthquake, if the building was constructed prior to the adoption and enforcement of local building codes requiring earthquake resistant design of buildings; is constructed of unreinforced bearing wall masonry construction on the effective date of this Article, and exhibits any one of the following characteristics:

(1) exterior parapets or ornamentation that may fall on a public way,

(2) exterior walls that are not anchored to the floors or roof,

(3) lacks an effective system to resist seismic forces.

(e) In order to make building reconstruction economically feasible and to provide improvement of the safety or life in seismically hazardous buildings,

standards enacted by local government for building reconstruction will differ from standards which govern new building construction.

_____. Each city, city and county, or county may assess the earthquake hazard in its jurisdiction and establish by ordinance, it is deems appropriate, seismically hazardous building reconstruction standards commensurate with the magnitude of the local earthquake hazard.

_____. Notwithstanding the provisions of Sections 19100 or 19150 of the Health and Safety Code or any other provision of law, excepting those structures or buildings which are needed for emergency purposes after an earthquake in order to preserve the peace, health and safety of the general public, such as hospitals and other medical facilities having surgery or emergency treatment areas, fire and police stations; municipal government disaster operation centers and public utility and communication buildings deemed vital in emergencies, the governing body of any city, city and county, or county may, by ordinance, establish standards for reconstruction of buildings identified by the city, city and county, or county as being hazardous to life in the event of an earthquake. Such seismic building reconstruction standards may be applied uniformly throughout the city, city and county, or county or may be applied in specific areas designated by the city, city and county, or county. The identification of any buidling as being potentially hazardous to life in the event of an earthquake shall be made by a licensed or certified architect or registered civil or structural engineer as defined by Chapter 3 or Chapter 7 of the Business and Professions Code.

_____. Any local ordinance adopted pursuant to Section _____ shall require that:

(a) The reconstructin of any building identified as being hazardous to life in the event of an earthquake shall provide for the reasonable adequacy of:

(1) Unreinforced masonry walls to resist normal and inplane seismic forces,

(2) The anchorage and stability of exterior parapets and ornamentation,

(3) The anchorage of unreinforced masonry walls to the floors and roof,

(4) Floor and roof diaphragms,

(5) The development of a complete bracing system to resist earthquake forces.

(b) Any building or portions of any building reconstructed pursuant to the ordinance shall resist and withstand seismic forces from any direction of a magnitude not less than the seismic forces set forth in the local ordinance. The magnitude of the seismic forces and allowable working stresses shall be established after review and consideration of model ordinances prepared by the Seismic Safety Commission.

(c) Any city, city and county, or county may assign allowable working stresses to existing materials based on substantiating research data. In the event the local jurisdiction does not have the ability to assign such allowable working stresses, it can use those prepared by _____ by the Office of State Architect, subject to approval by the Seismic Safety Commission.

_____. Any city or county adopting an ordinance establishing standards for reconstruction of buildings identified as being hazardous to life, in the event of an earthquake shall file with the Seismic Safety Commission a copy of the ordinance and all subsequent amendments.

_____. Any building identified as being a seismic hazard to life and reconstructed in compliance with a local ordinance adopted pursuant to this article may not within a period of fifteen years be identified as a seismic hazard to life pursuant to any local ordinance adopted after the date of the building reconstruction unless such building no longer meets the seismic hazard standards under which it was reconstructed.

_____. The Seismic Safety Commission shall review and assess

standards enacted by local government for building reconstruction will differ from standards which govern new building construction.

_____. Each city, city and county, or county may assess the earthquake hazard in its jurisdiction and establish by ordinance, it is deems appropriate, seismically hazardous building reconstruction standards commensurate with the magnitude of the local earthquake hazard.

_____. Notwithstanding the provisions of Sections 19100 or 19150 of the Health and Safety Code or any other provision of law, excepting those structures or buildings which are needed for emergency purposes after an earthquake in order to preserve the peace, health and safety of the general public, such as hospitals and other medical facilities having surgery or emergency treatment areas, fire and police stations; municipal government disaster operation centers and public utility and communication buildings deemed vital in emergencies, the governing body of any city, city and county, or county may, by ordinance, establish standards for reconstruction of buildings identified by the city, city and county, or county as being hazardous to life in the event of an earthquake. Such seismic building reconstruction standards may be applied uniformly throughout the city, city and county, or county or may be applied in specific areas designated by the city, city and county, or county. The identification of any building as being potentially hazardous to life in the event of an earthquake shall be made by a licensed or certified architect or registered civil or structural engineer as defined by Chapter 3 or Chapter 7 of the Business and Professions Code.

_____. Any local ordinance adopted pursuant to Section _____ shall require that:

(a) The reconstructin of any building identified as being hazardous to life in the event of an earthquake shall provide for the reasonable adequacy of:

(1) Unreinforced masonry walls to resist normal and inplane seismic forces,

(2) The anchorage and stability of exterior parapets and ornamentation,

(3) The anchorage of unreinforced masonry walls to the floors and roof,

(4) Floor and roof diaphragms,

(5) The development of a complete bracing system to resist earthquake forces.

