NBS SPECIAL PUBLICATION 549

Proceedings of the National Conference on Regulatory Aspects of Building Rehabilitation

U.S. DEPARTMENT OF COMMERCE/National Bureau of Standards

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Proceedings of the National Conference on Regulatory Aspects of Building Rehabilitation

Held at the National Bureau of Standards
October 30, 1978

Sandra A. Berry, Editor

Building Economics and Regulatory Technology Division
Center for Building Technology
National Engineering Laboratory
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Washington, D.C. 20234

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Issued August 1979

Library of Congress Catalog Card Number: 79-600095

National Bureau of Standards Special Publication 549
Nat. Bur. Stand. (U.S.), Spec. Publ. 549, 220 pages (Aug. 1979)
CODEN: XNBSAV

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 1979

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $5.50

Stock Number 003-003-02107-5


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Preface

President Carter and the Congress have called for greatly increased emphasis on rehabilitation of existing housing to rebuild the Nation's neighborhoods. In other occupancy classifications as well, the economic factors involved have led to the reuse of existing buildings and often a subsequent change in occupancy classification. In many of the Nation's cities, the rehabilitation of existing structures has turned warehouses into shops and restaurants, disintegrated residential city blocks into shopping malls, single-family homes into suites of professional offices, courthouses into day care facilities, etc.

Regulatory problems have been identified as impacting the rehabilitation of existing buildings. These problems are caused by: (1) application of codes for new construction to existing buildings; (2) lack of a technical basis for various code provisions; (3) an unclear code enforcement process for some types of construction represented in many older buildings; and, (4) a lack of valid evaluation methods for existing construction.

The National Conference on Regulatory Aspects of Building Rehabilitation considered these issues relative to the rehabilitation of buildings in three parts:

Session on Code Provisions and Their Impact
Session on Technical Evaluation Guidelines and Their Development
Session on Administrative Procedures and Their Effectiveness

The conference was designed to bring together all parties concerned with the regulatory aspects of building rehabilitation to share knowledge and experiences as well as to gain additional insight on ongoing programs at the State and Federal level in this subject area.

A major topic of discussion at the conference was the Massachusetts Building Rehabilitation Pilot Project. The project included a review of the Massachusetts State Building Code and its impact on existing buildings, and the development of new code provisions for the administration of building rehabilitation.

Thanks are extended to all the sponsors of this conference:

Association of Major City Building Officials
Building Officials and Code Administrators International, Inc.
International Conference of Building Officials
National Academy of Code Administration
National Association of Housing and Redevelopment Officials
National Bureau of Standards
National Conference of States on Building Codes and Standards, Inc.
Southern Building Code Congress International, Inc.

Appreciation is expressed for the invaluable contributions of the individual speakers and the active participation of the other attendees in the panel discussions, which collectively made this a timely, informative, and well-received conference.

Special thanks and recognition is due James H. Pielert, Group Leader, Building Rehabilitation Technology, for organizing this day-long session, for development of the conference agenda which succinctly addressed this diverse and far-reaching subject, and for personal involvement in procuring a variety of speakers whose presentations so well defined the state-of-the-art in the building rehabilitation subject area.

We have been deeply saddened by the untimely death on February 20, 1979, of our Keynote Speaker, Nathaniel H. Rogg. Dr. Rogg was widely recognized for his long-term contribution to housing and for his recent efforts in regard to building rehabilitation, which he so effectively shared with us in his Keynote Address.

James G. Gross, Chief
Building Economics and Regulatory
Technology Division
Center for Building Technology
National Engineering Laboratory
National Bureau of Standards

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Metric (SI) Units

The following list of conversion factors for the most frequently used quantities in building design and construction may be used.

QUANTITY	INTERNATIONAL (SI) UNIT	U.S. CUSTOMARY UNIT	APPROXIMATE CONVERSION
LENGTH	meter (m)	foot (ft)	1 m = 3.2808 ft
	millimeter (mm)	inch (in)	1 mm = 0.0394 in
AREA	square meter (m^2)	square yard (yd^2)	1 m^2 = 1.1960 yd^2
		square foot (ft^2)	1 m^2 = 10.764 ft^2
	square millimeter (mm^2)	square inch (in^2)	1 mm^2 = 1.5500 x 10^{-3} in^2
VOLUME	cubic meter (m^3)	cubic yard (yd^3)	1 m^3 = 1.3080 yd^3
		cubic foot (ft^3)	1 m^3 = 35.315 ft^3
	cubic millimeter (mm^3)	cubic inch (in^3)	1 mm^3 = 61.024 x 10^{-6} in^3
CAPACITY	liter (L)	gallon (gal)	1 L = 0.2642 gal
	milliliter (mL)	fluid ounce (fl oz)	1 mL = 0.0338 fl oz
VELOCITY, SPEED	meter per second (m/s)	foot per second (ft/s or f.p.s.)	1 m/s = 3.2808 ft/s
	kilometer per hour (km/h)	mile per hour (mile/h or m.p.h.)	1 km/h = 0.6214 mile/h
ACCELERATION	meter per second squared (m/s^2)	foot per second squared (ft/s^2)	1 m/s^2 = 3.2808 ft/s^2
MASS	metric ton (t) [1000 kg]	short ton [2000 lb]	1 t = 1.1023 ton
	kilogram (kg)	pound (lb)	1 kg = 2.2046 lb
	gram (g)	ounce (oz)	1 g = 0.0353 oz
DENSITY	metric ton per cubic meter (t/m^3)	ton per cubic yard (ton/yd^3)	1 t/m^3 = 0.8428 ton/yd^3
	kilogram per cubic meter (kg/m^3)	pound per cubic foot (lb/ft^3)	1 kg/m^3 = 0.0624 lb/ft^3
FORCE	kilonewton (kN)	ton-force (tonf)	1 kN = 0.1124 tonf
		kip [1000 lbf]	1 kN = 0.2248 kip
	newton (N)	pound-force (lbf)	1 N = 0.2248 lbf
MOMENT OF FORCE, TORQUE	kilonewton meter (kN•m)	ton-force foot (tonf•ft)	1 kN•m = 0.3688 tonf•ft
	newton meter (N•m)	pound-force inch (lbf•in)	1 N•m = 8.8508 lbf•in
PRESSURE, STRESS	megapascal (MPa)	ton-force per square inch ($tonf/in^2$)	1 MPa = 0.0725 $tonf/in^2$
		ton-force per square foot ($tonf/ft^2$)	1 MPa = 10.443 $tonf/ft^2$
	kilopascal (kPa)	pound-force per square inch (lbf/in^2)	1 kPa = 0.1450 lbf/in^2
		pound-force per square foot (lbf/ft^2)	1 kPa = 20.885 lbf/ft^2
WORK, ENERGY, QUANTITY OF HEAT	megajoule (MJ)	kilowatthour (kWh)	1 MJ = 0.2778 kWh
	kilojoule (kJ)	British thermal unit (Btu)	1 kJ = 0.9478 Btu
	joule (J)	foot pound-force (ft•lbf)	1 J = 0.7376 ft•lbf
POWER, HEAT FLOW RATE	kilowatt (kW)	horsepower (hp)	1 kW = 1.3410 hp
	watt (W)	British thermal unit per hour (Btu/h)	1 W = 3.4121 Btu/h
		foot pound-force per second (ft•lbf/s)	1 W = 0.7376 ft•lbf/s
COEFFICIENT OF HEAT TRANSFER [U-value]	watt per square meter kelvin ($W/m^2•K$) [= $W/m^2•°C$)]	Btu per square foot hour degree Fahrenheit ($Btu/ft^2•h•°F$)	1 $W/m^2•K$ = 0.1761 $Btu/ft^2•h•°F$
THERMAL CONDUCTIVITY [k-value]	watt per meter kelvin (W/m•K) [= (W/m•°C)]	Btu per square foot degree Fahrenheit ($Btu/ft^2•°F$)	1 W/m•K = 0.5778 $Btu/ft^2•°F$

NOTES: (1) The above conversion factors are shown to three or four places of decimals.

(2) Unprefixed SI units are underlined. (The kilogram, although prefixed, is an SI base unit.)

REFERENCES: NBS Guidelines for the Use of the Metric System, LC1056, Revised August 1977;
The Metric System of Measurement, Federal Register Notice of October 26, 1977, LC 1078, Revised November 1977;
NBS Special Publication 330, "The International System of Units (SI)," 1977 Edition;
NBS Technical Note 938, "Recommended Practice for the Use of Metric (SI) Units in Building Design and Construction," Revised edition June 1977;
ASTM Standard E621-78, "Standard Practice for the Use of Metric (SI) Units in Building Design and Construction," (based on NBS TN 938), March 1978;
ANSI Z210.1-1976, "American National Standard for Metric Practice;" also issued as ASTM E380-76$^{\epsilon}$, or IEEE Std.268-1976.

Background

Abstract: This document contains the edited Proceedings of the National Conference on Regulatory Aspects of Building Rehabilitation held October 30, 1978, at the National Bureau of Standards.

It contains a total of 18 presented papers, all of which address the subject of rehabilitation--currently a critical issue in the Nation's effort to revitalize its cities and house its citizens.

Public sector, as well as private sector programs and experiences toward achieving this goal are covered in one general and three technical sessions.

Key Words: Building; code administration; codes; evaluation; existing buildings; performance standard.

These Proceedings report on a year-long series of activities which address the issue of the impact of the regulatory process on the rehabilitation of existing buildings. The purpose of this introduction is to outline the activities to provide a better understanding of the papers included in these Proceedings.

In the fall of 1977, the National Bureau of Standards (NBS) initiated a study of the nationally-recognized model building code organizations, and selected State and major city building regulatory agencies to determine their needs in regard to rehabilitation of existing buildings. This study identified needs in three major areas:

1. Code Provisions
   - technical bases for elimination or modification of the 25-50 percent rule
   - performance requirements for existing buildings
2. Technical Requirements
   - methods for evaluation of existing construction
   - validation of technical constraints for various occupancies
   - catalog of data on building systems no longer in use
3. Regulatory Process
   - improved process for existing buildings to replace the current ad hoc system

These results were the basis for the establishment of the Building Rehabilitation Technology Group in the NBS Center for Building Technology in October 1978.

While reviewing the results of this study, concerned officials in the State of Massachusetts determined that the State could benefit by a review of its existing building code and the subsequent adoption of interim building rehabilitation guidelines. A team of building regulatory-related organizations was established to work with the State in this effort. The National Bureau of Standards provided technical support to the team in its development of the interim code provisions.

These provisions were to become a part of the Massachusetts State Building Code--Article 22. The final draft of proposed Article 22 of the Massachusetts State Building Code entitled, "Repair, Alteration, Additions and Change in Use of Existing Buildings," was submitted on October 23, 1978, to the State Building Code Commission by the developing team. This document is included as Appendix B to these Proceedings.

The code concept contained in Article 22 no longer uses the amount of work undertaken on an existing building as a basis for determining the degree of compliance with the code for new construction. Instead, it is the intent of Article 22 to allow repairs, alterations, additions to, and change in 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.

After public hearings in Massachusetts and review by the State Building Code Commission, the draft Article 22 was revised by the project team. The final Article 22 was adopted by the Commission and was printed as part of the third edition of the Massachusetts State Building Code. The Commission has established a committee to review and update Article 22 based on implementation experience. The committee met for the first time on March 29, 1979.

This National Conference on Regulatory Aspects of Building Rehabilitation, held October 30, 1978, at the National Bureau of Standards, was structured to provide an overview of regulatory aspects of building rehabilitation activities in the United States and specific details in the development and content of Article 22. The papers in these Proceedings should be read consecutively to obtain a clear understanding of this activity which could have a significant impact on the re-use of the Nation's building stock.

Introduction to Conference

by

James G. Gross
Chief, Building Economics and Regulatory Technology Division
Center for Building Technology
National Engineering Laboratory
National Bureau of Standards

Mr. Gross earned a B.S. in Architectural Engineering from North Dakota State University in 1954.

Mr. Gross joined the staff of the Center for Building Technology in 1971. He has held various management positions relative to CBT work in building regulations, standards participation, building code services, research related to the development of building codes and standards, and housing technology. He is currently the Chief of the Building Economics and Regulatory Technology Division, managing CBT work related to building economics, solar energy standards and criteria, regulatory technology, and building rehabilitation technology.

Prior to joining NBS, Mr. Gross served as Director of Engineering and Research for Precast Systems, Inc., and for many years as Director of Engineering and Technology for the Structural Clay Products Institute.

He is a registered professional engineer, is active in many construction industry and professional organizations, and is the author of numerous technical publications and articles.

Two of the Nation's more pressing societal problems are insufficient housing and urban decay. Not only is there a lack of housing to meet the current demands, but the costs are high and rising more rapidly than income. Urban revitalization is needed to enrich the quality of life in our inner cities and to provide a tax base to support the necessary municipal services. The solution to these two problems may lie in a large part on the effective use of our existing building stock. A successful national program of rehabilitation and re-use of buildings of all types, housing and nonresidential buildings, is a major national need.

Building regulations and their enforcement have been identified by many and widely cited in the literature as impediments to rehabilitation. This is not a new finding. It is discussed in the literature of the 1930's. In 1968, the Douglas Commission reported, and I quote:

> "There is widespread recognition among code experts that current code standards, which are intended for new construction, should not be applied literally to the alteration of existing buildings. Administrators of the rehabilitation programs in cities throughout the country have found that costs become excessive when present building code standards are followed."1/

Nevertheless, it is widely acknowledged that the problems continue to exist. One of the consequences is that we continue to demolish and otherwise lose approximately 850,000 housing units each year, many of which could be saved, rehabilitated and reused; instead we continue to squander this valuable resource. There is, however, an increasing awareness of the need to conserve and re-use our existing buildings. This is true in all levels of government--Congress, the Administration, various Federal agencies, State government, city and local jurisdictions. The private sector, too, is becoming increasingly interested in solving the societal problems of insufficient housing and urban decay.

The magnitude of building rehabilitation today is not small by any means. The current level of housing maintenance and repair is estimated to be $38 billion per year, while the total dollar expenditure for new housing construction is currently running at the rate of $78 billion per year; or, in other words, the rehabilitation and remodeling market is roughly one-half of the new construction market in housing. George Christie, Chief Economist of McGraw-Hill Information Systems, estimates another $15 billion is currently being spent on nonresidential rehabilitation. Further, the rehabilitation and remodeling has been increasing at a more rapid rate and is expected to continue. Obviously, attempts to improve the rehab climate are of great interest to builders, designers and planners, industry, building regulators, and other government officials.

Today, we want to focus on the regulatory aspects of the problem in general and, in particular, we want to share with you the results to date of a pilot project aimed at removal of regulatory impediments, with the thought that this pilot project has national implementation implications. During this discussion, we will talk both about the products used for regulating rehabilitation and the processes of applying those regulations.

We have attempted to structure today's program to encourage your participation. We hope that you will bring your concerns and questions to the attention of the speakers.

1/ National Commission on Urban Problems, Building the American City, Report of the National Commission on Urban Problems to the Congress and to the President, 1968.

Welcome to the National Bureau of Standards

by

James R. Wright
Deputy Director
National Engineering Laboratory
National Bureau of Standards

Dr. Wright received a Ph.D. from the University of Delaware in 1951, with a major in organic chemistry.

He came to the National Bureau of Standards in 1960 as a chemist in the Building Research Division; became Assistant Chief of the Organic Building Materials Section; Assistant to the Chief of the Building Research Division; and then Chief of the Division. More recently, he became Deputy Director of the Institute for Applied Technology; and currently is the Deputy Director of the National Engineering Laboratory.

Dr. Wright received the Department of Commerce Gold Medal Award in 1975. He has held membership in a number of national scientific and engineering societies, as well as the International Union of Laboratories for Testing and Research for Materials and Structures.

Dr. Wright holds 27 U.S. and foreign patents and has published an even larger number of scientific and technical papers.

I am very pleased to be here today and to have the honor of meeting you--the members of the building community concerned with the growing trend towards the rehabilitation of structures.

On behalf of Dr. Ambler, the Director of the National Bureau of Standards, and Dr. John Lyons, the Director of the National Engineering Laboratory, who unfortunately cannot be here today, I would like to welcome you to the National Bureau of Standards for this Conference on the Regulatory Aspects of Building Rehabilitation.

NBS and the other co-sponsors feel that this Conference is particularly significant because of the greatly increased emphasis on the re-use of existing buildings in the United States and the impact on such structures of building regulations.

The National Bureau of Standards has been in the building research business since its founding around the turn of the century. Since that time, the Bureau has undergone a number of organizational changes, the most recent was completed in early 1978. This reorganization is facilitating our relationship with the building community, since we are now organized along functional lines. Technical competencies that have grown up over the years in various organizational units have been consolidated; and the number of formal organizational units reduced.

The Bureau's functional activities are now structured within two major units, called Laboratories. One is the National Measurement Laboratory; the other is the National Engineering Laboratory. Prior to that, dating back to 1964, the Bureau was organized into four Institutes: the Institute for Basic Standards; the Institute for Materials Research; the Institute for Applied Technology; and, the Institute for Computer Sciences and Technology.

The Center for Building Technology is now a component of the new National Engineering Laboratory (NEL), and can draw upon the expertise of other components within the Laboratory, such as fire research, electronics, electrical engineering, mechanical engineering and various other areas of expertise and academic disciplines. I have available a brief description of the reorganization. It is in an article called, "A New Look for NBS." I will leave some of these. So, if you are interested in looking in more detail at the new structure of NBS, feel free to do so.