(b) Any building or portions of any building reconstructed pursuant to the ordinance shall resist and withstand seismic forces from any direction of a magnitude not less than the seismic forces set forth in the local ordinance. The magnitude of the seismic forces and allowable working stresses shall be established after review and consideration of model ordinances prepared by the Seismic Safety Commission.

(c) Any city, city and county, or county may assign allowable working stresses to existing materials based on substantiating research data. In the event the local jurisdiction does not have the ability to assign such allowable working stresses, it can use those prepared by _____ by the Office of State Architect, subject to approval by the Seismic Safety Commission.

_____. Any city or county adopting an ordinance establishing standards for reconstruction of buildings identified as being hazardous to life, in the event of an earthquake shall file with the Seismic Safety Commission a copy of the ordinance and all subsequent amendments.

_____. Any building identified as being a seismic hazard to life and reconstructed in compliance with a local ordinance adopted pursuant to this article may not within a period of fifteen years be identified as a seismic hazard to life pursuant to any local ordinance adopted after the date of the building reconstruction unless such building no longer meets the seismic hazard standards under which it was reconstructed.

_____. The Seismic Safety Commission shall review and assess

the effectiveness of State regulations and local government ordinances adopted pursuant to this article and shall recommend any necessary changes to the Legislature by June 30, 1985, or earlier at its discretion.

SEC. 2. Notwithstanding Section 2231 of the Revenue and Taxation Code, there shall be no reimbursement pursuant to that section nor shall there be an appropriation made by this act because the duties, obligations, or responsibilities imposed on local government by this act are such that related costs are incurred as part of their normal operating procedures.

Appendix 9
Detroit Electrical Code, Chapter 10

Chapter 10 of the code is added as follows:

1000–1. Minimum standards for existing dwelling units.

If inspection reveals that the wiring system of an existing dwelling type occupancy is inadequate, or if code certification as a habitable dwelling under this section is requested, the following minimum requirements shall be complied with:

(a) **Entrances and Exits:** Where two (2) or more entrances and/or exits exist, at least two (2) entrances and/or exits shall be illuminated by exterior lights. Lighting outlets shall be controlled by interior wall switches, located for convenient and readily accessible use.

(b) **Living Room:** Living room shall be provided with illumination. Lighting outlet shall be controlled by a wall switch, located for convenient and readily accessible use. One of the receptacle outlets controlled by a wall switch in lieu of ceiling lighting outlet is acceptable. Convenient duplex receptacle outlets shall be provided. Receptacle outlets shall be equally spaced around the room with at least one duplex receptacle outlet on each wall.

(c) **Kitchen:** Kitchen shall be provided with illumination. Lighting outlet shall be controlled by a wall switch located for convenient and readily accessible use.

A separate kitchen appliance circuit shall be provided, supplying a minimum of three (3) grounding type duplex receptacle outlets. Two (2) of these receptacles shall be readily accessible for convenient use of portable appliances. New appliance circuits shall be twenty ampere capacity.

(d) **Bathroom:** Bathrooms shall be illuminated. Lighting outlet shall be controlled by a wall switch. A receptacle outlet separate from the light fixtures, shall be provided and shall be located at least thirty (30) and not more than forty-eight (48) inches above the floor adjacent to the wash basin and not more than four (4) feet from the basin.

(e) **All Other Habitable Rooms:** Illumination for each habitable room shall be provided. Lighting outlet shall be controlled by a wall switch. Wall switches shall be located for convenient and readily accessible use. Convenience duplex receptacle outlets shall be provided with a minimum of two (2) receptacle outlets equally spaced around the room. An additional receptacle outlet controlled by a wall switch is acceptable in lieu of a lighting outlet.

(f) **Basement:** Basement shall be wired for a minimum of one lighting outlet in each 200 square feet or major fraction of area for use as general illumination. All enclosed areas that may be walked into, such as toilet rooms, fruit storage rooms, utility rooms, excavated areas under porches, etc., shall be provided with at least one lighting outlet (except coal bins).

Stairwell and laundry area lighting outlets shall not be counted as part of the required basement lighting outlets.

(g) **Laundry Areas:** Laundry areas shall be provided with illumination. Laundry circuit shall be an individual circuit. A wall-mounted grounding type duplex receptacle outlet shall be provided, located near the laundry equipment.

An existing drop cord receptacle outlet on a separate circuit shall be acceptable providing it is a grounding type receptacle outlet not more than five (5) feet six (6) inches above the floor.

(h) **Space Heating System:** Heating equipment requiring electrical energy for operation and/or control shall be provided with an individual circuit. A disconnect switch shall be provided on or adjacent to the heating equipment (exception: thermo-pile controlled furnaces).

(i) **Stairwells:** Stairwells shall be adequately illuminated. Lighting outlets shall be controlled by wall switches. Wall switches shall be located for convenient and readily accessible use. Switches shall not be located where it is necessary to use darkened stair sections for their operation. All stairwells to finished portions of dwelling shall be provided with multiple switch control, one at the head the other at the foot of the stairwell.

(j) **Service and/or Feeder:** Service to existing dwelling unit shall be a minimum of one hundred ampere, three wire capacity, service equipment shall be dead front having no live parts exposed whereby accidental contact could be made. Type "S" fuses shall be installed when fused equipment is used.

Exception: Existing service of fifty-five ampere three wire capacity, and feeders of thirty ampere or larger two or three wire capacity shall be accepted if adequate for the electrical load being served.

(k) **Existing Wiring and Equipment:** Existing wiring and equipment shall be in good repair. Circuit extensions made with flexible cord wiring in lieu of permanent wiring shall be eliminated.

1000-2. New Work. All new work shall conform to this ordinance.

1000-3. Evidence of Inadequacy. Evidence of inadequacy shall be any of the following:

(a) Use of cords in lieu of permanent wiring.

(b) Oversizing of overcurrent protection for circuits, feeders or service.

(c) Illegal extensions to the wiring system in order to provide light, heat or power.

(d) Electrical overload.

(d) Misuse of electrical equipment.

(f) Lack of lighting fixtures in bathroom, laundry room, furnace room, stairway or basement.

Appendix 10
Format and Methodology for Developing a Local Rehabilitation Code, Regulations, or Guidelines

The approach presented here deals with the safety and health objectives of building regulation, since it is assumed that accepting reduced levels of performance related to these two areas will be more difficult to justify than similar reductions related to welfare or to property protection. However, similar approaches can be developed for analysis related to these goals also.

When considering the rehabilitation of a given existing building, it is necessary to analyze its intended use and occupancy, in order to determine what levels of performance should be required by the regulation. It is useful to consider separately three categories of attributes for which performance is regulated by codes:

- Structural safety
- Fire safety
- Accident safety, health and hygiene

In the suggested analytical approach, the proposed use of building is analyzed by considering a series of matrices. Each matrix requires the consideration of a set of code regulated attributes with respect to each occupancy group. For purposes of illustration, the CABO/BCMC occupancy index is used. However, a community applying this approach should substitute the occupancy classifications in its building code. The occupancy designations and a brief description are as follows:

Group A - Assembly occupancy is the use of a building or structure, or any portion thereof, for the gathering together of persons for purposes such as civic, social or religious functions or for recreation, or for food or drink consumption or awaiting transportation.

Group B - Business Occupancy is the use of a building or structure, or any portion thereof, for office, professional, or service type transactions including normal accessory storage and the keeping of records and accounts.

Group E - Educational Occupancy is the use of a building or structure, or any portion thereof, for the gathering together of persons for the purpose of instruction.

Group H - Hazardous Occupancy is the principal use of a building or structure, or any portion thereof, that involves highly combustible materials or flammable materials or explosive materials that have inherent characteristics that constitute a higher fire hazard.

Group F - Factory-Industrial Occupancy is use of a building or structure, or any portion thereof, for assembling, disassembling, repairing, fabricating, finishing, manufacturing, packaging or processing operations that are not otherwise classified in this code.

Group I - Institutional Occupancy is use of a buildidng or structure, or any portion thereof, for the purpose of pro-

viding medical treatment or care and sleeping facilities of persons who are mostly incapable of self-preservation because of age, physical or mental disability, or because of security measures not under the occupants' control.

Group M - Mercantile Occupancy is the use of a building or structure, or any portion thereof, for the display and sale of merchandise.

Group R - Residential Occupancy is the use of a building or structure, or any portion thereof, for sleeping accommodations and is not classed as an Institutional Occupancy.

Group S - Storage Occupancy is the principal use of a building or structure, or any portion thereof, for storage that is not classed as a Hazardous Occupancy or for the purpose of sheltering animals.

A more detailed occupancy description is included in the model codes.

(a) Structural Safety

A community might find it useful to carry out the analysis by considering in detail a matrix which addresses each of the building code's occupancy groups, and three attributes of structural safety.

	VERTICAL LIVE & DEAD LOADS	SEISMIC LOADS	WIND LOADS
A - Assembly			
B - Business			
E - Educational			
F - Factory			
I - Institutional			
M - Mercantile			
R - Residential			
S - Storage			

- Vertical Live and Dead Loads

It is unlikely that lower levels of performance may be acceptable here. If the proposed occupancy results in increased vertical live or dead loading, the building must be capable of supporting this loading utilizing design stresses permitted in the current building code. Where the building is constructed with archaic materials, appropriate research source data should be used in context with the historical experience of that type of construction material. Factors of safety required for archaic materials should be comparable to those required by the current building code. In the event it is not possible to establish allowable design stresses for a design analysis, it may be necessary that load tests be conducted. The amount of load to be applied varies depending upon the

materials utilized since all materials do not perform in an identical manner. Higher factors of safety are sometimes applied to concrete, masonry and wood construction than are applied to other materials due to their inherent natural variability. Most codes and a variety of national standards prescribe load test procedures.

- Seismic Loads

Buildings built to comply with earlier editions of building code are likely not to have been designed for the magnitude of seismic forces required by the current building code.