The importance of building rehabilitation to the Center for Building Technology is evidenced by the formation of a Building Rehabilitation Technology Program within the Center. The objectives of this program include the development of rehabilitation technology and the tools for evaluating such technology; the improvement in the technical base for building regulations, so that the regulatory process becomes more responsive to today's needs; and, the development of economic and other decision-making models that support building rehabilitation activities.

It is through this program that technical support has been provided to the Massachusetts Pilot Project which is the focus for the Conference here today.

I again bid you welcome to the National Bureau of Standards and wish you well in your endeavors. I look forward to the results of what I know will be a successful and timely Conference.

Thank you.

Keynote Address

by

Nathaniel Rogg
Consultant
Former Vice President of
National Association of Home Builders

Dr. Rogg received a B.S. (Magna Cum Laude) from New York University in 1934; a M.S. in Economics from New York University in 1935; and, a J.D. from George Washington University in 1951.

Dr. Rogg is an economist, attorney, administrator and teacher. He has written many articles and made numerous speeches on housing and economic topics. He is a consultant to other nations on housing problems and has been a participant in scores of national and international housing events. He had nearly 20 years Federal Service beginning in the 1930's, including military, and 23 years with the National Association of Home Builders, serving as its Chief Executive for 12 years.

Currently, Dr. Rogg is an Economic Advisor and Consultant to Savings and Loan Industry, Manufacturing, Development and Mortgage Businesses and Lecturer on Urban topics.

Dr. Rogg is a member of numerous professional organizations and is the author of Urban Housing Rehabilitation in the United States.

The National Bureau of Standards and the National Conference of States on Building Codes and Standards deserve to be congratulated, along with your other sponsors for putting together this long-needed Conference on the Regulatory Aspects of Building Rehabilitation.

It comes at a time when government regulation is being singled out by many as responsible for everything--from inflation, the high cost of housing and living, to the Asian flu. It is a signal opportunity to illustrate the beneficial aspects of the government regulatory process, emphasize those elements which can be constructive and facilitating, a situation which is not always the case today for building and regulatory practices as they apply to rehabilitation.

As you know, from the introduction, I am not an engineer, I am not a code expert, but I have been an observer of the housing scene and a student of its complexities for many years. I have some biases; let me identify some of them. I believe that good housing for all of our people is an essential element by which to judge how well and whether a society indeed serves its people.

Much of my lifetime, and virtually all my adult life except for some military service, has been spent in housing and related fields, whether studying, teaching, or as an economist and chief executive for many years for a very remarkable trade association which many of you are acquainted with--the National Association of Home Builders. Above all else, I live in a house. I have built two and rehabilitated the one I now live in. This really rounds out my expertise like it does that of most of the American people. So I am both an observer and a participant in the housing scene.

It is obvious that I have no technical expertise; however, last year at the request of the United States League of Savings Associations, whose members finance nearly two-thirds of all housing in the U.S., I tried to see what was actually going on in the rehabilitation field. One thing learned was that if today's building codes were literally enforced, if building inspectors worked to the book, as airline controllers sometimes do, most rehabilitation in urban areas would come to a screeching halt.

In the course of my study, I found a lot of rehabilitation going on--far more than I had anticipated. While there was much going on, there is also a general--and somewhat inaccurate--belief that it is not very significant, that rehabilitation per se is not very successful.

The Washington Post on Labor Day--a very dull news day--ran an entire page two story on the subject, "Is there a back to the city movement?" and concluded, "probably not." They illuminated the story with a picture of me saying that there was a lot going on and that the statistics were irrelevant, since they reported what happened several years ago, not what was going on today.

One of the indicators that I relied on was what was happening to urban real estate. And, I had used a story which only partially appeared in the paper and I want to share it with you.

A fellow next door to me, and I live on the wrong side of Dupont Circle near the Cairo Hotel, bought his house for $42,000 in 1970. I bought mine in 1963 for $29,000. He sold it in March 1978 for $177,000. The guy who bought it came in to see me to ask if I could recommend a contractor because he needed three new bathrooms, a new kitchen, and a new heating system. Last month, the contractor I recommended to him was in my home on another matter and he said, "You know, that couple got into an argument about what to do and they could not decide what to do," and I said, "I know it." Because they did nothing, did not move into the house

and they decided instead to sell it, and they sold it last month for $210,000. The Washington Post tells us there is not much of a movement back to the city and I think that is a lot of 'hooey.' Because the rise in urban real estate values in the last several years reversed a generation-long trend of a decline in those values and it seems to me that is the most significant kind of indicator you can have that something is going on in the cities.

Let me put all of this into some kind of perspective.

We have come to the end of, and through, a generation of relatively inexpensive and abundant new housing, mostly in new suburbs, in the generation just past, with relatively low operating costs, reasonably low taxes, low priced energy; the life-styles of most of our new households in that generation centered on that suburban way of life.

This has changed more rapidly than we realize. We are in a period of rapidly escalating housing costs and prices, of rising operating costs and property taxes, and a rediscovery of the potential of the city as a place to live. We are learning the hard way that for many of today's and tomorrow's families, a larger share of their income than in the past generations will have to go to take care of their housing costs. We are also moving into a period of intensified competition for living space.

Underlying much of what happens in these housing markets are the demographics of our society. This is indeed, a new demographic era. Population trends shift very slowly, almost glacierly, but like glaciers, they are irresistible and they are dominant. The birthrate now is down. It is down from 26 per thousand in the 1950's to 14 per thousand--probably about the lowest level we have had in the 200 years of our history.

In the first post-War decade, the population increased by 26 million, in the 1960's it went down to an increase of only 21 million; this decade to about 19 million, and it is staying about the same level.

Yet, with all the slowdown in the population increase, there is no decline in the housing requirements. To the contrary, in the next 20 years we face the largest bulge in housing that we have ever had. Anyway you look at it, new household formation in the next 20 years will be the highest in American history and the reason is very simple. Children born in the post-War baby boom are now forming their own households, they need their own housing. Taking the 30 year age group as a kind of entry age group for forming households, for raising children and for making relatively more permanent housing arrangements, you get some very interesting numbers and they put the whole thing in the kind of perspective I was talking about.

From 1950 to 1955, 12 million people entered into the 30 plus age group--these were the kids born in the prosperity years of the 1920's. From 1955 to 1960, 1960 to 1965, and 1965 to 1970, the numbers declined somewhat, and this reflects the relatively low birthrate in the depression years. From 1970 to 1975, something strange happens; it suddenly goes up to 14 million; 1975 to 1980 it goes to 18 million; 1980 to 1985 it goes up to more than 20 million; and, 1985 to 1990 those numbers reach 22 million.

And, to the end of the century, the next two 5-year periods, they stay at about 21 million or a bit less.

Now, compare this to the previous post-War peak of some 12 million and you begin to see what is happening. New household formation in this period is tending toward even higher rates than these 30 plus age group numbers suggest. We are witnessing smaller and more numerous housing units, a larger number of widows and widowers, who are incidentially living longer and make of that what you will, live alone rather than with their families, young people leave home, marry later and so the statistics suggest, also live longer.

One of the changes is in life-styles--marriage as an early goal seems to be losing favor. Life-styles are in flux. Many of the new households are of unrelated individuals--a nice way the Census Bureau has of saying, "They ain't married."

However you express it, the wave of new home seeking households in the next 20 years is unbelievably greater than the public policy makers have been suggesting. None of this is really a forecast of population, because all of the people I have been talking about until the end of the century are already born--they are already in-being.

There is a lot of debate about what kind of families there are going to be, what their life-styles will be like. We know there will be smaller families, we know they will have fewer if any dependents, they may be putting their priorities differently than my generation did. The one certainty is change. We know they will be living under the inhibitions of energy shortages, higher energy costs and with two working, they may not fancy the long journey to work. What is likely is that in the next fifteen to twenty years a lot of these people will come to live in the central city.

In the first post-War generation, the low population in the 30 plus age group generation, along with enormous economic growth of the U.S., not only undergirdered the movement to the suburbs, but it lessened the necessity to look to rehabilitation as a potent force in meeting our housing requirements.

That period is now over. With the enormous number of shelter-seeking families in the next two decades there are very serious questions as to whether the Nation will produce enough new housing or whether it will allocate sufficient resources and priorities to produce new housing to meet the new demand.

This is one of the factors underlying the very rapid run-up of housing costs and prices--a run-up which is going to be with us for a long time. But, for this coming generation this really underlines and strengthens the need to make better use of existing housing stock.

Today, the concept of where the housing frontier is located has changed. In the first post-War period, that frontier was obviously in the suburbs. Today's frontier is not only the suburbs, but must, of necessity, include the central city.

One further comment about this. There is a myth that we have a city vs. suburb confrontation. People looking at President Carter's urban policy document were beginning to draw that conclusion from it. It is not either/or, or both. The other day in Denver, Jay Janus, the Under Secretary of the Department of Housing and Urban Development, said that President Carter's new urban policy is not intended to stop expansion outside the cities. He went on to say that the need is so great we must make use of all the resources and we can no longer enjoy the luxury open to us in the first post-War generation of neglecting the cities--we can no longer afford to by-pass this enormous natural resource.

There is a back to the city movement! It may be in part the energy crisis, a lot of young couples have what I would call a city preference; it may be nostalgia; it may be in part a reaction to the centennial; it may be that working wives are now experiencing what their husbands were talking about when they talk of the journey to work and the trouble they had; it may be that neighborhoods in urban areas have more life and vitality. I know that mine does. There was a Rabbi on one side, a rooming house on the other. We have gays, winos, sikhs--sikhs are one of the groups on my block and they own about five houses and there are a lot of them. In fact, they have the only young kids on the block. There are small shops, we have theives--I have been robbed but so have friends of mine in the suburbs. The trash is collected twice a week. A lot of people have nowhere else to go. There is a combination making for all of this--affluent, adventurous young couples, blue collar, middle income, ethnic neighborhoods. The poor, crime, and unemployment are continuing and serious problems. But, bear in mind what I said: every indicator shows that city real estate values are going up and I think the Census statistics about ten years from now will reflect what is going on now.

I found much going on in the cities that I visited and something equally exciting is going on in other cities in America. The essential point is that there is a "live in the city movement" plus a "back to the city movement" and that it is supported in large part by people who never left and intend to stay. And, behind it all is the enormous pressure for housing by the new families coming onto the scene.

There are a lot of problems. Some of the problems involve the housing inventory itself and its rehabilitation. Older housing, built prior to 1940, was largely craft-built. A study by Miles Colean for the Twentieth Century Fund, indicated that the typical builder in the 1930's built about one-half of a house a year--that is kind of an odd way to build I suppose. This kind of housing may often require expensive customizing and modernization. From a cost standpoint, it puts limits on what you can do in rehabilitation for lower income families, and mandates different methods than are used in new construction. It is one of the reasons why builders, suppliers, and trade unions have not yet mounted an effective low-cost program for property rehabilitation. From a builder's standpoint, inner-city rehabilitation is difficult; it requires more supervision, his overhead and administrative costs are much higher and there is no strong

pressure compelling him to work in the city. In addition, there are a whole series of public constraints, ranging from land use subdivision practices, to construction standards, to building codes, to income and real property taxes.

In the course of my study I found a lot of cities, a lot of local governments, were not properly equipped to promote rehabilitation. They lack local policy, they lack appropriate organization, and in almost all cases, the whole process of regulatory standards--the clearances, the licenses, the permits--discouraged both the entrepreneur and the home owner.

I saw a lot going on when I went out and I saw a lot of different kinds of rehabilitation. I witnessed everything from a kind of cosmetic rehabilitation to a more complete restoration to make houses look as they did years ago. I stress the concerns I have with the different types of housing--single-family vis-a-vis multi-family, because the building codes may affect them in different ways. For example, it would be difficult to do any kind of extensive rehabilitation in a multi-family building or structure without adhering strictly to building regulations prevailing in the community. This is so because the job is so large it does not escape the notice of the city officials. Also, on a gut rehabilitation.

But there was a lot of rehabilitation going on as there was in one of my neighbor's houses--all of it inside the house and all of it outside the permit process. A lot of the rehabilitation that went on in the city was of that kind and I do not think it is a very good way to do it.

I think it is obvious that strict adherence to building codes designed for new construction would, in all too many cases, impede rehabilitation. Violations often seem to occur in the building code standards in the jobs when the occupants--frequently the owners--do a sizable amount of the work themselves. The problem really arises out of the fact that we seem to have no universally acceptable rehabilitation regulations which offer standards to which rehabilitation can be accomplished. Instead the rehabilitation, if major, in too many localities, is required strictly to conform to whatever standard for new construction exists. In some cases involving older structures, the question that I saw was, "Is it even possible to meet the new construction standards?"

The problem relates to the extent of the rehabilitation. Take the case of the new building code requiring stairways with certain height on the risers, certain widths, certain depth and treads. When substantial rehabilitation does not really affect the stairwells and stairways, should the stairways be reconstructed in order to conform to the new building code as the 50 percent rule requires?

In no city that I visited did I see a separate code or separate provisions for rehabilitation although I quickly found out there were different standards, separate standards of enforcement and administration. For example, in one city I was told the inspector looked at rehabilitation of

single-family jobs in terms of what was satisfactory at the time the house was built. If no major question of public health or safety is involved, building inspectors would overlook bringing everything in the house up to the standard for new construction, even though more than 50 percent of the value was being spent in rehabilitation.

Part of the problem I observed was differential levels of enforcement in various areas and various neighborhoods. The building inspectors seem to me to have a tendency to be a little less strict on single-family rehabilitation, particularly as I said, with the owner-occupant. Incidentially, I think that when the problem is examined one of the things which needs to be factored in is not only building code standards but the housing code standards. There needs to be a reasonably close relationship between the two. In some cases, and I venture to make this recommendation to you, you may be thinking of a multi-tiered enforcement strategy which provides for different approaches to satisfy different concerns between owner-occupied and rental housing.

In summary, it seems to be important that we develop the key parts for a model rehabilitation regulatory code, that these key parts be different, maybe even less stringent than those for new construction, and that one of the aims should be that they not impose extraordinary difficulties on rehabilitating older housing built in a different day to a different standard.

I would like to hasten to add the comment that in no way I am suggesting that we lessen our concern for life safety and health features in whatever regulations you people develop.

Incidentially, I am not recommending that we adopt a nationwide building code--rehabilitation code--anymore that I would urge that we adopt a nationwide building code. Rigid national codes, I think, can do a lot of damage. We need to develop suggested performance standards for rehabilitation which could be reviewed by each locality, adjusted to meet local conditions, and then coordinated with standards already in effect in that community.

In talking with building code officials, many of whom do think a separate code is needed for building rehabilitation, I perceive that they, themselves were in effect, applying different standards of code enforcement to rehabilitation than they were applying to new construction, particularly rehabilitation in poorer neighborhoods.

In short, they themselves were applying their own wisdom which seemed to me to be a separate kind of code treatment for rehabilitation because they perceived the necessity to do so if they were, in fact, not to impede rehabilitation beyond any hope of success.

It would be better, in my opinion, if the codes themselves provided such authority or provided standards which gave such authority to building code officials rather than relied on their willingness to use their own good judgment.

There is a very serious question about what the Federal role in developing building code and building regulatory devices ought to be. Without Federal initiative and support, I have some real doubt that we will be able to develop and put into widespread use any kind of model rehabilitation code provisions. However, without State and local cooperation these code changes will not have much acceptance. Therefore, it is important that it be a tripod type effort along with the building code officials' organizations, since they themselves are really the key to this sort of thing. Nothing will work if it does not have their support and that support will not be forthcoming without their involvement.

In our country, with its unique form of county and municipal governments, there are thousands of code issuing and code enforcment bodies. Obviously, neither the Federal government nor any single code organization can develop code provisions until the States and the localities want to adopt. This suggests the need for code utilization and implementation strategy which brings these communities as I have suggested, into the code implementation process and a strategy which also uses Federal benefits as a device for getting these changes adopted.

There is something very exciting going on in many of our cities, more can happen if we would choose the right path. Suggesting changes in building regulation will not alone solve the rehabilitation problem. What we need are good, sensible, model rehabilitation regulations, which allow the communities to make locally practical variations and allow maximum discretion based upon performance standards. That is the challenge you are facing and it is an important challenge and an important opportunity. Much depends upon how you people, and the people whom you represent, move on the whole field of revising the building code rehabilitation standards.

Much of the future of rehabilitation depends upon your work here. There is no quick and easy answer to the whole business of revitalizing our cities. When it happens, it is going to be done block-by-block, neighborhood-by-neighborhood, by the people who live there and by other people who realize it is good business and good government.

A scholar and a friend of mine, now in his 88th year, Nels Anderson, still teaching at the University of New Brunswick in Canada (imagine teaching full-time at age 88), has just written a book on the Industrial Urban Community. Apart from some very choice words on work, he has this salutory reminder--"Cities," he said, "since they first appeared, have been the seedbeds for innovation and invention." "I cannot," he goes on, "run with those who speak of cities in final decay. I prefer to believe that only in the city, man's most ingenious invention, will we be able to meet the challenges that threaten our civilization."

Overview of Massachusetts Pilot Project

by

Charles J. Dinezio
Executive Director
Massachusetts State Building Code Commission

Mr. Dinezio is the Executive Director of the Massachusetts State Building Code Commission, where he is responsible for the implementation of the Commission's policies and objectives.

Immediately prior to this, he was the Coordinator of Code Development in the Massachusetts' Department of Community Affairs where he was responsible for the development of housing and building codes for the Commonwealth of Massachusetts. In addition to other public employment, Mr. Dinezio was involved in the private construction sector as both a contractor and home builder. He has lectured at various colleges and universities and provided consulting services to the National Bureau of Standards, as well as several universities.

Mr. Dinezio is currently the President and Northeast Regional Chairman of the National Conference of States on Building Codes and Standards, Inc., and serves on a number of public and private professional committees.

The Massachusetts Building Rehabilitation Project, a unique public-private action program involving the Commonwealth of Massachusetts and the nation's major building code and research organizations, has been the outgrowth of the growing concern that is being expressed throughout our country for the need to more fully utilize and preserve our nation's building stock. This concept is not new; Federal, State and local initiatives in this area--particularly with regard to housing--date back many years. The initial impetus was based upon the goal of providing, for all citizens, housing which met minimum standards of health and safety.

It is recognized that there are many forces at work which potentially impede the full utilization of existing buildings; market forces, financial consideration, income levels, industry structures, and regulatory activities are but a few.

The National Conference of States on Building Codes and Standards (NCSBCS), along with the model code organizations--Building Officials and Code Administrators International, Inc., (BOCA), International Conference of Building Officials (ICBO), Southern Building Code Congress International, Inc. (SBCCI)--and the Association of Major City Building Officials (AMCBO), last winter concluded a study under contract to the National Bureau of Standards (NBS) which sparked the Massachusetts Rehabilitation Project.

The results of that study indicated that building officials at the State and local levels concur that there is a need to review their existing codes relating to the issue of rehabilitation.

In conducting such a review, the weaknesses of the codes could be identified and a method for improvement initiated. Some specific problem areas that were confirmed by the research sponsored by NBS fall into the following six major areas:

1. Codes represent new construction.
2. Requirements for complete code compliance are arbitrary and may tend to increase costs.
3. The nature of current codes limits alternate solutions.
4. Regulatory organization and procedures tend to be constraints.
5. Legal actions deter approval of alternate solutions.
6. Backgrounds and skills of code enforcement personnel are diverse.

The nature of the problems noted above indicates that existing buildings do require special treatment, if we are to achieve massive revitalization and adaptive re-use of the existing building stock. The desired approach to this problem is to develop a revised system of treating existing buildings that ensures that the intent of codes is met for maximum protection of health and safety, while allowing flexibility in enforcement and a sound technical basis for alternate solutions to meet safety standards.

In reviewing this NBS study, former Massachusetts' Governor Dukakis, and the State Building Code Commission determined that our State could benefit by a review of its existing building code and from the adoption of interim building rehabilitation guidelines.

On March 4, 1978, Governor Dukakis invited representatives of eight major national model building code and building research organizations to a meeting in Boston to gain their assistance in developing an interim building rehabilitation code for our State.

Present at the meeting were representatives of BOCA, ICBO, SBCCI, AMCBO, National Academy of Code Administration (NACA), NBS, and NCSBCS. Governor Dukakis outlined, for these representatives, a plan for undertaking the Massachusetts rehabilitation project and pledged his personal support for that effort.

Following discussion of the plan, the eight pledged together with the Commonwealth of Massachusetts, a total of approximately $206,000 in cash and in-kind services to the State building rehabilitation code project and agreed to form a project team. The scope of the project called for NCSBCS, as the prime contractor, to produce with the other members of the project team, an interim code document containing code provisions for alterations and additions to existing buildings. The code provisions are to establish a system for the design professional, building owner, and State and local enforcement officials to evaluate proposed changes to an existing building.

The format provides a structural and technical basis in place of current ad hoc techniques. These model provisions have been included as elements in a major revision to the Massachusetts State Building Code. These provisions provide the enforcement official with guidelines for working with the document, major technical issues which must be considered, and alternate technical solutions and approaches which are applicable in the State of Massachusetts.

In addition, the Massachusetts State Building Code Commission formed an Advisory Council, comprised of representatives of interested and affected parties in Massachusetts to review and provide constructive comments to the draft provisions and guidelines throughout the project's development stages.

The final draft of the interim code provisions was completed by the project team in August 1978 and was forwarded to the members of the State Building Code Commission for their review and comment. These comments were received by the project team and were incorporated into the rehabilitation document.

In late September 1978, three one-day workshops were held in Massachusetts for local building officials to explain the interim code provisions that had been developed and to get their feedback for possible changes in the document. Presenting the project to the local officials were representatives of the State Building Code Commission and various members of the rehabilitation project team.

Public Programs for Housing Rehabilitation

by

Anita Rechler
Neighborhood Conservation Specialist
U. S. Department of
Housing and Urban Development

Ms. Rechler received a Master's of Urban and Regional Planning from the George Washington University in 1974.

Prior to joining the HUD Office of Urban Rehabilitation and Community Reinvestment, her experience was in the area of community development rehabilitation at the local level.

Ms. Rechler worked for the D.C. Department of Housing and Community Development in the program and policy development area. Some projects included the development of guidelines for the D.C. Rehabilitation Loan Program; development of Urban Homesteading Program; and, operation of a demonstration program, which provided small seed money grants to neighborhood and non-profit organizations to carry out innovative neighborhood preservation projects.

She worked with Ralph Nader on a two-year project entitled, "What's Right with America," the results of which were published in the book - Proudly We Hail.

Let me start out by telling you what I am not here to talk about. The first thing I am not going to talk about is codes, the second thing is HUD money and how you can get it for your cities, or your States, or even for yourselves. Lastly, I am not going to talk about Section 511 of the Housing and Community Development Amendments of 1978, which call for the Secretary of HUD to develop model rehabilitation guidelines.

What I am here to discuss with you briefly are some of the HUD-funded programs for housing rehabilitation, which you all will be living with for the next few years.

I particularly want to talk about the programs administered through the Office of Community Planning and Development. These programs are directed by the former Baltimore City star of rehabilitation--Assistant Secretary Robert Embrey. The programs are the Section 312 rehabilitation loan

program, the Community Development Block Grant rehabilitation projects, the Urban Homestead Program, and the Rehabilitation Technical Assistance Program.

Let me start with the Section 312 program. For those of you who are not familiar with it, this is a direct Federal loan to property owners for rehabilitation. Loans carry an interest rate of 3% for a maximum of 20 years. (Note: recent legislative changes permit the Secretary of HUD to change the 3% rate depending upon the incomes of borrowers.) The loan limit for residential properties under the Section 312 program is $27,000 per unit for one and two unit dwellings. For non-residential properties the maximum loan is $50,000. Priority for loans must be given to low and moderate income families and loans are limited to specified neighborhoods.

Those of you who run Section 312 programs in your towns are probably thoroughly frustrated with the on-again/off-again funding cycle. You will be pleased to know that the funding level for FY 79 will be $260 million, a more than threefold increase over FY 78. In order to allow cities to rationally plan their rehabilitation program HUD will be notifying cities of their share of the available funds on an ongoing basis.

One of the things we will be able to do now that we have additional amounts of money is to expand what has been an essentially single-family lending program to include more multi-family and commercial properties. We are authorized to spend up to $60 million for other than one unit rehabilitation.

We anticipate that these two "new" programs--the multi-family and the commercial programs--will be a challenge to those of you who are in the code business, since very few cities have been operating multi-family rehabilitation or commercial rehabilitation projects.

The second activity that is administered by the Office of Community Planning and Development is the Urban Homestead Program. This started out as a demonstration project and now is being expanded to cities throughout the country. The program makes available HUD-owned property to localities. These properties are then turned over to persons who agree to rehabilitate them and to live in the properties at least three years. The properties must be brought up to health and safety standards before the property may be occupied, and then within 18 months, must be brought up to a local code standard.

In addition to expanding the Homestead Program to an additional number of cities, HUD will encourage the homesteading of multi-family properties. Many of you have read about the multi-family urban homesteading that is going on in the Bronx in New York City. It is being assisted through a group called U-Hab--the Urban Homesteading Assistance Board. We hope to be able to stimulate similar projects in other cities across the country where there is a large stock of multi-family abandoned housing. We will do this by providing technical assistance to implement multi-family homestead projects.

The Community Development Block Grant Program makes available monies to cities on a formula basis. It allows communities wide discretion as to how they choose to spend their money. Almost all the cities participating in the program have chosen to use some of their money for rehabilitation. Rehabilitation under the Block Grant Program is very diversified. Cities have an opportunity to implement their programs almost anyway they want. They can administer a program that is very closely tied to the rehabilitation codes and to code enforcement; they can choose to run a program that is based upon very minimal standards of rehabilitation. Many communities also have provided a great deal of assistance to borrowers who are participating in the program; others have chosen to do very little work. HUD does not prescribe how the program shall be operated.

For code and building professionals, that means there is a great deal of opportunity to participate in the development of a program; to work with people who are running rehabilitation projects; and to talk about codes and code enforcement and how to integrate that with the rehabilitation that is taking place.

Partly because the Block Grant Program is so individualized, partly because the level of rehabilitation activity has grown so quickly, and partly because the supply of well trained, highly-skilled people at the local level has not kept up with the pace of rehabilitation, we have started a Rehabilitation Technical Assistance Program that operates through the HUD Central Office. The technical assistance program has been doing two things. First, we have been working to establish a Housing Rehabilitation Training Program. This will be a training institute which provides courses on an ongoing basis in the field of urban rehabilitation. At a minimum, courses will be available in the following subject areas:

rehabilitation construction;
rehabilitation program design and administration;
rehabilitation management; and,
rehabilitation finance.

We will be training the staff of local government agencies, non-profit housing groups, neighborhood organizations, and others engaged in rehabilitation activities. The courses will be designed to teach rehabilitation professionals the various "nuts and bolts" skills required to carry out their programs.

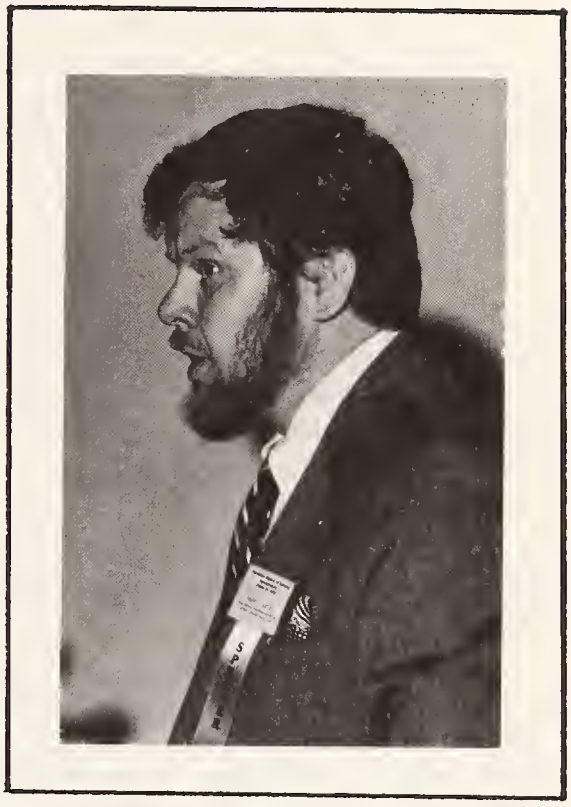
The second part of our technical assistance activity is direct outreach to cities through workshops and publications. We are publishing several guidebooks on rehabilitation program finance and administration. These guides are used as the resource material for various workshops and seminars for rehabilitation professionals.

HUD Rehabilitation Guidelines

by

Robert J. Kapsch
Program Manager
Rehabilitation Guidelines Activities
U.S. Department of Housing and Urban Development

Mr. Kapsch earned a B.S. in Engineering from Rutgers University in 1964; a M.S. in Management of R&D from George Washington University in 1974; and, a M.A. in American Studies from George Washington University in 1978.



Mr. Kapsch joined the staff of the Center for Building Technology in 1971. He has held various management positions of research activities aimed at developing the necessary technical basis for governmental regulations for buildings and communities. He is currently on detail to the U.S. Department of Housing and Urban Development, to assist in the development of rehabilitation guidelines.

Prior to coming to the Center for Building Technology, Mr. Kapsch was employed by the Air Force Data Systems Design Center where he was a manager of computer specialists engaged in developing new computer systems for the Air Force medical services, by the Central Intelligence Agency where he was a project engineer, and with the Air Force Surgeon General's Office as a Medical Construction Officer.

It is a pleasure to be here.

I am the HUD Departmental Representative on the Rehabilitation Guidelines. Two weeks ago Congress, in its 32-hour marathon session prior to recess, passed the Housing and Community Development Amendments of 1978. Included in that Bill is a Section on rehabilitation guidelines. I would like to talk to you today on where that provision on rehabilitation guidelines came from, where it is now, and what it directs HUD to do.

As Jim Gross mentioned, I first became interested in the subject of rehabilitation and building codes back in 1975 when I was his Assistant Chief. I wrote several papers on the subject and worked on a number of the publications that are on the table outside.

When I received the American Political Science Association's Congressional Fellowship, I was asked to join Senator Proxmire's staff on the Banking, Housing and Urban Affairs Committee, specifically for the purpose of organizing a hearing of the Committee, chaired by Senator Proxmire, on the problem of building codes and rehabilitation.

There are a number of reasons for Senator Proxmire's interest in this subject. First, he has always been an admirer of the late Senator Paul Douglas. As a matter of fact, a number of Senator Proxmire's staffers used to work for Senator Douglas. In addition, Senator Douglas was, of course, the Chairman of the Douglas Commission, which studied among other things, building codes.

One of the recommendations made in 1968 from the Douglas Commission was that Congress authorize the Secretary of the Department of Housing and Urban Development to develop model standards to be incorporated into local building codes with special reference to the needs of rehabilitation of housing. This recommendation was never acted on.

The hearing by the Senate Banking Committee on building codes and rehabilitation was held on March 24, 1978. The record of the hearing has just been published, about one month ago. Copies of the record of this hearing are available from the Senate Banking Committee, 5300 Dirkson Senate Office Building, Washington, D.C.

A number of the speakers that you have heard or will hear today provided testimony at that hearing. These include Tad Stahl, Charles Dinezio and Nat Rogg.

In addition to the witnesses at the hearing, written testimony was solicited from each major organization in the building community, such as the Chamber of Commerce, National Association of Home Builders, National Fire Protection Association, American Institute of Architects, and others. Not all chose to provide written testimony for this hearing, but many did and those are included in the hearing record.

Senator Proxmire had four questions for the witnesses at this hearing:

1. Do building codes and other regulations obstruct or discourage rehabilitation, particularly Federally-assisted rehabilitation?
2. Should a model rehabilitation code or standard be developed for the use by States and communities in regulating rehabilitation?
3. If so, by whom? Who should do the work to develop such a model rehabilitation code or standard?
4. Since the regulation of rehabilitation is primarily a State responsibility, what is the appropriate role of the Federal government, if any, in developing and implementing such a model rehabilitation code or standard?

The answers to these four questions that Senator Proxmire received were:

First, on whether building codes do provide a problem or obstruction to rehabilitation was, "Yes, it was a problem." Virtually all the testimony received indicated that building codes do have an adverse impact on housing rehabilitation. Some of the testimony indicated that funds wasted on rehabilitation due to unnecessary building code requirements was as much as 20% of the total rehabilitation budget--leading Senator Proxmire to later state that perhaps as much as $240 million a year of Federal funds may be wasted through this source.

On the second question--Should a model rehabilitation code or standard be developed?--there was little agreement on what should be done. Some held that a model rehabilitation code should be developed, others said it should be a standard, or it should be rehabilitation guidelines.

On the third question--Who should develop such a code or standard?--there was even less agreement. Organizations mentioned include the National Institute of Building Sciences (NIBS), National Conference of States on Building Codes and Standards (NCSBCS), National Bureau of Standards (NBS), model code organizations and others.

But, on the fourth and final question--What is the role of the Federal government, if any?--there was substantial agreement, both on the written and the oral testimony received by the Committee. The testimony indicated that the Federal role with respect to building codes and rehabilitation should be limited to funding the necessary effort. Further, there was a substantial agreement that whatever should be developed - rehabilitation standard, guidelines or codes - should be developed by the private sector with Federal support.

There was also a consensus in the testimony that no sanction should be imposed, such as the withholding of Community Development Block Grant funds, on the States and communities to encourage them to adopt any rehabilitation standard, guidelines or code that might be developed.

With this background, Senator Proxmire decided to offer an amendment to the Housing Authorization Bill, directing HUD to develop rehabilitation guidelines.

This amendment was offered on the Senate floor on April 26 by Senator Proxmire. The provision directed the Secretary of HUD to develop model rehabilitation guidelines for the voluntary adoption by States and communities, to be used in conjunction with the existing building codes by State and local officials in the inspection and approval of rehabilitated properties.

Second, it instructed HUD that such guidelines shall be developed in consultation with the National Institute of Building Sciences, appropriate national organizations, officials of State and local governments, representatives of the building industry, consumer groups, and other interested parties.

Third, it directed the Secretary of HUD to publish such guidelines for public comment not later than one year after the date of enactment of this Section and promulgate them no later than 18 months after such date of enactment.

Fourth, it directed the Secretary of HUD to furnish technical assistance to State and local governments to facilitate the use and implementation of such rehabilitation guidelines.