Appendices 9 and 10 contain two specific examples of regulations establishing reduced requirements for seismic design in rehabilitated buildings when compared to new construction requirements. A community must carefully analyze its building stock in relation to its seismic risk. It must determine if the proposed occupancy results in an increase to "life risk", from a structural viewpoint, in the event of building failure. As a general premise, one could assume that if the proposed use contains a greater number of occupants it would increase the "life risk" in the event a building collapsed during an earthquake. A further consideration would be the number of hours a day or days per week that the building is occupied, considering the probability of an earthquake occurring when the building is occupied. Also, such an analysis may consider the relative importance of particular buildings or classes of buildings to the community (e.g., hospitals, power stations, fire stations, etc.).
The "Tentative Provisions for Development of Seismic Regulations for Buildings (ATC 3-06)" contains a chapter on Systematic Abatement of Seismic Hazards in Existing Buildings. Following procedures of this type may be desirable for buildings being rehabilitated or undergoing occupancy changes in high seismic risk areas.

- Wind Loads

Wind forces must be considered as well as seismic forces when buildings undergo rehabilitation or a change in occupancy or use. Seismic forces may be more critical, however, since earthquakes cannot be predicted and occupants are unable to evacuate the structure when an earthquake occurs. Occupants of structures located in areas subject to strong wind forces such as tornados or hurricanes are generally warned well in advance of the event and can go to areas of refuge.

Additionally, if a building has been in existence for a number of years, it has probably been subjected to the maximum expected wind force for the area, except in specific hurricane areas. Accordingly, one could reasonably assume that wind design would not be a major consideration for buildings undergoing rehabilitation or a change of occupancy, and a reduction of the level of performance required for building rehabilitation compared to that for new construction, for most occupancies, may be more acceptable and easier to justify.

(b) Fire Safety

Codes provide for life safety in buildings by regulating various fire safety features associated with the buildings' intended use. The basic premise is to assure that all occupants in all occupancies are provided with an equivalent level of life safety. These regulations are based on various considerations including ignition hazards, fuel loading, occupant density, panic, sleeping, etc. For new construction these regulations are set down in a straight forward manner in all building codes. However, when an existing building is being rehabilitated or changed from one occupancy to another, the issue is more complex.

If a community wishes to explore the possibility of modifying or waiving new construction fire safety requirements for buildings being rehabilitated or undergoing a change of occupancy, while maintaining a reduced but acceptable level of safety, it must evaluate the fire safety features of existing buildings relative to the hazard of the proposed new occupancy. In some cases, the interaction of fire safety features and hazards between existing buildings and proposed use will be acceptable. In other cases, the interaction may even make the building unsuitable for conversion to the new use.

A methodology should be developed for analyzing particular existing buildings for specific proposed occupancies. Such a methodology may consider various fire-related hazards, such as:

(1) Ignition Hazards: The hazard due to open flame, heating, cooking or electrical equipment.

(2) Smoldering Fires: The hazard of fire developing undetected.

(3) Spread of Fire: The hazard of fire spreading in the building once ignited. This is controlled by limitations on flame spread on finish materials, especially in exitways and corridors. Also by amount of combustibles in the building assembly.

(4) Spread of Smoke: Smoke is the primary life hazard. It spreads through unenclosed stairways and vertical shafts, open doors, ducts, etc. It may cause panic.

(5) Panic: The hazard relates to building occupants' behavior, and partly depends on familiarity with the building, number of occupants, etc.

(6) Exiting: The means of exiting from or within the building to a place of refuge within a given time period. Hazard is controlled by limitations on deadend corridors, enclosure of stairways, doors and closures, and similar means.

(7) Community Safety: The hazard of fire spreading to adjacent buildings. Prevention of fire spread between any two buildings is dependent on the buildings' spatial relationship, type of construction, roof covering, wall protection and reasonable expectations of the capability of the fire suppression services.

A matrix relating such hazards to occupancy groups may be useful in the analysis.

PROPOSED OCCUPANCY	HAZARD						
	(1) Ignition	(2) Smoldering fires	(3) Spread of fire	(4) Spread of Smoke	(5) Panic	(6) Exiting	(7) Community Safety
A - Assembly							
B - Business							
E - Educational							
F - Factory							
I - Institutional							
M - Mercantile							
R - Residential							
S - Storage							

A community may rank order the hazards for each occupancy category based on knowledge of the building stock, local fire history and local firefighting capabilities. Such a rank ordering, reflecting specific community characteristics, can then be used to identify those building code requirements which may be modified or alleviated in the case of rehabilitation or change of occupancy, without incurring an unacceptable level of risk.

(c) Accident Safety, Health and Hygiene

Accident safety, health and hygiene are each regulated by a variety of building code provisions. Current regulations require that buildings should be brought to a condition of safety commensurate with that required for new buildings, when undergoing extensive rehabilitation or change of occupancy. A community may analyze its particular situation to determine specific areas where less than full compliance with new construction requirements would be acceptable in rehabilitated buildings, without incurring an unacceptable level of safety.

A similar analysis to that recommended for fire safety may benefit from a similar matrix.