Finally, it directed the Secretary of HUD to report to Congress, not later than 36 months after the date of enactment of this Section regarding: (1) actions taken by State and local governments to adopt guidelines or equivalent; and, (2) recommendations for further action.

During the Senate markup of this Housing Bill, HUD neither supported nor opposed this amendment and it was included in the Senate version of the Housing Authorization Act. However, the Proxmire amendment was not included in the House version of the Housing Authorization Act, and it, therefore, went to the Senate-House Conference. This is the Conference that had been reconciling the differences between the Senate version and the House version of the Housing Authorization Bill.

Toward the end of the Conference, the House receded to the Senate position on the rehabilitation guidelines provision. The only change that was made by the Conference was that the statement the Secretary "shall" furnish technical assistance in implementing the rehabilitation guidelines was changed to the Secretary "may" furnish technical assistance.

While this was going on, on August 11th, the Under Secretary of HUD, Jay Janis, sent a letter to the Director of NBS requesting that I be detailed to HUD for a period of six months to assist HUD in the development of the model rehabilitation guidelines.

The current status of this provision and this Bill is that we expect the President to sign the Bill in the very near future.

In implementing this provision, the first decision HUD has to make is in which HUD component this activity should fit. There are a number of components that are very intimately involved in rehabilitation: Community Planning and Development, headed by Assistant Secretary Robert Embry; and, as Anita mentioned, this is the HUD component which administers the community development block grant programs, the Section 312 rehabilitation loan program and other rehabilitation activities. It could also go under

Housing, headed by Assistant Secretary Lawrence Simons, which has the very large Section 8 substantial rehabilitation and moderate rehabilitation programs. Or, it could go under the Policy Development and Research component, headed by Assistant Secretary Donna Shalala. We expect that this decision will be made within the next day or two by the Under Secretary.

Once the major component has been decided by the Under Secretary, it will be possible to move forward on the other decisions relating to developing the rehabilitation guidelines such as the budget level, the conceptual approach and the contractors to be used. I say contractors because the intention here is not to use in-house HUD staff for this effort. This effort is intended to be developed by the building community, funded by the Federal government.

No doubt many of you will become involved in this effort in the next coming months. We are certainly looking forward to the interaction and the technical expertise that you can bring to bear in assisting in the development of these rehabilitation guidelines.

QUESTION: Unidentified Participant

Would you please comment on the relationship between rehabilitation standards and the Minimum Property Standards (MPS), and HUD insurance programs for rehabilitation?

RESPONSE: Robert J. Kapsch

The hearings covered both conditions of participation such as the MPS's and other regulations, like the 312 regulations and block grant programs. They also questioned State and local building codes. Testimony was mixed on what was the real problem. Some of those giving testimony said the real problem was the MPS's and not State and local building codes. Probably the bulk of the testimony leaned the other way. That is one of the problems in this area; there is very little objective evidence. There is a lot of expert opinion that has been provided but very little objective evidence as to which document is the specific problem and what specific problems are involved in each of those documents.

QUESTION: Unidentified Participant

Is the intent to relax the MPS's as a result of this?

RESPONSE: Robert J. Kapsch

This provision has nothing to do with any HUD condition of participation regulation currently issued by the Department. It is an extramural effort.

QUESTION: Richard Kuchnicki, National Association of Home Builders

You said that these guidelines will be re-evaluated in 36 months to determine what action is necessary if they are not being implemented. Does that mean that 36 months from now they could become a Federal standard if HUD is not happy that they are not being used?

RESPONSE: Robert J. Kapsch

I do not think that is the intention that they become a Federal regulation. The intent was to answer the question of sanctions. Senator Proxmire's primary interest in rehabilitation guidelines was Federal funds wasted. We are going through a period where Federal expenditures for rehabilitation programs are astronomically expanding. This is true in the Housing Amendments of 1978 and he is very concerned on the issue of sanctions. That provision--the 36 month provision--is primarily addressed to whether sanctions should be imposed and that is different than a Federal regulation.

Session on Code Provisions and Their Impact

Moderator: T. H. "Nick" Carter, Former Executive Director
International Conference of Building Officials

PANEL

Richard Kuchnicki
Associate Director,
Technical Services
National Association of
Home Builders

Paul Folkins
Principal Structural
and Safety Engineer
City of Boston Building
Department

Kenneth M. Schoonover
Chief Engineer, Codes
Development and
Interpretations Div.
BOCA International, Inc.

SESSION MODERATOR

T. H."Nick" Carter
Former Executive Director
International Conference of Building Officials

Mr. Carter earned a B.S. in Civil Engineering from the California Institute of Technology.

Prior to joining the staff of ICBO in 1958, he was senior structural and research engineer for the City of Los Angeles Building and Safety Department. He became Executive Director of ICBO in 1962.

Mr. Carter was instrumental in the development of the One and Two Family Dwelling Code, was a HUD contractor in preparing a report for the Douglas Commission on the building code situation in the U.S., was secretariat to the Model Code Standardization Council, and held a position on the Advisory Council for the Development of Operation BREAKTHROUGH.

Mr. Carter recently opened a private consulting practice and has been retained by the Council of American Building Officials for technical coordination under the CABO / DoE contract to develop model solar energy documents.

He is a member of numerous national boards and his professional affiliations include the American Concrete Institute and the National Fire Protection Association, among others.

All of us in the code enforcement field have been aware for years that problems exist with the national model codes in regard to rehabilitation of buildings. The problem is created by those provisions in the codes that relate to alterations or additions to existing buildings. These provisions are often referred to as the 50% rule and require that if a building is altered or rehabilitated by more than 50% of its replacement value the entire structure must comply with the requirements for a new building.

Strict application of the 50% rule can and often does result in unreasonable enforcement policies in regard to existing buildings. As examples, an existing building may have 8% of its floor area in window area as compared to the code requirement of not less than 10%; or where the code requires an 8-foot high ceiling, a 7-foot ceiling would create a non-conforming

building. We all realize that these are not serious health violations but if the code is strictly enforced, it means that alterations cannot be made to the building unless the entire building conforms to the code requirements for a new structure.

We believe that the original purpose of the 50% rule was to prevent alterations to existing non-conforming buildings where it would prolong their life and create a hazardous condition.

The 50% rule has been used for many years and often as a vehicle to demolish non-conforming buildings in blighted areas. In other words, it was called a rehabilitation program but in fact was a demolition program which did away with many structures that had many years of serviceable life still remaining. Based upon these experiences, code enforcement officials now realize that a new tact must be taken to maintain our existing housing that does not present a hazard to life or limb.

The code enforcement officials want and need an enforceable rehabilitation code. Not having it creates a serious legal problem for the officials, particularly due to repercussions because of sub-standard construction that results in the loss of life.

We believe that in order to provide a vehicle to the building official to allow rehabilitation and to ease his legal responsibility, that it is necessary to develop a set of guidelines or a manual of practice for rehabilitation of existing buildings. It will give us the alternates that are necessary to do an effective job at the grass roots level.

Application of Article 22 of the Massachusetts State Building Code

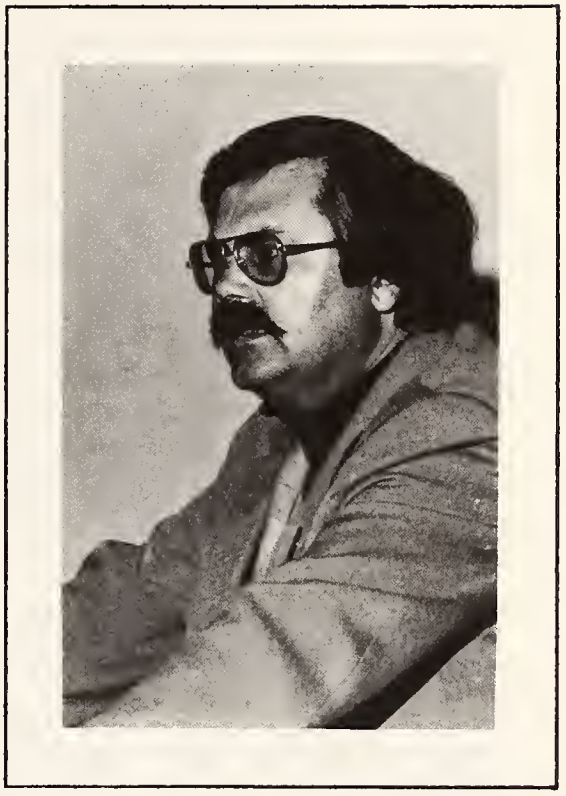
by

Paul Folkins
Principal Structural and Safety Engineer
City of Boston Building Department

Mr. Folkins is a Civil Engineering Graduate of Lowell Technological Institute.

Mr. Folkins joined the staff of the City of Boston Engineering Department in 1964. Since that time, he has served in several capacities, including Senior Engineering Aide and Senior Structural and Safety Engineer. Currently, he is Principal Structural and Safety Engineer, and provides consultant services to architects, engineers, and contractors on the Massachusetts State Building Code, as well as other State, Federal and national codes and regulations.

Prior to joining the Engineering Department, he served as Senior Engineering Aide-M.C.D.-Parks Engineering Department; Assistant Resident Engineer and Chief of Survey, Barnes Engineering; and, Student Trainee, U.S. Army Corps of Engineers.



I am going to give a specific example of a building that was rehabilitated and re-used in the City of Boston, under the current Massachusetts State Building Code. This will include the problems encountered in obtaining a building permit, and the sections of the Code that the building, in theory, violated. I will then go through the process as it would be looked at under the proposed Article 22 of the Massachusetts State Building Code entitled, "Repair, Alteration, Additions and Change of Use of Existing Buildings."

The structure in question is a warehouse building, built around 1870. It is five stories high, heavy mill construction, type 3A, 62 feet to the highest point of the roof, and its legal occupancy is listed as merchantile. It is a rectangular structure, 25 feet wide and 60 feet deep, with an area of 1500 square feet per floor.

Since its inception, the building had been used as a warehouse, merchantile building. For the year prior to its renovation it had been vacant and open to trespass. It had been included with a whole series of almost identical buildings in a massive rehabilitation program.

The proposal to change the occupancy of the building was brought before the City of Boston Building Department. It was proposed to change the use to five apartments. The whole area where it is located is being changed from merchantile to residential occupancy.

The floor plans, as presented to the Department, are shown in Figure 1. The basement, which was almost completely below grade, was going to be used for the boiler room and possibly, a storage area. There would be a one-bedroom apartment on the first floor and one, two-bedroom apartment on each of the remaining four floors. This total gutting of the building is a very typical rehabilitation situation for the City of Boston.

The building, when evaluated under the present Massachusetts State Building Code, had an assessed value of $10,000. If looked at strictly as a replacement, it would cost approximately $60,000 to replace the shell of the building. The proposed work would cost approximately $100,000. The amount of work, therefore exceeded 50% of the assessed value of the building. In fact, it was over 100%. Therefore, the Code mandated that the building be brought up to requirements for new construction in all respects.

This entailed a rather lengthy appeal to the State Building Code Commission for every building under consideration. Approximately 30 buildings were being renovated, and individual appeals had to be filed for each and every one of them, even though the problems were very similar in each building.

The Sections of the Massachusetts State Building Code, which is based on the BOCA Basic Building Code, which were appealed are:

- Section 303.0 - Buildings of type 3A construction are not allowed over four stories, 50 feet high. The existing building is five stories, 62 feet high.

- Section 616.21 - All interior stairs shall be 42 inches in width. It was proposed to re-use the old stairwell opening, thereby reducing the width of the stairs to 36 inches.

- Section 616.62 - All stairway doors shall swing onto the stair landing in the direction of egress travel. The doors off the stairway are proposed to swing into the apartments not onto the landing.

- Section 616.9 - The stairway shall be of non-combustible construction and have a two-hour fire resistive enclosure if over 3 stories high. The proposed stairway is of wood construction with a two-hour combustible fire resistive enclosure.

- Section 621.0 - All windows on or within 5 feet of fire balconies shall be fire windows (wire glass in steel frames). The proposed windows are plain glass in wood frames.

- Section 718.0 - The existing building was not designed for seismic forces.

- Section 815.0 - The existing mortar (lime) does not meet the requirements for new mortar.

- Section 868.0 - All masonry exterior walls shall have parapet walls 2 feet above the roof. The existing parapet walls are 1 foot above the roof.

- Section 1206.0 - Standpipes are required in buildings of residential occupancy over 3 stories high. It was proposed to omit the standpipes.

This project went to the Board of Appeals, which granted all variances, the building permit was issued and the building was rehabilitated under a Federally-assisted program and is currently being occupied.

Under the proposed Article 22, the building official would look at the existing building and proposed changes to determine if any hazardous conditions exist and if the hazard level index is being increased, decreased or staying the same.

In the example, the existing building is structually sound and has two means of egress (the stair and the connecting balconies); therefore, no hazardous conditions exist. The hazard index number of the existing merchantile occupancy is 3 and of the proposed residential occupancy is 2; therefore, the hazard level is being decreased and under Section 2203.8.1 of Article 22, no further compliance with the Code is required except for new systems--plumbing, electrical, HVAC--partitions, the new stairway and the fire alarm system.

By having no hazardous conditions and decreasing the hazard index, the violations under Sections 303.0, 621.0, 718.0, 815.0, 868.0, and 1206.0 do not occur as no compliance with those sections is required.

However, as a new stairwell is being installed, Sections 616.21, 616.62 and 616.9 must be complied with as per Section 2203.8.1.1 of Article 22. Section 2203.8.1.1 allows compliance alternatives and therefore, the building official can allow less than total compliance with the code for new construction.

Sections 616.21, 616.62 and 616.9 require that the stairway be 42 inches in width, have doors swinging onto the landings and be of non-combustible construction with a two-hour fire resistive enclosure. The proposed stairway is 36 inches in width, has doors that swing into the apartments, is made of wood, and is enclosed with two-hour combustible fire resistive partitions (2 layers of 5/8 inch gypsum wallboard, type X, both sides of wood studs).

A stair of 36 inches in width is one and one-half units of egress width, which gives an allowable occupancy of 113 persons per floor. The occupancy load allowed in the previous merchantile occupancy is 25 persons per floor and under the proposed residential occupancy is 6 persons per floor. Therefore, a 36 inch stair is more than adequate for the occupancy load, as it is unlikely that 113 persons are going to be in the entire building, let alone on any one floor. Furthermore, to install a 42 inch stair the floor would have to be restructured and reframed, reducing the size of the apartment units and possibly, running into structural problems. A friend of mine, who is a structural engineer has a saying that, "Buildings that are together, tend to stay together if you don't disturb them." This is true, it is best to do the least amount of structural work as is possible if the building is structurally sound.

The requirement for the swing of a door onto the stairwell landing was written from the point of view of a larger structure in which a corridor leads to the stairwell. Therefore, you would want the door from the corridor to the stairwell to swing onto the landing in the direction of egress travel. Historically, in row buildings which were used as apartment houses and/or lodging houses, the doors have always swung into the units without endangering the life safety of the occupants.

The existing stairs were wood with an unrated enclosure. The proposed stairs would be wood with a rated enclosure. Due to the various floor-to-ceiling heights, as well as other construction difficulties, steel stairs were not chosen to be used.

Because of the previous statements and the fact that the occupancy safety of the building is being increased via the use of fire retardant finishes, installation of a fire alarm system, and the rated enclosure of the stairwell, the building official could approve the permit without requiring a Board of Appeal hearing.

This is only one small example, and the principles illustrated could be used in many other circumstances.