ENVIRONMENTAL REQUIREMENTS	Assembly	Business	Educational	Factory/industrial	High hazard	Institutional	Mercantile	Residential, hotel	Residential, multifamily	Residential, 1 & 2 family	Storage
• PREMISES CONDITION											
Rubbish, weeds											
Grading and drainage, ponding											
Insect and rodent control											
Paved areas repair											
Exhaust vent discharge											
• EXTERIOR STRUCTURE											
Weatherproof roof											
Weatherproff walls											
Weathertight and operable openings (doors and windows											
Glazing											
• INTERIOR STRUCTURE											
Lead-based paint											
Bathroom and kitchen floors											
Treads and risers - uniform dimensions											
Obstruction in egress - headroom and width											
Handrails, guardrails											
Walls and ceilings - structurally stable											
Floor surfaces - uneven, obstacles											

	Assembly	Business	Educational	Factory/Industrial	High hazard	Institutional	Mercantile	Residential, hotel	Residential, multifamily	Residential, 1 & 2 family	Storage
LIGHT, VENTILATION, AND SPACE REQUIREMENTS											
o LIGHT											
Window area, no artificial											
Halls and stairways											
Other spaces											
o VENTILATION											
Window area											
Toilet rooms, window or mechanical											
Cooking facilities											
Mechanical ventilation, if not natural											
o DWELLING UNITS											
Privacy											
Common access											
Basement rooms											
o SPACE											
Floor area											
Ceiling heights											
Acoustics											
PLUMBING FACILITIES											
o REQUIRED FACILITIES											
Dwelling unit water closet & lav											
Accessibility, adequate fixtures											

	Assembly	Business	Educational	Factory/industrial	High hazard	Institutional	Mercantile	Residential, hotel	Residential, multifamily	Residential, 1 & 2 family	Storage
• TOILET ROOMS											
Privacy											
Accessibility											
Floor, partition, wall materials											
• FIXTURES											
Quality											
Connections											
Operation and functional adequacy											
• WATER SUPPLY											
Hot and cold											
Contamination											
Water heater											
• SEWAGE SYSTEM											
Sewer functionally adequate											

Appendix 11
"Rehabilitation of Existing Buildings: An Achievable Goal"

by William J. Tangye, P.E. Reproduced from the Southern Building Magazine, February/March 1980, with permission of the Southern Building Code Congress International, Inc.

The cover of this issue of the "Southern Building" magazine acknowledges 40 years of service by the Southern Building Code Congress to the building community. During these 40 years the south in particular and the nation in general have undergone a tremendous building boom, the results of which are the existing buildings of today that form one of our most important, yet least recognized, resources.

It seems appropriate, therefore, to reflect upon both the code requirements of the past 40 years and those existing buildings that were designed and constructed to meet those requirements. It is recognized that these existing buildings may not comply with all the requirements of today's codes, yet, at the time of their construction, they complied with the applicable codes and standards and in most cases have stood the test of time by serving their intended use in a safe and satisfactory manner.

The fact that these buildings, for the most part, have performed their intended function is sufficient to justify their rehabilitation and/or re-

use. It is imperative--if we are to achieve the goal of rehabilitating our existing building stock--that a concerted effort be made by code enforcement personnel, local governments and others involved in the building community to encourage and find the means to facilitate this activity.

Codes and Enforcement Today

Today's codes and code enforcement techniques are being criticized in the belief that both impede if not discourage the rehabilitation of existing buildings. Much of this criticism is not valid. There are some aspects, however, that ring true and these aspects should be considered by us as a challenge to prove that rehabilitation of existing buildings can be accomplished in a timely and beneficial manner using the present codes enforcement process. The accomplishment of this challenge may require modifications to both codes and enforcement techniques but more important, it will require a change in attitudes about building rehabilitation.

In order to adapt a code enforcement program to include the rehabilitation of existing buildings, we need to briefly review how the present system works.

Applicable Building Regulations

Existing buildings are, in general, regulated by one of the following methods:

1. Standard Building Code - Sections 101.4(a) through (d) covers existing buildings that are to be altered or repaired or that have been damaged, but the occupancy classification of the rehabilitated building will not be changed. The requirements contained in these sections are commonly referred to as the 25-50% rule. Section 101.4(e) covers existing buildings that undergo a change in occupancy classification.

2. Standard Code for the Elimination or Repair of Unsafe Buildings - This code deals with existing buildings that represent an imminent hazard to life as defined in Section 201.3. This code is "building" rather than "occupancy" oriented and mandates that unsafe conditions be abated or that the building be demolished.

3. Standard Housing Code - This code deals only with existing Group R - residential occupancies and focuses primarily on health and safety issues and contains requirements aimed at maintaining the buildings in a habitable condition. It should be noted that the requirements in the housing code may be less than those required in new building construction.

4. Standard Fire Prevention Code - This code deals primarily with the maintenance of the life safety features of a building such as means of egress, fire protection systems, alarm systems and the handling and storage of hazardous or flammable materials. This code applies to all occupancy classification.