Figure 1: Floor Plans of Proposed Re-Use of Merchantile Building

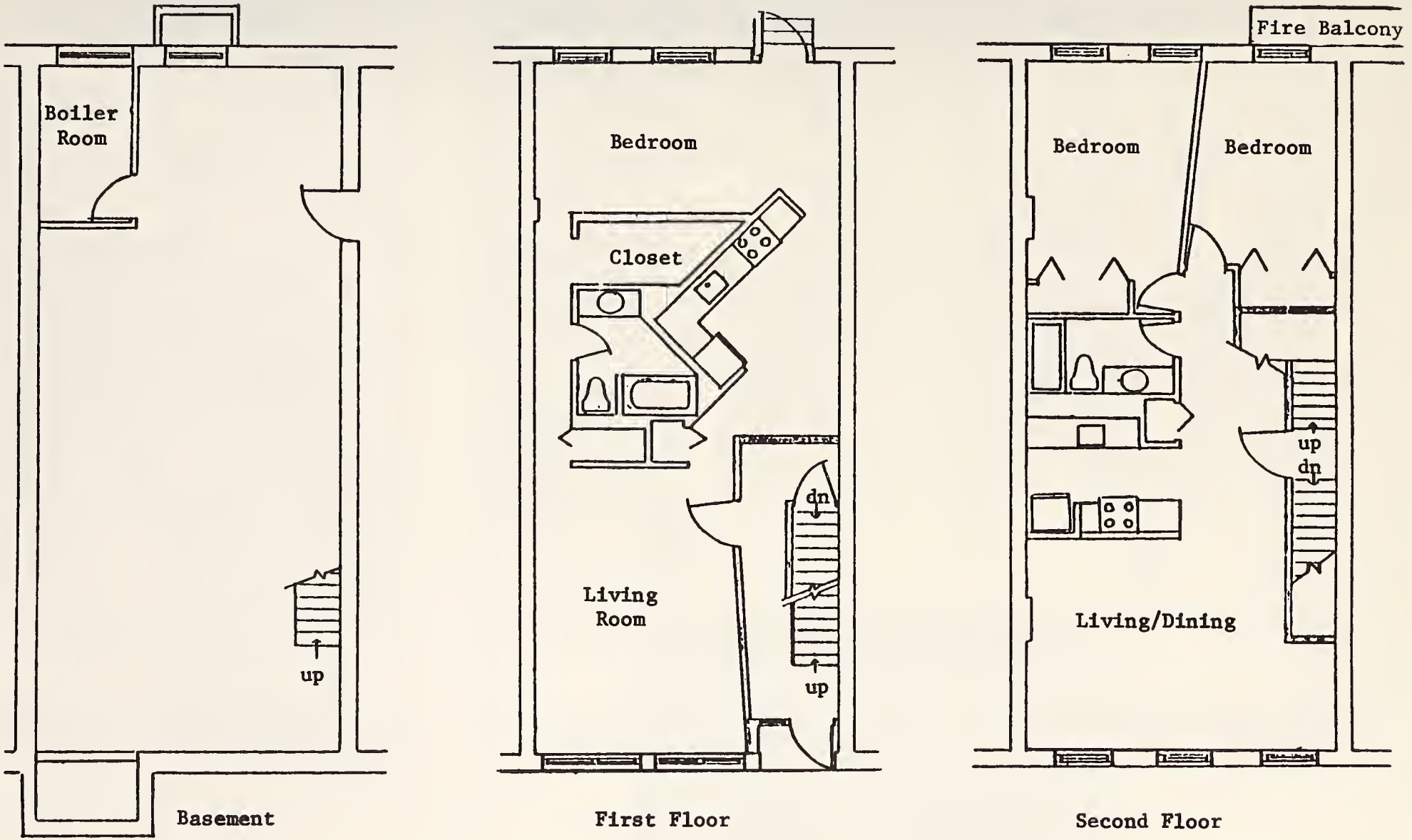
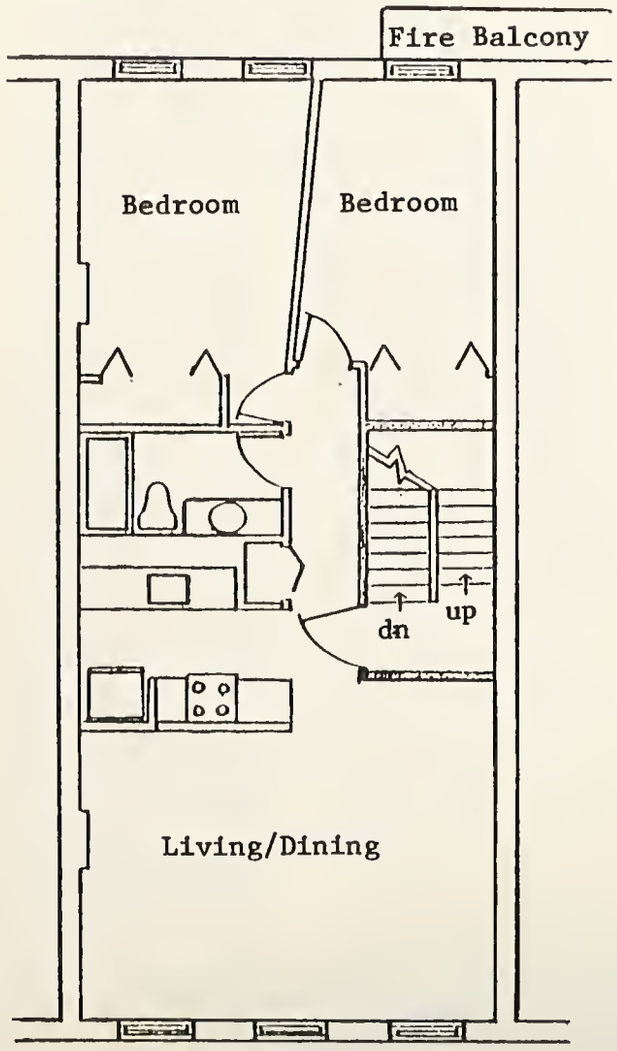
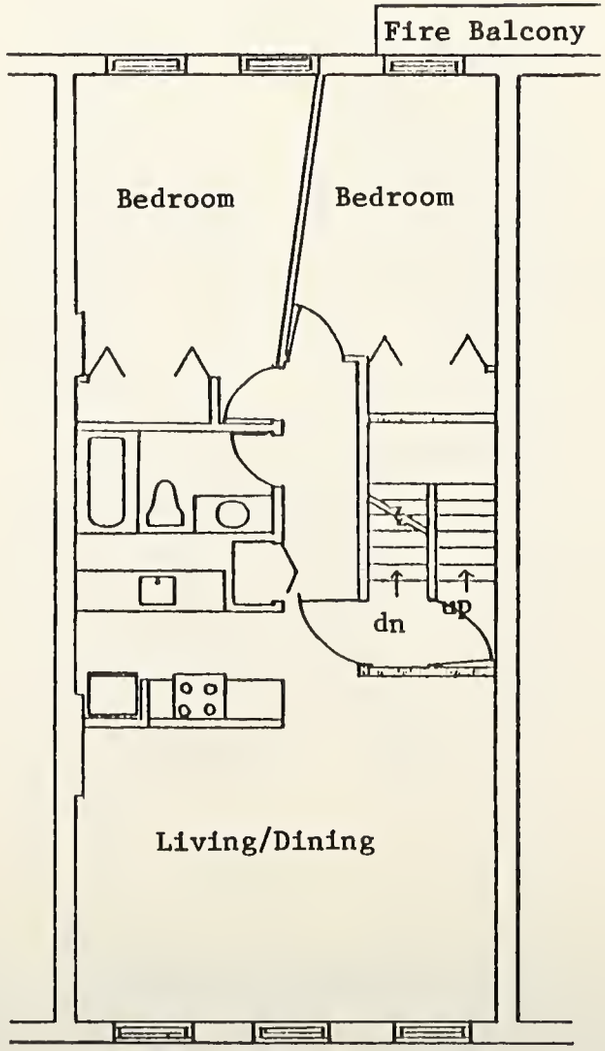


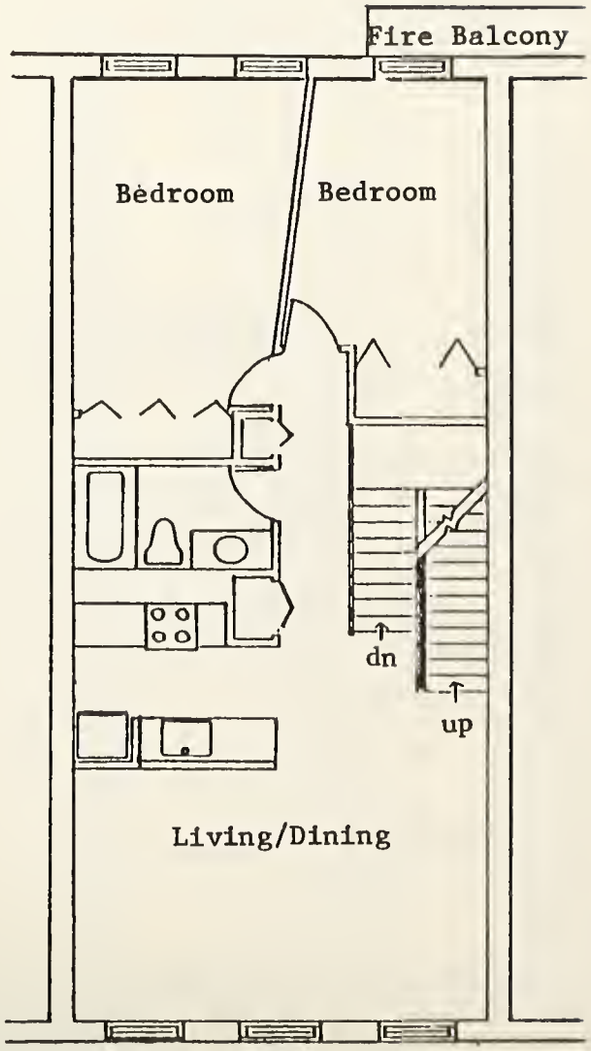
Figure 1: (continued)



Third Floor



Fourth Floor



Fifth Floor

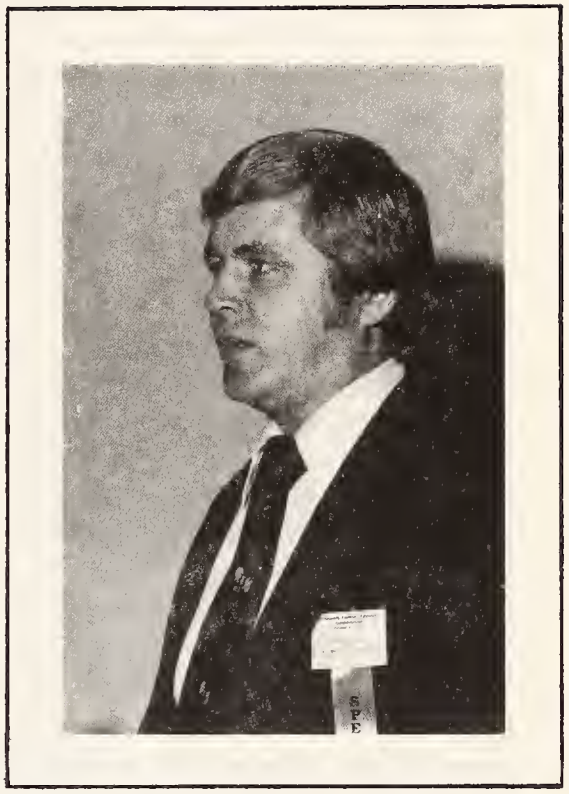
Impact of New Construction Oriented Codes on Building Rehabilitation

by

Richard P. Kuchnicki
Associate Director of Technical Services
National Association of Home Builders

Mr. Kuchnicki received a degree in architecture from Texas A&M University.

After several years as an officer with the U.S. Army Corps of Engineers where he served as a construction engineer in various assignments in the U.S. and overseas, he joined the staff of the National Association of Home Builders (NAHB). Currently, Mr. Kuchnicki is the Associate Director of Technical Services with NAHB, where he is involved in providing service and advice to builders in such areas as codes and standards, energy conservation, and materials and building systems. In addition, he has represented NAHB at model code revision hearings and on various committees of these groups. Mr. Kuchnicki is the staff coordinator for NAHB's Special Committee on Energy.



Mr. Kuchnicki is co-author of the "NAHB Builders Guide to Energy Conservation" and assisted in the development of the NAHB Thermal Performance Guidelines for One- and Two-Family Dwellings, and Thermal Performance Guidelines for Apartments and Condominiums. In addition, he serves on several committees of the National Fire Protection Association and the American Society for Testing and Materials.

Mr. Carter mentioned that I have been involved somewhat in energy conservation matters with the National Association of Home Builders (NAHB). However, one of the biggest jobs in my department is in the area of codes and standards. When Nat Rogg left, our membership was up to 85,000; we now have over 108,000 members in NAHB and we are expanding our services to our members. One of the big areas that we are expanding services in is in the area of remodeling and rehabilitation. In the back of the room is the Assistant Director of the NAHB Remodeling and Rehabilitation Department, Amy Van Doren. So, if there are any questions I cannot answer, Amy is here for you to talk to and answer questions.

My comments will be directed more toward the builders concern about those items in the code that affect rehabilitation because of the fact it is part of a new construction type code. It would have been good if

we had a copy of the Massachusetts Rehabilitation Code ahead of time to to critique. However, I am sure we will be putting our comments together and sending them to the gentlemen who put it together.

NAHB shares the concern of many others that building codes can present a nearly insurmountable barrier to rehabilitation projects, particularly when enforcement officials insist that the whole structure be brought up to new construction standards.

The fact that the model building codes require an existing structure be brought completely up to the standards of the currently enforced building codes whenever rehabilitation costs exceed 50% of the building's value and in some instances require all new work to comply where costs are between 25-50%, creates real problems for builders who want to undertake a rehabilitation project.

The low property value of many of the older buildings compounds the problem even further when the 50% rule is applied. In many cases, older buildings cannot be brought up to standards of the model building codes because these codes are new construction oriented. Many obsolete construction materials and techniques are not addressed in the codes because they have been replaced by new technologies.

The prescriptive language in new construction oriented codes can create problems that are unique to existing buildings. The truly performance type code for rehabilitation is, therefore, of prime importance.

Another problem which can make a rehabilitation project difficult is the lack of coordination among the various codes--building, plumbing, mechanical and electrical. Right now we are just addressing the building code here. While the three model code groups all have their own building code, mechanical code, and plumbing code now that ICBO has recently adopted a plumbing code, there is still little or no coordination with the National Electrical Code (NEC).

For example, although the building code is supposed to be concerned with fire ratings of construction assemblies and combustibles in concealed spaces, the NEC has been trying to regulate the use of non-metallic sheath cable based on the argument that it is a fire hazard. The same problem has existed with plastic pipe requirements in the Uniform Plumbing Code.

Bringing older buildings completely up to the standards of a currently enforced building code is even further complicated by the fact that there are now many new sections in the code that did not exist when the building was constructed and are not imminent hazards to life and safety. The reason for this is that in recent years there seems to be a trend toward the use of building codes to regulate the social problems of our nation.

One example of this is the provisions for energy conservation. NAHB has been a strong supporter of energy conservation in buildings. However, these measures must be cost-effective and realize a payback to the consumer within a reasonable time period. The energy conservation measures currently in the model codes are, in some instances, not even cost-effective for new construction. They certainly will not be cost-effective for a rehabilitation project.

Another social problem that is beginning to be addressed in the building codes is that of building security. It has been our position that security measures do not belong in a building code and they certainly should not be part of a rehabilitation code.

Barrier free design is yet another area that the building code now addresses. Certainly the problems of making the building accessible to the handicapped are much different in an existing building than they are in new construction.

Sound transmission control is yet another new addition to the codes in recent years which is not a life safety issue.

These non-life safety type of items should definitely not be included as requirements in a rehabilitation code. Perhaps, they could be separated and put into some form of guidelines to consider depending on what the local needs are as far as, for example, barrier free design is concerned.

Another area of concern we have is the fact that most buildings have been constructed using the concept of fire-zoning or fire districting, where it was the intent to limit construction and uses of buildings so that fire would not spread from building to building over a large area of a city.

Highly concentrated built-up areas where the greatest possibility of conflagration exists would be in a more restrictive fire zone. As it turned out, however, establishing the fire zones did little to limit conflagration, since the application of fire zones for new construction did little to change the condition of existing buildings and such zoning is usually not applied until its needs can be justified.

In recent years, there has been much discussion at the hearings of the model code groups concerning the elimination of the fire zoning concepts from the code, because it is not effective and in many cases it is not being enforced.

NAHB has supported the proposals to delete fire zones, not only because they have not been effective but also because they have been a detrimental effect on the rehabilitation of older buildings, since rehabilitation is not often feasible due to more restrictive requirements which occur within the fire zones.

These problems that I have mentioned are only a few of the constraints which are placed on rehabilitation by building codes which are new construction oriented. Whether or not the preparation of a code which specifically addresses the rehabilitation of buildings can solve these problems will depend on many factors.

One of the biggest factors which will affect the successful development of a rehabilitation code is whether or not a truly performance type code can be developed which can be easily and practically interpreted.

Materials and construction standards must be written in performance terminology by stating clearly "what" is to be achieved, rather than "how" it is to be achieved.

Uniformity of code requirements, as well as uniform enforcement requirements, are essential. The model code groups will have to work as a team in developing one, single, uniform code.

It will be very important to utilize the knowledge and skills of all those organizations and individuals which have experience in code development and enforcement and those which must comply with the codes.

NAHB strongly urges that a committee structure be set-up similar to the Council of American Building Officials' One- and Two-Family Dwelling Code Committee, which has a wide representation.

Currently, the code revision committees of the model code groups include code enforcement personnel only. We feel strongly that a rehabilitation code committee should also include builders, architects, engineers, consumers, labor representatives and other affected groups.

An effective training and education program will be necessary to properly implement the code. This program should be directed not only toward building officials, but also to builders, architects, engineers, etc. NAHB stands ready to assist in such a program.

In summary, NAHB's viewpoint as far as the impact of building codes on rehabilitation is concerned, is that although rehabilitation remains an excellent source of lower cost housing, improperly written codes can destroy this source. When rehabilitation means gutting, then we have turned rehabilitation into new construction.

It is, therefore, extremely important that a rehabilitation code be written which is truly performance oriented and concerns itself with those items only that affect the health and safety of the building occupant.

Code Requirements for Existing Buildings: A New Approach

by

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Chief Engineer
Building Officials and Code Administrators International, Inc.

Mr. Schoonover received a B.S. from the Milwaukee School of Engineering in 1973.

Currently, Mr. Schoonover is the senior staff engineer of the Building Officials and Code Administrators International, Inc. (BOCA), where his responsibilities include code interpretation, code development and general technical services. In addition, he is the project director of the National Conference of States on Building Codes and Standards-Department of Energy, Energy Code Contract and will be involved in BOCA's continuing activities in the energy conservation, rehabilitation and related code development areas.

Mr. Schoonover's teaching assignments have included Building Code, One- and Two-Family Dwelling Code, and Plan Review Workshops, as well as several short courses in energy conservation. He is a registered Professional Engineer in the State of Wisconsin and is listed in the Directory of Fire Research Specialists published by the National Bureau of Standards.

It is a pleasure for me to be here today because of my close involvement with this project. I have been called a specialist on this subject but that is probably only because this project has involved trying to do something with the current codes that has never been done before; that is, attempting to change how the building code is applied to existing buildings.

Whenever something new like this is attempted, we tend to tread new ground, try to solve some old problems, but this often brings up some new problems. In this respect, this effort has been particularly challenging. We think we have taken what is the first step in trying to improve the codes as they relate to existing buildings.

The document I am referring to represents an effort at trying to improve the existing building code provisions for the State of Massachusetts. The project was conducted specifically for that State and, therefore,

some of what is contained in the provisions reflects or represents some State-specific concerns. Rather than go into specific detail as to what is contained in this document, I would like to address the concepts or objectives which were outlined and identified and which we intended to establish by the specific code provisions.

The State of Massachusetts is adopting the 1978 BOCA Basic Building Code as its statewide code. The Basic Building Code contains, which has been mentioned previously, rules for the application of the code to existing buildings and is commonly referred to as the "twenty-five - fifty percent" (25-50%) rule. These rules relate to the cost of alterations or repairs compared to the replacement value of the building and establish what is now identified as rather arbitrary triggering mechanisms for code compliance.

To what extent must existing buildings currently comply with the code for new construction? Very simply, if the cost of alterations or repairs is less than 25% of the value of the building, those alterations or repairs may occur with no further compliance to the code for new construction; that is, they may be replaced with what was originally there. This aspect of the 25-50% rule has posed no significant problems.

If the cost of alterations or repairs exceeds 50% of the value of the building, the code specifically says that the building must comply with the code provisions for new construction, irrespective of the condition the building is in. The existing conditions may or may not be easy to make comply with the code for new construction. Although this causes many compliance problems for the owner of the building, this aspect of the rule has been easy to enforce. The building must comply with the code, no ifs, ands, or buts about it.

The last range of the current 25-50% rule left to discuss is the aspect which many code enforcement officials find troublesome. If the cost of alterations or repairs is between 25 and 50% of the value of the building, the code states that the building official shall determine to what extent that building shall comply with the code for new construction. It is up to the building official to specify the level of compliance which will result in an acceptable building for re-use. This aspect of the rule opens the door for decision-making, judgmental decisions about the proposed alterations and, in general, exactly what the building official will accept in terms of minimum requirements.

The essence of the provisions drafted for the Massachusetts State Building Code are an expansion of the range of the current 25-50% rule under which the building official determines to what extent the building shall comply. It is intended to expand the decision-making ability to any situation when alterations or repairs are being made and does not arbitrarily specify that either the entire code for new construction shall be complied with or that no new compliance shall be required. It is anticipated, under this expansion of the decision-making ability for

the building official, that he will work hand-in-hand with the building owner and/or architect to come to agreement on the conditions which will be permitted to occur in the re-use of existing buildings. By removing the arbitrary triggering mechanisms we hope we will have removed the primary obstacle to the rehabilitation of existing buildings.

This concept states as simply as possible that you can do anything in building in terms of alterations or repairs which improves its condition or basic level of compliance to the current code for new construction. You can do nothing to reduce its level of compliance. With the exception of certain changes in use group, and the installation of new construction systems, at no point will one have to face the possibility of the code indicating that full compliance for new construction is required.

This poses a unique challenge since every given existing building has individual and unique sets of circumstances. Under this concept, one must evaluate the building as it exists and has been previously operating. Every existing building will fall at a certain point in terms of its reference to compliance with the code for new construction. The code establishes requirements for all new construction, therefore, a building may be evaluated in terms of what degree it presently complies with the code for new construction, and this should be fairly easy to measure. At the other end of the measuring stick, a code outlines what is termed an unsafe or dangerous building. Although it is not very explicit on all unsafe conditions, it does establish that this is the bottom line of the code in terms of life safety. The code does not permit a building to exist in an unsafe condition.

Having these two reference points, all existing buildings will fall in this range usually between the point of unsafe and complying with the code for new construction. Most buildings, I expect, fall somewhere below the level of the code for new construction; that is, they do not fully comply with all the provisions of the code for new construction in all aspects. Most of these same buildings are most likely above the level established by the code as unsafe or dangerous. These are primarily the buildings which the new code provisions will affect, although they are not limited to that. Any unsafe conditions which might occur in existing buildings must be corrected just as the code today requires. On the other hand, if a building exceeds the code requirements for new construction, these provisions could allow the reduction of that level of compliance to that which is required for new construction. For example, if a sprinkler system is in an existing building and it is neither required by the code for new construction nor was it a condition of prior approval of the building, these provisions would allow the elimination of that sprinkler system. This could also apply to any other aspect of the building which is over and above the requirements for new construction.

But again, the majority of buildings fall somewhere below the level for new construction and as long as there are no unsafe or dangerous

conditions the building may remain at its present level of compliance or may be improved, regardless of the dollar amount of work that is being done.

The provisions of the code which I would like to be specific on are contained in section 2203.0 of the draft provisions. What is outlined here are the different conditions under which an existing building finds itself when work is intended to be done. These situations are additions, alterations, repairs or changes of use, and the conditions which are either over and above the code for new construction, below the level of the code for new construction, or below the unsafe or dangerous level.

Section 2203.1 basically states what I previously described, those facets which are over and above the code for new construction may be reduced to the level of the code for new construction. When a building is less than the code requirements for new construction, alterations may be made without further compliance to the code. Again, this is where the arbitrary triggering mechanism of the 25-50% rule is eliminated. Recognizing the elimination of the old triggering mechanisms and the expansion of the decision-making ability of the building official, you can appreciate the problems that this poses for him. What goes along with the concept we are fostering is promotion of the use of judgmental decisions and the use of compliance alternatives, which is what the next section speaks to. Where compliance with the provision of the code for new construction is not practical, and we have seen that under the old rule many impracticalities can occur, these provisions allow the building official to accept alternative solutions--solutions which achieve the basic objective of the code without necessarily meeting all the specific and detailed requirements of the code for new construction.

This is a very important concept although it is not a new concept. Under the present rule as I described, when the alterations are between 25 and 50% of the value of the building, the judgmental determination by the building official is called for today. The intent of these provisions is to further foster and promote the idea of the use of judgmental decisions and secure the intent of the code regardless of the cost of work being completed.

Section 2203.4 speaks to additions. The basic idea is that if you are going to add to a building, the addition must comply with the code for new construction to the fullest extent possible. It should not be unreasonable to expect that any new work which will occur; that is, work which is going on that is not affecting anything in place or which was not there before, should comply to the fullest extent possible. We expect new buildings to comply with the code, and, therefore, it is not unreasonable to expect any new construction to comply. This would include structural assemblies, adding floor area to a building, electrical systems, fire safety systems, etc.

It was also necessary to include a subtle statement to prevent an addition to an existing building from bringing the existing building further out of compliance. For example, if you are adding to an existing building and the addition eliminates some of what was previously an exterior wall, the elimination of that exterior wall may put the existing building out of compliance. The original building may have relied on the open space adjacent to that exterior wall for compliance to the height and area requirements of the building code. Since the basic concept is that you can do nothing to an existing building which brings it further out of compliance with the code, this situation would not be permitted.

Section 2203.6 outlines some of the hazardous conditions which must be upgraded, no differently than under the present building code. Imminent threats to life safety, such as structural defects, lack of sufficient number or capacity of exitways are identified as hazardous conditions. These are intended to work in conjunction with the current provisions of the building code that give the authority to the building official to go in and exercise elimination of unsafe conditions.

From this point on the provisions speak to two situations in existing buildings which will always occur when there is a plan for re-use of the building. These conditions are change in use, and alteration or repair with no change in use.

If there is no change in use, the provisions relate back to the basic concept. You can do anything which improves or maintains the condition of the building and you can do nothing to reduce the present level of compliance. As previously described, however, if there are new systems incorporated into the building such as additions or electrical systems, they must comply to the fullest extent possible.

At this point, it was necessary to get specific about certain occupancy classifications. Here again, I would point out that some of what is contained in these provisions on certain occupancies, like residential and institutional buildings, are due to specific needs or desires of the State of Massachusetts. In concept, they could be applicable anywhere. For example, if you increase the number of dwelling units in a residential building without changing the use group classification of the building, then there are certain minimums which are expected. This situation commonly occurs in the old Victorian Arts in Boston. In this case, these provisions call for single station smoke detectors in each dwelling unit and exit signs and lights as required for new construction. If the occupancy load of the building is increased, the exits may have to be upgraded as necessary to provide the minimum number and capacity. While this may apparently conflict with what I stated was the basic concept of these provisions, that is, no required compliance with the code for new construction, these are aspects which are not unreasonable and which most designers would consider doing anyway.

These are also items which we have identified either through past history or continuous appeals which have been experienced in the State of Massachusetts.

If there is a change in use group, here is where we have taken the newest steps in trying to foster a new idea about compliance with the code. These provisions set up identification of different use group classifications according to the building code and establish what is called a Hazard Index Number that is intended to represent the relative hazard of that use group to another use group. It takes into consideration the admittedly nebulous parameters that the present building code is founded upon, such as the occupancy load of the building and the nature of the activities and occupancy itself. High hazard occupancies, according to the building code, naturally have a high hazard index number. Buildings such as assembly or nightclubs, which have a high occupancy load, also have a higher hazard index number. The hazard index numbers are intended to approximate the relative stringency of current building code requirements for those occupancies.

Applying the hazard index number indicates what is expected to be upgraded when a change of use occurs. When a building has been operating satisfactorily for one given use group, we may expect upgrading of certain aspects of the building when it changes to a higher hazard use group. There are a number of conditions which again are spoken to here.

If the building is being changed to a use that is an equal or lesser hazard, then the original rehabilitation concept applies, that is, no further compliance with the code is expected. Here again though, the previous position on new construction systems and unsafe conditions still applies. If there is a change of use in which the hazard index number is higher, these provisions establish two conditions which are treated differently. If the change in use is one hazard index number higher, that is, the building is going to be a slightly more hazardous use, the provisions for the code for new construction shall be complied with but with certain exceptions. The stated exceptions are attempts to identify items which cannot be upgraded to new construction requirements without causing a significant burden or which cannot be complied with without tearing the building down. For example, window areas and ceiling heights may not meet the code for new construction. Also, lime mortar was commonly used in many older buildings in Boston, and does not comply with the code for new construction. To expect compliance on those items is impractical and unreasonable.

When the change in use is more than one hazard index number higher; that is, we are taking a significant jump in the hazard level of the use that exists, these provisions require full compliance with the code for new construction. The building code today requires full compliance when any change of use is involved. These new provisions do not affect the current position of building codes when the change in hazard index number is more than one number higher, but relaxes this position when

the changing hazard index number is only one number higher. It was felt that this was the best first step that could be taken at this point in time.

Another objective of this effort was to eliminate the number and types of appeals which have gone on because of the arbitrary 25-50% rule. It is felt that the provisions which make exception for mandatory compliance with the code for new construction, such as the lime mortar situation, begin to accomplish this for the State of Massachusetts. It may not totally eliminate all appeals, but to a great extent, I think we are going to improve the treatment of existing buildings.

The code provisions themselves are not necessarily the key to the problems that have gone on in the treatment of existing buildings. The biggest challenge that faces us is the attitudes and thoughts of the people who are charged with enforcement of the codes. This approach requires a change in the trend of thinking and increased awareness of compliance alternatives, and in general, being reasonable and open-minded about making decisions on alternative solutions. Again, I emphasize that the present code to a limited extent provides for such decision-making by the building official, when the cost of alterations is between 25 and 50%. To provide code provisions which expand this concept is a much smaller problem than that of promoting the proper implementation of the concept.

In an attempt to assist in the decision-making process, there are series of reference standards that accompany the code provisions. These reference standards are intended to do nothing more than provide some helpful information to assist both the building official and the designer in coping with this new approach.

The first reference standard could probably have served as my entire presentation because it provides a description of the application and objectives of these code provisions.

The second reference standard is entitled, "Acceptable Compliance Alternatives." The use and acceptance of alternative solutions to code compliance problems is an important part of these provisions. The purpose of this standard is only to outline and describe the thought process which should be used in coming up with up with alternative solutions. The examples are not detailed and are not intended to be the "Bible" which applies to every situation. Every existing building has its own set of circumstances, and at this point it would be impossible to provide examples to reflect every conceivable situation one may come into contact with. Again, many of the examples are based on appeal cases and generally accepted situations which have been used in the past. It is anticipated that as more and more experience is gained in dealing with existing buildings the examples in this reference standard will be expanded and increased.

Reference Standard 3 merely lists a number of different occupancies and identifies the appropriate use group classification and hazard index number. These are intended to work in conjunction with the use group classification according to the building code and should not in any way supersede the authority to establish a use group classification under Article 2 of the building code. This information may serve to assist in identifying appropriate use group classifications when in fact it may be questionable.

Reference Standard 4 represents an area where the National Bureau of Standards has been helpful and which we see as necessary because it outlines what is called Archaic Construction Systems. A significant amount of information is provided about building construction systems which are no longer in common use, which may no longer be mentioned by current building codes, but which may occur in existing buildings and may in fact be acceptable. It is necessary for both the building official and the designer to be aware of the make-up of existing buildings in order to be able to evaluate the changes that are being made to that building. There is information on the materials and assemblies which were used and accepted as having a fire resistance rating, as well as information about older structural assemblies.

Again, these reference standards are definitely not the optimum answer to all situations. I think the scope of any project from here on in will be an expansion and improvement of this information and the assistance type information which is going to be necessary for building officials and designers to properly and appropriately utilize this concept.

In summary, we hope these provisions will eliminate some of the problems we are currently having with the building code for existing buildings, while yet maintaining the true objective of the code in providing for an appropriate level of life safety, health and general welfare. We look forward to continued use, upgrading and improvement of this type of material and hope that we are moving in the right direction in facilitating the re-use of our existing buildings.

PANEL DISCUSSION

QUESTION: John McClaughry, National Commission on Neighborhoods

In your remarks you emphasized many times the importance of granting discretion to the building code official in dealing with a wide latitude of code questions. What provision is there in the Massachusetts code for dealing with disputes between the contractor and the building code official in this gray or discretionary area?

RESPONSE: Kenneth Schoonover, Building Officials and Code Administrators International, Inc. (BOCA)

That is not a new problem. Whenever the building code establishes the authority for a building official to make a decision, as with any law, the persons affected by the decision--if they feel it is an improper decision or improper interpretation of the code--have the right to appeal the decision of the building official. Currently, under the building code there is a section called, "Modifications," which allows a building official to make a modification. Other sections of the code give the building official the authority to interpret the code. Again, any building code will set up a mechanism for appealing the decision of the building official, should for example, a contractor feel that the building official has made an improper decision, or an incorrect decision or interpretation of the code. So that method of follow-up is the same as is in the building code and would be the established appeal procedure.

QUESTION: T. H. Carter, International Conference of Building Officials (ICBO)

Are there appeal procedures or boards established within the Massachusetts Rehabilitation Code specifically, or would it be up to the State code or whatever the case may be--the local code?

RESPONSE: Kenneth Schoonover, BOCA

This may be a point of confusion. These provisions as we have drafted for Massachusetts are incorporated as a part of the building code and tie in directly with those established procedures of the current building code. There has been some discussion about the possibility of setting up a new or different appeals procedure, either on a regional basis or the like, but these provisions are going to work in concert with the already existing appeals procedures of the building code.

QUESTION: T. H. Carter, ICBO

Does the State Building Code provide for an Appeals Commission or Board, as such?

RESPONSE: Charles J. Dinezio, Massachusetts State Building Code Commission

Yes, it does. There are two appeals boards. You can have one if the local municipality wishes to establish one. Or, if not, there is a State Building Code Commission which does have an Appeals Board. You can bypass the local and go directly to the State Building Code Commission.

QUESTION: Bernard A. Cummings, National Association of Housing and Redevelopment Officials (NAHRO)

I see two model code organizations represented here. Are all of the model code organizations committed to this type of modification of their codes to implement rehabilitation - to remove the obstacles to rehabilitation?

RESPONSE: T. H. Carter, ICBO

Yes, that commitment has been made and not only in the State of Massachusetts. We have participated with the National Conference of States on Building Codes and Standards (NCSBCS). Also, the NCSBCS has submitted an unsolicited proposal to the U.S. Department of Housing and Urban Development, which Mr. Dinezio just told you about. Here again, the three model code groups, or the Council of American Building Officials, are part of that effort. They all believe in this basic concept.

QUESTION: Creighton Lederer, City of Detroit

In the example that you gave, was there any planning that went on as to what actions would take place if in the near future, after the reconstruction was completed, there was a fire involving loss of life, where the question of those decisions which were made concerning stairway widths, door swings, window areas came into question?

RESPONSE: Paul Folkins, City of Boston Building Department

There were discussions in my office as to if a fire occurred and there was a loss of life. We keep a record of what we do, and a copy of the plans are always on file with us. The principles that are used here we have used in Boston for many years when the rehabilitation was under 50%. In fact, it would have been used on these buildings except that it was impossible because of the information shown in the figures, there was no way you could ever say they were doing work less than 50% of the physical value of the buildings.