The above codes, with the exception of the Standard Building Code, deal with the maintenance of existing buildings in a safe and healthful manner and generally promote the continued use of our existing building stock. The Standard Building Code, on the other hand, is primarily directed

toward new construction and even though it contains performance language such as Section 103.6 - Alternate Materials and Alternate Methods of Construction, it also contains requirements such as those in Section 101.4 that may not in all cases encourage the rehabilitation of existing buildings.

It is my opinion that relatively few and minor changes would have to be made to the Standard Building Code to facilitate the rehabilitation of existing buildings. Accordingly, the remainder of this article will deal only with the Standard Building Code.

Before discussing modifications to the Standard Building Code, it should be emphasized that rehabilitation of existing buildings falls into two distinct categories. The first category includes existing buildings that are to be altered or repaired but in which no change of occupancy classification is contemplated. The second category contemplates that an existing building will undergo a change in occupancy classification.

These categories also comprise the two major criticisms of today's building codes relative to rehabilitation of existing buildings--the 25-50% rule and the categorical requirement that when the occupancy classification of an existing building is changed, the building must be made to conform to the code requirements for the new occupancy classification.

The 25-50% Rule

Let's consider first the 25-50% rule which is contained in Sections 101.4(a) thru (d) of the Standard Building Code and requires the following:

1. If an existing building is to be repaired or altered and the cost of such work done in any 12 month period exceeds 50% of the value of the building, the entire building must be brought up to current code requirements.

2. If an existing building is to be altered or repaired and the cost of such work done in any 12 month period is more than 25% but less than 50% of the value of the building, the building official must determine to what extent the building must be brought up to current code requirements.

3. If an existing building is to be altered or repaired and the cost of such work done in any 12 month period is less than 25% of the value of the building, the building need not be brought up to current code requirements.

4. If an existing building is damaged and the damage exceeds 50% of the value of the building, the building must be brought up to current code requirements. It is implied though not expressly stated that if the damage is less than 50%, the stipulations of items 2 and 3 above would apply.

The strict application of these requirements may discourage the rehabilitation of existing buildings for the following reasons:

1. There is no clear and concise definition of how to establish or what should be considered when established--the value of a building.

2. The percentages are arbitrary and have no basis in fact, thus making them difficult to enforce, particularly if court action is involved.

3. The value of a building will vary with not only the more traditional considerations of size, type of materials, occupancy, etc. but with the geographical location within a governmental jurisdictions boundaries, thus making the requirements potentially discriminating.

Deleting the Rule

Based on the preceding discussion one might conclude that the deletion of the 25-50% rule is the only answer to achieve the goal of rehabilitation of existing buildings. This is one alternative, but such radical action may not be necessary. If, for instance, the 25-50% rule were deleted in favor of some other wording, those buildings that presently fall in the category of less than 25% of the value of the building and are not required to meet the current code, would then have to comply with the new wording. It has not been shown that the "less than 25%" figure has resulted in unsafe buildings, neither has it been a deterrent to rehabilitation. The criticism has been with the higher percentages and the accompanying requirement for full or partial compliance with current code requirements. Therefore, deleting the rule would penalize a certain percentage of rehabilitation work now being accomplished. Another alternative might be to revise the percentage to say 33-66% to permit more rehabilitation work without having to comply with current code requirements. However, this is nothing more than juggling numbers and the new numbers have no more basis in fact than the old numbers. It might also be appropriate to reduce the time span from 12 months to 6 months, which would permit twice the amount of rehabilitation work before triggering compliance with current code requirements. A final alternative would be to remove the requirement for having to bring the entire building up to current code requirements and give the building official the authority to determine which requirements apply.

If a community chooses to maintain the 25-50%, which can be a viable option, the following are recommendations for modification to the rule that will encourage rehabilitation:

General Recommendations

1. Encourage a flexible interpretation of the rule.

2. Define the cost of rehabilitation to exclude all non-permit items such as painting, decorating, cabinets, land-scaping, kitchen and domestic appliances, architects, engineers or contractors fees and all items that would require a separate permit such as plumbing, mechanical and electrical.

3. Define the building value as the current replacement cost after rehabilitation. Do not use assessed valuation since it is usually out of date and may not reflect accurate replacement costs.

4. Revise time span to 6 months.

Specific Recommendations

1. Add a new definition to Section 201.2 to read as follows: *COST OF REPAIR, ALTERATIONS OR REHABILITATION, means the cost of repairs, alterations or rehabilitation as used in Section 101.4 and shall include only those items that are regulated by this code and shall*

not include non-permit items such as painting, decorating, cabinets, land-scaping, appliances not regulated by this code, architects, engineers or contractors fees, nor shall it include items that require a separate permit such as plumbing, mechanical or electrical work.