We have done this in the Back Bay area, and in buildings in the South end. This has been a practice in Boston when Boston had its own code up until January 1, 1975, when the State Code came into effect. We keep the records by keeping the plans and keeping what we have approved on file. That is the best way we can keep records. We have had some fires in buildings we have given permits to and in which there has been a death. But, we try to improve our methods if that happens.

QUESTION: Creighton Lederer, City of Detroit

My question was posed towards the difference between new construction requirements vis-a-vis the allowances that would be made in a building like this in order to rehabilitate.

RESPONSE: Paul Folkins, City of Boston Building Department

That really has not come up on a legal basis. Basically, we have had buildings which do not naturally meet new standards because they are existing buildings and have been given permits. And, either we have given them on our own authority because they were under 50%, or they went to the Board of Appeals. But, no one has ever questioned, at least in Boston, the legality of what we did and why we did it. I honestly do not know what the answer to that question might be.

COMMENT: T. H. Carter, ICBO

We like to look at it from the other point of view. Yes, it is, in effect, a double standard. However, a code in itself is really a list of general requirements which really apply to all parameters criteria. And, therefore, it has to cover a multitude of sins. Here, we have an existing building that has proven itself over a period of 50 years, or whatever. And, we have specific conditions or parameters that pertain only to that situation. And, for that reason we are justified in many instances in not requiring new building requirements.

QUESTION: Bennett Selekof, New York State Building Codes Bureau

We all know what the 50% value rule is, we have it. But, in effect, what you have done in Massachusetts is to pull back the determination to 25% and the term "replacement value" is still a key figure. Do you have a firm definition as to what you mean by "replacement value?" Has Massachusetts come up with a firm definition of that?

RESPONSE: Kenneth Schoonover, BOCA

Under the provisions for the State of Massachusetts, the application of the code to existing buildings is no longer going to depend on the cost of the work being done as it compares to the replacement value of the building. I can tell you how the Basic Building Code defines that and it is nothing more than the current replacement cost of the building. That being interpreted to be what it would take to replace that building with a building of like size and use, constructed of conventional or currently-used building materials.

QUESTION: Bennett Selekof, New York State Building Codes Bureau

In other words, you do not have any alteration--regardless of the extent--even a 5% or 10% alteration that comes under this new code?

RESPONSE: Kenneth Schoonover, BOCA

Right. The application of these provisions will not be a function of the cost of work that is being done. That has been eliminated.

QUESTION: Bennett Selekof, New York State Building Codes Bureau

In the example that you gave of the warehouse where you are reducing the hazard from a type three to a type two, the new code would essentially have required very little except for compliance with several items which you have here. Suppose, for example, in this building that the existing stairway was not 36 inches, but was 30 inches or 28 inches, supposing the enclosure was not two hours, but say 3/4 of an hour. The building official still has to accept such a building now?

RESPONSE: Paul Folkins, City of Boston Building Department

The building official may accept such a building. I grant you that it says when you go to a lesser or equal hazard that there is no additional compliance with the code; but, the building official still has under his jurisdiction and can use, the section we wrote under hazardous conditions where it says "capacity of exits," it states "any required door, aisle, passageway, or stairway or other required means of egress, which is not of sufficient width to comply with Section 606--that is the capacity of it--or is not so arranged as to provide safe and adequate means of egress." If the building official felt that this was not safe and adequate means of egress, he does have the authority to refuse it. It is purely a discretionary matter.

QUESTION: H. Brian Dickens, National Research Council of Canada

We, in Canada, are very much interested in the problem of rehabilitation ourselves, and I much appreciate the pioneering that is being done in the description of what is going on today. I would like to ask, I do not understand the point, I think you said that under the new code, if you have a construction or a change in occupancy classification index two or more higher than the original occupancy, you have to meet the full code in all respects. Am I correct in that interpretation?

RESPONSE: Kenneth Schoonover, BOCA

Yes.

QUESTION: H. Brian Dickens, National Research Council of Canada

Then my question is - our code and I presume the model codes in the U.S. - have certain requirements that are less critical to safety, perhaps could even be considered non-safety requirements by some. Are you suggesting that an old building that is two hazards or more above, must meet all these requirements with no discretion at all?

RESPONSE: Kenneth Schoonover, BOCA

Yes, except in the scope of provisions that the current building code has that allows a building official to make certain modifications. That notwithstanding, we did not change the scope of the current building code or how it treats change of use when the change of use is two or more hazard index numbers higher. Right now, the current building code says that when a building changes use, it must comply fully with means of egress, fire protection, and general life and safety type items. When the change of use is two hazard index numbers higher, we have not changed that concept.

COMMENT: T. H. Carter, ICBO

The hazard classification is only a function of a true hazard to life or limb. It is not a question of some of those items you brought up within the code that really do not relate to life safety. I assume the Massachusetts classifications are true life hazards.

RESPONSE: Kenneth Schoonover, BOCA

Within the parameters that we set for within the hazard index numbers, that is correct. There is a lot of discussion about how to appropriately establish a number--one single number which reflects the true hazard that that use poses. There are a lot of facts to take into consideration, some of which a lot of study is going on right now. Certainly, the hazard index numbers we established were based on a given set of parameters, not all of which may be considered appropriate or ideal. That is where a lot of research and effort is going to go in. It is almost impossible to establish one number that truly reflects and takes into consideration everything that should be when talking about a given use group.

QUESTION: Howard Markman, U.S. Fire Administration

My question arose from Mr. Schoonover's presentation but it is not necessarily addressed to him. You spoke at one time that you could do whatever you desired to a building as long as the compliance with the requirements for new construction were not reduced. This to me implies a level of safety which is somewhat less than that which would be provided by the requirements for new construction would be acceptable, as long as those unsafe conditions, whatever they are, do not exist. Later in your presentation you spoke of the need for flexibility and the acceptance of alternative solutions, which to me implies that the goal is one of code equivalency and another way of achieving code compliance.

So my question is the bottom line of a rehabilitation code--is society saying, well, because of the need to provide housing and because of the practicality of the economics, we will accept a level of safety for an existing structure which is less than we would if the building were newly constructed; and, if that is not the case, why is not this flexibility and "performance approach" not already provided in the present day codes for new construction?

RESPONSE: Paul Folkins, City of Boston Building Department

I do not think that there are any existing buildings that you are talking about in the renovation or rehabilitation field that will meet, even after rehabilitation, new code standards. At least I do not know of very many in the City of Boston that will do this, and these are major rehabilitation projects.

I will give you a minor rehabilitation project--a building on the waterfront that is an office building was renovated floor-by-floor over a period of many years. That building does not

meet new code standards and yet, it is the headquarters of the National Fire Protection Association. This is a fact of life! You are talking in theory that everything should be as 100% as safe as possible--building codes themselves do not guarantee a safe building. If you build a building today under new code precepts, and meet them 100%, this does not guarantee that someone will not die in the building from fire.

Given enough time and enough money, probably the people in the model code groups could come up with such a building, but no one would ever build it because it would be impossibly high. What we tried to do in writing this is to come up with a document that gives you equivalent safety or a level of safety that people will accept. If you wish to make people 100% safe, the most dangerous occupancy in the world as far as fire is concerned is a single-family house, and if you tried to put high precepts on single-family houses, I do not think there would be anyone sitting here--we would be strung up because you would never be able to build a single-family house again.

It is a matter of degree and your question as to whether you should have these types of options in new construction--in theory you do have these type of options in new construction, because if you do not wish, when you are applying for a permit for a new building, to go on totally with the precepts of the code for new construction, because you have a special design or a special set of circumstances, there are the appeal routes, and appeals have been granted for new construction. There are several buildings in Boston of new construction that have gone through the appeal routes because of special considerations for them. The Federal Reserve Bank Building in Boston is one that comes to mind and there are several others. I do not know if this answers your question, but at least it is what I think you asked.

COMMENT: Kenneth Schoonover, BOCA

You were somewhat questioning the concepts of the code regarding, more or less, a dual standard, is that correct?

COMMENT: Howard Markman, U.S. Fire Administration

Yes. I did not mean to suggest that the compliance with the provisions for new construction would guarantee 100% safety, but rather I was not sure if you were saying that in a rehabilitated structure something less than what would be provided for new construction would be acceptable.

RESPONSE: Kenneth Schoonover, BOCA

Yes, and to your question as to whether society is accepting that or specifying that that is acceptable--yes, I think it already has. Every model building code now establishes the legal right of an existing building to exist. There is a clause which says legal non-conforming buildings may continue to be occupied as long as there is not work being done.

Under the present building code laws, the building code in itself is not retroactive, the minute a new building code or an amended building code is adopted, you cannot go into every existing building and say, "you shall meet this building code." Every building has a right to exist, be it conforming or non-conforming and where the problem has been is the concept of rehabilitation, which is - if I am going to do something to an existing building to improve it, why can't I do that. If I don't do anything to it, it can exist anyway. So, if we are going to improve it we are saying--let's do it--we will allow you to do it without being arbitrarily unreasonable about full compliance with the code for new construction.

COMMENT: T. H. Carter, ICBO

There is another way of putting it too. For a new building we really have a double standard. In other words, you could use the specification type provisions that are within the model codes; but, if you want to make a more detailed design you can use the design concepts that are recognized nationally. So, in effect, it is kind of a double standard and we look upon rehabilitation in the same manner. A code itself is general and is supposed to apply to many different conditions, which we all know is not possible. But, here we have a building which has existed for 50 years. That, to us is field experience, that is data to justify its continued use and why it should be treated differently than the way you treat a new building coming in, not knowing the congestion in the area, the water supply, many ramifications that enter into the design of a new building. They are unknown factors that we assume.

COMMENT: Howard Markman, U.S. Fire Administration

That raises a lot of interesting legal issues when you get into double standards, and makes me question then, and it is really a rhetorical question, can the provisions for new construction be justified? Maybe they are too strict. And, so that NFPA is not the only one who has its headquarters criticized, when the Fire Administration moved into its building, which is owned by the Federal Government, it only had one exit and the people on the sixth floor had no exits. GSA spent one quarter of a million dollars to try to fix it up.

QUESTION: John Kinney, North Carolina Department of Cultural Resources

We usually have nothing to do with building codes. However, about 1-1/2 or 2 years ago we became involved in a dialogue with the North Carolina Building Code Council regarding the affect of the building code on historic properties in North Carolina. That led to some eventual modifications to the building code of a minor nature, mostly involving historic house museums and some of the non-life safety provisions like handicapped codes, etc. The roadblocks that we continually ran into in dealing with our own code officials regarding the consideration of what you call compliance alternatives was the question of the liability incurred by the building official if he starts making discretionary judgments on items that are matters of life safety. We never successfully avoided that roadblock. As a consequence, many of the things which we discussed and would like to have seen incorporated in the building code were not incorporated and were, in effect, deferred to some later date.

How does the Massachusetts Code or the Basic Building Code effect this? If a fire official or building official makes a decision to follow one of the compliance alternatives and later on that alternative can be identified as a reason for loss of life in a fire or other hazard, what is the position of the building official, is he legally liable for that decision?

RESPONSE: Kenneth Schoonover, BOCA

That is something which is probably not specifically provided for in the code. I know within the Basic Building Code there are clauses that speak to the relief from personal liability of the building official and it sets out in the general administrative provisions to whatever specific extent possible, what these liabilities are. As they relate to the specific decisions he makes under the code, we have not really done anything new. The code clearly states the building official shall make interpretative decisions and judgments within the way the administrative provisions of the Basic Building Code have been set up. They have been slightly modified by the State of Massachusetts. But, it is a problem we are just going to have to approach as we get experience in the decision making that occurs under a building code. With the decisions that a building official is making right now under the building code, he is still faced with the potential of a decision coming back and haunting him--being a factor in a catastrophe or disaster. We feel confident that as long as he is doing the job, as long as he is not negligent in his duties, that will eliminate him from personal liability.

When situations like that occur, they identify that perhaps there is a problem with the code itself, and will result usually in modifications or changes to the code itself.

COMMENT: T. H. Carter, ICBO

I think that there is good precedent established on this. Each of the model code groups since the middle 1950's have been putting out research recommendations, primarily for the purpose of recognizing innovations, things that are not covered in the code, new design concepts, etc., and in a lot of cases these research recommendations are, in fact, an extension or interpretation of the model codes themselves. And, since 1955, some 20 odd years, we have had these recommendations challenged, we have had the authority of the building official challenged. But, it appears that the courts will side with the building official and his interpretative powers if he takes the recommendation or should we say the "manual of practice," developed by a national association or institute, or a national standard. This is what we plan to do, both in the Massachusetts rehabilitation code and also with the non-solicited proposal we have before the National Conference of States on Building Codes and Standards.

COMMENT: Paul Moriarity, Counsel, Massachusetts State Building Code Commission

What we need to keep in mind is that the building official is not going to design this building, he is not going to suggest these changes, these are something that will be proposed by the developer on the outside. I would like to leave with the example of a person going up to a police officer and asking him if he may go in a rob the bank. Now, if the police officer says, "Yes," that man simply cannot rob the bank--he cannot commit a crime. The responsibility has to rest with the person that is proposing these changes or working with the code, not the building official.

QUESTION: Unidentified Participant

Has that been tested?

RESPONSE: Paul Moriarity, Counsel, Massachusetts State Building Code Commission

It has been tested in the courts, some agree with it and some courts do not. It would depend largely on who is presenting the case and how the case is presented. I feel satisfied with the concept.

QUESTION: Irwin Fruchtman, Commissioner of Buildings, New York City

I would just like to say in response to that, that it is not interpretation in this case; it is discretion. There is a difference between interpretation of a code and a discretionary action.

That is what the building official is concerned about in a matter like this, where the area of discretion is greatly being expanded by this expansion of the 50% rule. I think we are doubly concerned in bigger cities where we have a large volume of rehabilitation work that is going on because of the manpower problems that we all face, and the specialist problems that we all face. We are coming into an area where people are not trained in the plan examination, the engineers are not trained to look at plans in this manner, where you are taking a total look at the building and saying is it safe from this manner, is it safe from that, and if we give a little here and give a little there, will it still be a safe building?

Because the main way architects work is, they will come in with a specific building and say to you, we want to decrease the width of stairs because it will cost us "X" amount of dollars; or, we do not want to put this in or that in, and then they take each minimum part you have approved as a precedent for the next action. So, what you essentially are doing is lowering the threshold on the codes, if you do not have the type of people who can look at each case on a new basis. This is my concern, although I am enthusiastic and am looking at this whole new area because it is a matter of necessity that the city of New York does this, because otherwise there are too many illegal conversions going on. From that standpoint, it is an appropriate thing to do, to have guidance for city officials and other code enforcement officials. It is just an observation but to have guidance on the type of individual we need in building departments is something perhaps someone on the panel would like to respond to.

RESPONSE: T. H. Carter, ICBO

This is a number one priority with each of the model code groups. Each of us have redirected our finances, income, expenses, etc. to take into account greatly expanded educational programs. That is the certification of building inspectors, as well as courses for plan reviewers to try to bring this together as far as the educational scene. I think you will find in the future that more and more emphasis will be placed on the education.

QUESTION: William Webb, Rolf Jensen and Associates

I am confused concerning what the minimum level of safety is in an existing building below which you cannot reduce the protection provided. In an example given, an automatic sprinkler system could be eliminated in the rehabilitation if that system were not originally required, or not a condition of the original permit, and were not required for new construction. Is that correct?

RESPONSE: Kenneth Schoonover, BOCA

Correct.

QUESTION: William Webb, Rolf Jensen and Associates

So, then the level of safety in the new building would be at least equivalent to that of the existing code, you would be permitting, in effect, a reduction in the level of safety that is already provided in the building?

RESPONSE: Kenneth Schoonover, BOCA

Yes. If the conditions in a building exist over and above what is required for new construction, it is not unreasonable to allow those conditions which are over and above the code to be brought down to the level that represents new construction, since that is all we expect of new construction anyway. That may not be a good example. I do not think most buildings in every aspect of their construction exceed every code requirement for new construction, and often the sprinkler systems will be used as an alternative to something which does not comply. It was not a good example.

QUESTION: William Webb, Rolf Jensen and Associates

If we take the case Mr. Folkins gave that was originally a warehouse, it probably had automatic sprinklers in it. Under that situation, the automatic sprinklers could be eliminated when the building was changed to apartments?

RESPONSE: Paul Folkins, City of Boston Building Department

In theory, yes. It would not be required in a new apartment building. However, the building official in looking at it could say, "keep the automatic sprinkler system and we will allow you to do this," because this increases the level of safety.

COMMENT: Kenneth Schoonover, BOCA

In that example, I think you would be allowed to do that because that building exceeded the height and area requirements. That could be seen as an item to keep it at the level of compliance it already is at. A better example might have been if there were four exitways in a building where only two are required. You could certainly eliminate one of them.

COMMENT: Murvan M. Maxwell, City of New Orleans

The area that I come from has the largest concentration of historic buildings in the United States--an area which is worked in, lived in, played in, day/night, everything else.

Before our building code appeals board we get cases like Mr. Folkins' case--6 or 7 a meeting--none of this is new to us. It is a question of biting the bullet. We certainly are not going to put these places out of commerce. It is essential that they stay in commerce. So, it is a matter of a meeting of the minds on what does it take to make one of these structures reasonably safe and usable from an occupancy standpoint; no more than that.