2. Delete present definition of valuation or value and substitute the following: *BUILDING VALUE, means the current replacement cost of a building after repair, alteration or rehabilitation.*

3. Delete Sections 101.4(a) thru (d) and substitute the following: 101.4 - EXISTING BUILDINGS *(a) If, within any six(6) month period, alterations, repairs or rehabilitation work costing in excess of fifty(50) percent of the building value is made to an existing building, such alterations, repairs or rehabilitation work and the remaining portions of the building shall be made to conform to the requirements of this code for new construction to such extent as may be determined by the building official. (b) If within any six(6) month period, alterations, repairs or rehabilitation work costing in excess of twenty-five(25) percent but not more than fifty(50) percent of the building value is made to an existing building only the portions that are altered, repaired or rehabilitated shall be made to conform to the requirements of this code for new construction, to such extent as may be determined by the building official. (c) Buildings damaged by fire or other causes, and that are to be repaired or rehabilitated shall comply with the provisions of Section 101.4(a) and (b). (d) The building value shall be established by the building official.*

If a local government felt that the 25-50% rule in either its present state or as modified above was not adequate to encourage rehabilitation of existing buildings, the following wording could be used:

Delete present Sections 101.4(a) thru (d) and substitute the following: 101.4 - EXISTING BUILDINGS *(a) Alterations, repairs or rehabilitation work may be made to any existing building without requiring the building to comply with all the requirements of this code provided that the alteration, repair or rehabilitation work conforms to the requirements of this code for new construction. The building official shall determine, subject to appeal to the Board of Adjustments and Appeals, the extent if any to which the existing building shall be made to conform to the requirements of this code for new construction. (b) Alterations, repairs or rehabilitation work shall not cause an existing building to become safe as defined in Section 103.4.*

This latter type of wording is more broad in scope and will encourage rehabilitation work. However, it would be emphasized that if this course of action is taken, it will require that the owner, his architect or engineer and the code enforcement personnel work closely from project inception to completion to assure that all work will provide the necessary degree of life safety. Under this type of procedure, as well as any other involving the rehabilitation of existing buildings, all parties are encouraged to seek innovative solutions to code related issues. The key is not that the solution comply with the exact code wording but rather that it achieve a level of safety consistent with that implied by the code.

Change in Occupancy

Consider Section 101.4(e) of the Standard Building Code which deals with changes in occupancy classification of existing buildings. This section requires that any time the occupancy classification of an existing building is changed, the building must be made to conform to the current code requirements for the new occupancy. It is obvious that this type of requirement poses a real roadblock to rehabilitation of existing buildings. Such compliance may not even be attainable considering that specific code language and the cost of attaining compliance, if possible, is often prohibitive. As a result, the rehabilitation work is done illegally or it is not done at all, with the result being a building that may be other than desirable or in the worst case abandoned.

One of the arguments in favor of this type of specific wording is that if we do not require compliance with the current code when a change of occupancy classification is planned, we are establishing a double standard for existing and new construction. The concern of establishing a double standard is valid but can be resolved to the benefit of all if the local government wants to make the rehabilitation of existing buildings a reality. If we consider that modern building codes reflect the state of the art in building construction, new buildings constructed today should reflect this technology to insure that it is made available to the public. This is not to imply, however, that existing buildings lawfully occupied but not meeting the specific requirements of the current code are less than safe. These existing buildings, as discussed earlier, were built to some code or standard that reflected the state of the art at the time. If they have performed their intended use without exposing the public to any undue hazard, one must conclude that they are safe even though they may not in all respects comply with current codes. Thus it is not consistent to require compliance with current code requirements in order to rehabilitate an existing building even though a change in occupancy classification may be involved. Further, not requiring compliance with current codes is not establishing a double standard but is instead recognizing the life safety required by past codes.

A point that should be made is that an existing building that is lawfully occupied may remain in its present condition and occupancy even though it does not comply with current codes for that occupancy. This is called a "non-conforming right". The occupancy of this building is contingent upon the assumption that there are no imminent hazards in the building. Even if there were hazardous conditions, the code only requires that the hazards be removed but does not require that the building be brought into compliance with the current code.

What the Standard Building Code is trying to accomplish in a change of occupancy classification in an existing building is to provide the equivalent level of health and safety to that prescribed for new construction. To accomplish this task, code enforcement personnel must research the intent of the various code requirements, not just rely on the specific wording. Alternate solutions and innovative methods to meet this intent in existing buildings can then be developed.

Thus, it can be seen that we are not dealing with a double standard, but simply more than one way to achieve the code goal of safety. We do much the same thing on new buildings. If an alternate solution to a specific code requirement is proposed that will achieve an equivalent level of safety to that specified, it can be approved under Section 103.6 If the concept is valid for new buildings, it is equally valid for existing buildings.

The concept of dealing with existing buildings undergoing a change in occupancy classification, and not requiring that the building be brought into

compliance with current code requirements, will require that each building be individually evaluated by the code enforcement personnel to determine those areas of the building that need to be modified. It then becomes the responsibility of the owner or his agent to develop methods of accomplishing the modification within the framework of the building and the level of safety required. This process is shown graphically in Figure 1.

In order for this type of system to work, several things must be done other than a change in code wording. Perhaps the most important item is that the local government must be totally committed to the system. The local government should reflect its commitment by adopting a statement that could read as follows:

1. "The (legislative body) finds that the public health, safety and welfare is in part dependent on the conservation, rehabilitation and reuse of the existing building stock, including both residential and other buildings; that the strict application of new construction requirements and standards to the rehabilitation of existing buildings undergoing a change in occupancy may not result in the most timely and beneficial results; that rehabilitation is a major mechanism for increasing the health and safety in existing buildings; and that adequate resources in the form of public and private initiatives exist to increase and expand the incidence of rehabilitation.

   "It is therefore the intent of this legislative body, to the maximum extent consistent with minimum standards of human health and safety.

   "(1) to promote the rehabilitation of existing buildings by allowing for differences between rehabilitation and new construction in the application of the requirements and standards of this code as long as the equivalent level of safety can be achieved;

   "(2) to encourage in rehabilitation the utilization of innovative and economical materials and methods of construction, to provide the level of safety; and,

   "(3) to encourage the agencies charged with enforcement of codes, and the officers thereof,

      "(i) to apply the provisions of the code to rehabilitated buildings in a manner consistent with the purposes stated herein; and,

      "(ii) to exercise discretion and employ resourcefulness in the evaluation of code compliance of rehabilitated structures, in a manner consistent with the purposes stated herein."

In addition to the policy statement, the local governing body needs to be aware of the fact that there are no easy rules to follow in developing or approving innovative solutions to code intent and that disagreement may arise as to the most desirable course of action even when all parties are following the policy statement. Accordingly, it is advisable to establish a rehabilitation advisory board to review the methods and solutions proposed and to determine which course of action should be approved. This responsibility can be assigned to the board of adjustments and appeals which most local jurisdictions already have in existence.

It is imperative also that the local governing body provide protection for the code enforcement personnel from legal action that may arise out of the enforcement of rehabilitation concepts. Since a program, as outlined above, must deal in generalities rather than specifics, as the code does for new construction, this protection is absolutely necessary to free the code enforcement personnel from personal liability.

Recommendation

1. Adopt an ordinance or add to the building code a section to read as follows:

   "All officers and employees of (the state, or local jurisdiction, as applicable) charged with enforcement of (state or municipal law generally, or specifically enumerated laws such as building codes) shall be relieved of all personal liability for all damage that may accrue to persons or property and for all costs, including attorney's fees, reasonably necessary to defend against litigation resulting from any act required or permitted in the discharge of official duties and exercised in good faith without malice or intentional wrongdoing. Pursuant to this section, the (jurisdiction) may purchase insurance to indemnify itself, its officers, and its employees from legal liability and defense costs. If insurance is not purchased or available, a suit instituted against an officer or employee for conduct arising out of the lawful discharge of official duties shall be defended by the (legal representative of the jurisdiction, e.g., city attorney) until the final termination of the proceedings, and the (jurisdiction) shall be liable for all costs reasonably necessary to defend such action and for all resulting judgments against the officers and employees based on the good faith discharge of said official duties."

The last item to be accomplished is a modification to Section 101.4(e) that will provide the building official with the authority to approve alternate solutions to code requirements when a change of occupancy classification to an existing building is contemplated.

Recommendation

Delete Section 101.4(e) and substitute the following:

(e) If the occupancy classification of an existing building is changed, the building shall be made to conform to the intent of this code for the new occupancy classification as established by the building official.

Once the changes to the code text as outlined for the 25-50% rule and the change in occupancy have been made and the policy statement and legal statement adopted, the basic framework for a workable rehabilitation program is in place.

The actual rehabilitation of an existing building is not a simple task and will require careful study and application of code intent. There are no manuals or books that will provide acceptable alternate solutions or tradeoffs to every code item and, as such, these solutions will have to be developed as they arise on an individual basis by each code enforcement agency.

There is, however, some valuable information contained in the "Draft Rehabilitation Guidelines" published by the Department of HUD, in the Federal Register, Vol. 44, No.215, Monday, November 5, 1979. This document, which was prepared in part by the model code groups, has been prepared as a voluntary guideline to be used by local governments in rehabilitation programs and certain information in this article was drawn from it. Copies may be obtained by writing the Dept. of HUD, Division of Energy, Building Technology and Standards, Room 8164, Washington, D.C. 20410.

There are also several cities that have implemented rehabilitatfon programs. These include Los Angeles, California; San Francisco, California; Denver, Colorado; and Washington, D.C. Copies of these programs should be requested from the building departments in each city. Also, the SBCCI is preparing a manual for code enforcement personnel involved in the inspection of existing buildings for rehabilitation. The manual will contain a discussion of general considerations and more specific sections on materials, construction methods, equipment and planning factors and will include possible corrective measures. For more information on the Rehab Inspection Manual, contact Bill Manning, P.E. or Al Moffitt, R.A. at the SBCCI headquarters.

The SBCCI Technical Department will provide plan examination service on existing buildings that are to be rehabilitated. This review service will be provided for active members and each such review must be accompanied by a letter of authorization from the active member, a copy of the plans, a description of all work to be done to the building, its intended occupancy, structural calculations and a copy of the building department's inspection report on the building. For more information on this service, contact W.J. Tangye, P.E. at the SBCCI headquarters.

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