Anyone who has been around a long time in this field does not have too much of a problem in working these things out. It is a matter of judgment and we use it everyday and we do not worry what the lawyers will say or what the courts will say, because what is going to happen will happen. How are you going to cover yourself for every eventuality that will come about? I do not know and I do not think anyone else knows. You have to have fortitude and sit down and do the job as you see the job has to be done. The problem is not so much with structures, like Mr. Folkins' pointed out, we get them 6 or 8 a meeting. It is in the slum areas and the outlying areas where property has really gone down and become really delapidated.

Talking about whether or not you are going to convert a warehouse into an apartment unit, so what! We do it everyday and have been doing it for years. It is the fringe areas that pose the problem and how much you are going to give in those fringe areas.

It is a matter of judgment and can be worked out without a lot of problems. We have an adapted version of the West Coast code and we have no serious problems. We do not worry about what the lawyers are going to think and what the courts are going to think--we just do the job.

Session on Technical Evaluation Guidelines and Their Development

Moderator: James H. Pielert, Group Leader
Building Rehabilitation Technology

PANEL

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National Association of Housing and Redevelopment Officials

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Mr. Pielert received a B.S. in Civil Engineering from the University of Maryland in 1961, and a M.S. in Civil Engineering from Lehigh University in 1965.

Mr. Pielert joined the staff of the Center for Building Technology in 1971. He has served in management positions in various CBT program areas, including the HUD Operation BREAKTHROUGH Program and mobile home research and standards development. Currently, he is the Group Leader, Building Rehabilitation Technology.

Prior to joining NBS, he was employed by Bethlehem Steel Corporation and was responsible for research in the area of structural steel building products; and by H. H. Robertson Company, where he researched the application of light gage steel, aluminum and plastic products to the building industry.

Mr. Pielert is a member of the American Society of Civil Engineers and is a registered Professional Engineer in Pennsylvania and Maryland.

The session this morning pointed out very clearly the need for technical guidelines which would be needed to successfully implement the type of performance rehabilitation code that was discussed. Ken Schoonover talked about judgmental decisions which are going to have to be made by building officials, design professionals and others involved in making these decisions. And, this is really the scope of this session on Technical Evaluation Guidelines and Their Development.

To give you some background on the work that has been carried out in this area at NBS, this year we are completing several studies which address the issue of technical needs in regard to rehabilitation. NBS awarded a contract to the National Conference of States on Building Codes and Standards to study the needs of the model code organizations and selected State and city regulatory agencies relative to building rehabilitation. Additionally, a grant was given to the Massachusetts Institute of Technology to develop the report, "An Investigation of the

Regulatory Barriers to the Re-Use of Existing Buildings." This report was handed out in your package. This study examined the regulatory process in Massachusetts for existing buildings to identify the types of problems which are being encountered.

Generally, the results of these studies indicated that a technical basis for rehabilitation decision-making is needed. As an example, codes may not address the type of construction represented in many old buildings. Technical data are no longer available for many older systems making it difficult to evaluate its performance relative to existing codes and standards. Secondly, evaluation methods needed to determine the condition of existing buildings may not be adequate. These include test methods for laboratory and in-situ evaluation, analytical procedures, and field inspection guidelines. And third, and this has been touched on several times this morning, the technical bases of regulations need to be developed. The technical rationale for code provisions relative to ceiling height, ventilation requirements, floor areas and other things discussed this morning needs to be studied. It could be that these are excessive and cause increased rehabilitation costs.

I would like to take a minute to discuss some activities going on in these areas at the Center for Building Technology. We are in the process of developing outlines of technical manuals for selected areas to aid in the decision-making process for rehabilitation. Figure 1 lists the types of information which will be included in these manuals. The first area is test methods. Test methods are needed to evaluate the existing condition of a building. This includes both destructive and nondestructive testing. Methods of analysis need to be documented, and if necessary developed, to assist in the evaluation process. In many cases it may be possible to analytically evaluate the conditions of various building systems. As an example, the condition of the plumbing system and its capability to accept additional loads may be of concern in a rehabilitation project. If this can be determined by calculation, it may be possible to keep down costs associated with expensive field testing or the eventual replacement of a suspect plumbing system. Field inspection methods are very important for determining the condition of the building in order to compare it to some code document or another technical base.

The next item is data on performance of existing construction. We know existing buildings contain construction systems which are no longer in use and for which the design data is not generally available. These manuals would include data or the sources of the data for these systems in order for those involved in rehabilitation to make the technical decisions. And finally, data on other building rehabilitation experiences represent a base which can be used by others to simplify the decision-making process.

Figure 2 illustrates a series of technical manuals containing state-of-the-art listings of technical data for building components and specific health, safety and general welfare attributes. The attributes

include strength and stability, health and sanitation, accident safety, fire safety, energy conservation, and security. Others which may be included are acoustics and access for the handicapped. A manual is needed for each attribute and would include, where available, data on structure; enclosure and division of space; mechanical systems; plumbing systems; and electrical distribution systems. This format would provide a basis for application of alternative solutions within attributes. For example, within the health and sanitation attribute an alternative solution for natural ventilation would be the addition of mechanical ventilation. There also will be potential interrelationships between the various attributes. The fire safety and security attributes may have conflicting technical aspects in regard to rapid egress versus locks.

Work is now being completed on the development of outlines of the strength and stability, health and sanitation, and accident safety manuals. The development of the strength and stability manual will take place in FY79. Work on the other technical manuals will depend on the availability of additional funding.

An important area where work is needed is fire safety. Studies have shown fire concerns are significant in building rehabilitation. We are fortunate today to have a speaker from the NBS Center for Fire Research to talk on a fire evaluation system for existing buildings.

Figure 1: Types of Information to be Included in Manuals

TECHNICAL MANUALS

- Test methods for nondestructive evaluation of existing construction
- Test methods for destructive evaluation of existing construction
- Methods of analysis to predict the performance expected of existing constructions
- Field inspection and evaluation methods
- Data on performance of systems no longer in use
- Data on rehabilitation experiences

Figure 2: Series of Technical Manuals

MANUALS FOR EVALUATION

COMPONENTS	ATTRIBUTES: STRENGTH AND STABILITY	HEALTH AND SANITATION	ACCIDENT SAFETY	FIRE SAFETY	ENERGY CONSERVATION	SECURITY	OTHERS
STRUCTURE							
ENCLOSURE AND SPACE							
MECHANICAL (HVAC, ELEVATORS, ETC.)							
PLUMBING							
ELECTRICAL DISTRIBUTION, LIGHTING, COMMUNICATION							

A "Professional Practice" Approach to the Rehabilitation Process

by

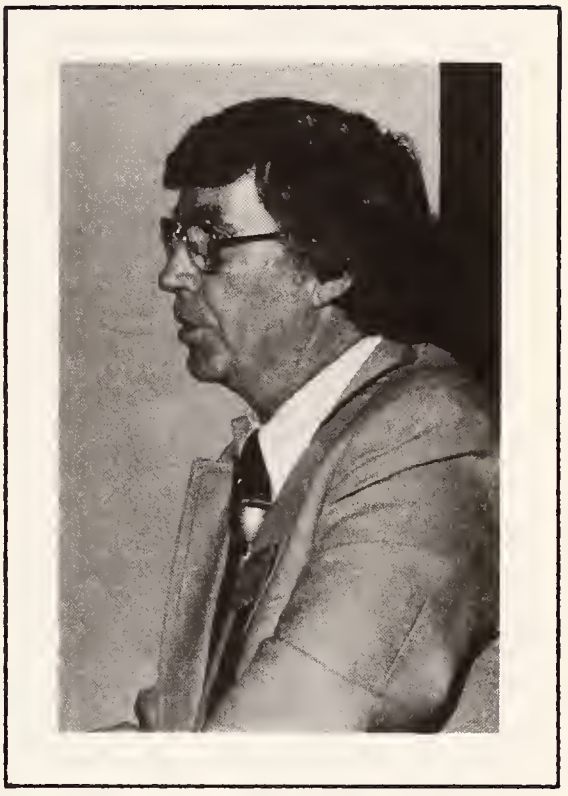
Walter E. Lewis
Professor, Department of Architecture
University of Illinois

Professor Lewis is an Architect and Professor of Architecture in the Department of Architecture at the University of Illinois.

Ten years ago, Professor Lewis pioneered an innovative Academy for Code Administration and Enforcement at the University, which has offered award-winning education and training programs for practicing code administrators and enforcement officials.

Last year, Professor Lewis created a unique graduate studio within the professional masters-degree program in the Department of Architecture called the Professional Practice Studio. The first project undertaken involved studies of adaptive re-use of buildings in the declining downtown district of a midwestern city of about 60,000 population.

He serves on the Board of Trustees and Executive Committee of the National Academy of Code Administration, which is developing a national voluntary, competency-based education/training and professional certification program for code administrators.



The Department of Architecture at the University of Illinois at Urbana/Champaign has embarked on a new and ambitious program in graduate education linked with continuing professional education for practitioners. This new program is called the "Professional Practice Studio." One of the first projects undertaken in the Studio explored incentives, through the building rehabilitation process, to restore vitality in a declining "downtown" of a midwestern city.

The work was performed in the newly-organized Professional Practice Studio by twelve graduate students in their terminal year of the six-year professional curriculum in Architecture at the University of Illinois. To assist the two graduate professors who coordinated the work in the Studio,

a Professional Practice Resource Group of five or six practitioners were sought to monitor and periodically critique the Studio work. A list was developed of 17 architects with distinguished records of architectural practice, many of whom had also completed successful projects in one or more of the complex facets of the building rehabilitation process. The entire list was invited to serve on the "Practice Group" in hopes that at least five or six practitioners would accept this crucial leadership role. Surprisingly, since no departmental funds could be budgeted for travel, lodging or other expenses of the Professional Practice Resource Group, all 17 endorsed the idea, pledged their personal time and money and as a result, the Professional Practice Studio became a reality!

Thus, an educational format was created with expert professional input to deal with complex urban and architectural issues in a manner that helps bridge the transition from academia to professional practice. The Studio helps the Department of Architecture meet three important goals:

1. Education at the "cutting edges" of architectural practice;

2. Research in a professional discipline with expert professional advice and counsel to create new knowledge; and,

3. a vehicle for Public Service to the profession, local regional community, the State and perhaps even the nation.

New learning potentials were immediately recognized by all who participated --graduate students, teaching faculty, practitioners and our Studio "clients" alike. Projects undertaken in the Studio are complex enough to accommodate either individual or group studies by the case study or project method. Participants learn "by-doing" on relevant research projects having "real" clients, "real" budgets, "real" sites, and the "real" complexities of urban development and redevelopment.

Practitioners became valuable resources in courses other than the Studio, especially the first professional course for freshman, "Introduction to Architecture and Environmental Design." During the periodic Practice Group visits, continuing education "interact seminars" were organized to address current issues of interest to practitioners, such as Marketing Architectural Services, Professional Ethics, Tax Increment Financing and so on.

Experience to date with the Professional Practice Studio and the Professional Practice Resource Group have led us to study the possibility of establishing an entire Professional Practice Option running parallel with other graduate options currently offered in the six-year program; Design, Structures, Historic Preservation, and Housing and Management (which is coupled with a Master of Business Administration degree).

One of the first projects undertaken in the Professional Practice Studio was a Rehabilitation Feasibility Study. It was a public-private joint venture to determine the physical, market, and economic feasibility of creating a comprehensive cultural arts complex in the heart of the

"downtown" district of Champaign, Illinois. In addition to our "client," the National Academy of Arts--a not-for-profit private corporation--other parties to the joint venture included the City Council and the Downtown Development Council. All other parties interested in the potential for downtown revitalization were invited to review sessions. The proposed project tested the feasibility of creating, in phases, a $10-$15 million cultural arts complex in the "downtown" district to house the international high school program and the professional company of the National Ballet of Illinois, both divisions of the National Academy of Arts, and to serve the educational and cultural arts needs of the immediate regional community. When completed, the Performing Arts Center would consist of new construction of certain facilities on existing parking lots, coupled with the rehabilitation of an existing six-story hotel no longer used for this purpose, and an adjacent three-story office building, all to meet program requirements of the "client"--the National Academy of Arts. The elements in the Academy Architectural program included in the feasibility study were:

New Construction - (on "open" land used for municipal parking adjacent to the hotel)

- Performing Arts Theater (1800 seats); including Practice Rooms; Recital Halls; Set/Costume Shops; and
- Parking Facility for 500 cars.

Rehabilitation of Existing Buildings (a six-story hotel and three-story office building)

- Administration and faculty offices for the National Academy of Arts, a change in use from the existing residential occupancy;
- Classroom facilities for an accredited junior/senior high school, a change in use from the existing residential occupancy;
- Training facilities for a regional community cultural arts program in dance, music, and theater arts, a change in use from the existing residential occupancy; and
- Housing and boarding facilities for 200 Academy students attending the international high school and the professional company of the National Ballet of Illinois, a permitted use under the existing residential occupancy.

The Studio project offered an excellent educational context for studying the complexities of urban redevelopment and rehabilitation and, depending on the final results of the feasibility study and future courses of action, such a project would offer:

- Positive stimulus to needed downtown development;
- Continuous year-around cultural programs that would provide regional attractions to bring thousands of citizens directly into city center creating new commercial market demand;

- Adaptive re-use of two existing downtown buildings in conjunction with the construction of major new structures;

- Rehabilitation of the existing hotel to provide resident housing for 200 Academy students creating 24-hour residents in the downtown district;

- Theater performance that would generate new evening parking demand in addition to normal daytime commercial parking demand helping to optimize parking structure financing;

- Comprehensive traffic, parking and other studies, in cooperation with city staff and regional plan commission to create a new information base to assist public and private decision-making; and,

- A test of Tax Increment Financing--a new Illinois law to assist local governments in redevelopment districts.

Graduate students in the Professional Practice Studio were divided into three teams to study the problem at three "scales." One team, using the entire downtown as the study area, developed major new studies to add to the information base. Another team studied the design potential of the new construction required to meet program requirements for the Performing Arts Theater and Parking Structure. The third team studied the redevelopment and rehabilitation potential of the two existing buildings on the site to meet the "client's" remaining program requirements.

One definite conclusion can be drawn from the Studio work: if major stimulus for urban redevelopment and rehabilitation is to be successful, a much broader, up-to-date information base is necessary for decisive public and private decision-making.

Redevelopment feasibility requires measurement and evaluation of two dependent variables: (1) the community's readiness to act, and (2) the community's willingness to act. The first depends on accurate, current information documenting the city's redevelopment capacity. Such an information base is essential to evaluate redevelopment demand required under project plans for urban revitalization. Thus, a project is feasible, under the readiness test when the community's redevelopment capacities--in terms of public facilities and services to accommodate requirements for new traffic flows, new parking demand, new utility services, new police and fire protection, to name just a few of the capacity factors--meet or exceed the demand factors for such facilities and services required under the redevelopment plan.

Research to document the city's capacities, as well as the demands the "client's" plan would place on these capacities, were well within the scope and capabilities of the participants in the Professional Practice Studio. From the beginning, however, the Project feasibility under the "willingness" test was beyond our ability to measure. There exists in Champaign no clear public/private community consensus on redevelopment goals or objectives; the city's Comprehensive Plan has not been updated in 26 years; and, while there have been numerous attempts to "Save Downtown," progress toward this goal moves at a glacial pace.

The first project undertaken in the Professional Practice Studio, even if nothing comes of it, offers a stimulus to heighten community awareness. It has been an excellent learning experience in the rehabilitation process for all who participated in the Professional Practice Studio. Some of the details of this project are summarized.

A graphic "Definition of the Building Process" was prepared in terms of Need, Program, Design, Construction and Use to help individual team members identify which phase in the Process was involved. Figures 1 through 5 illustrate these five phases. Figure 6 illustrates the management of the development process.

Base maps were drawn to document existing conditions in the downtown study area. These data describe Regional Access; Zoning and Uses of buildings in downtown; the Built Area versus open space; a mapping of Building Value; Land Value; Transportation; and, Ownership of land and buildings. Additional maps were draw describing the style, character and materials used in buildings, as well as many alternate studies for redevelopment in the downtown area. Figures 7 and 8 are examples of a Use/Zoning base map, and a Building Value base map, respectively.

The student team who examined the rehabilitation of existing buildings developed a process for documenting existing and revised conditions. Essentially, this process consisted of four steps:

1. securing original drawings and specifications, if possible;

2. preparing 8-1/2" x 11" field survey documents which included small scale plans, elevations and cross-sections, and schedules to permit field information to be recorded efficiently;

3. preparing drawings to document the existing and revised conditions; and,

4. detailing the revisions to be used in the rehabilitation.

Examples of the field notes taken on the small scale drawings and schedules show the conditions to remain and those to be altered. Code violations were starred in "red" to call attention to the re-design work that had to be done to correct the violations.

Figure 9 is an example of a small scale drawing portraying the conditions of the fourth floor of the existing six-story hotel, while Figure 10 is an example of the form used to portray the existing conditions and what needed to be done to rehabilitate this structure for its intended use.

Figure 11 is an example of a scale drawing noting existing/revised conditions. Finally, Figure 12 is an enlarged city street map illustrating the study area.

The Professional Practice Studio has received much positive media coverage. The Morning Courier of April 10, 1978, stated that the on-going program in the city of Champaign is "a project that participants view as something more than an academic exercise."

Figure 1: Phase 1, Need

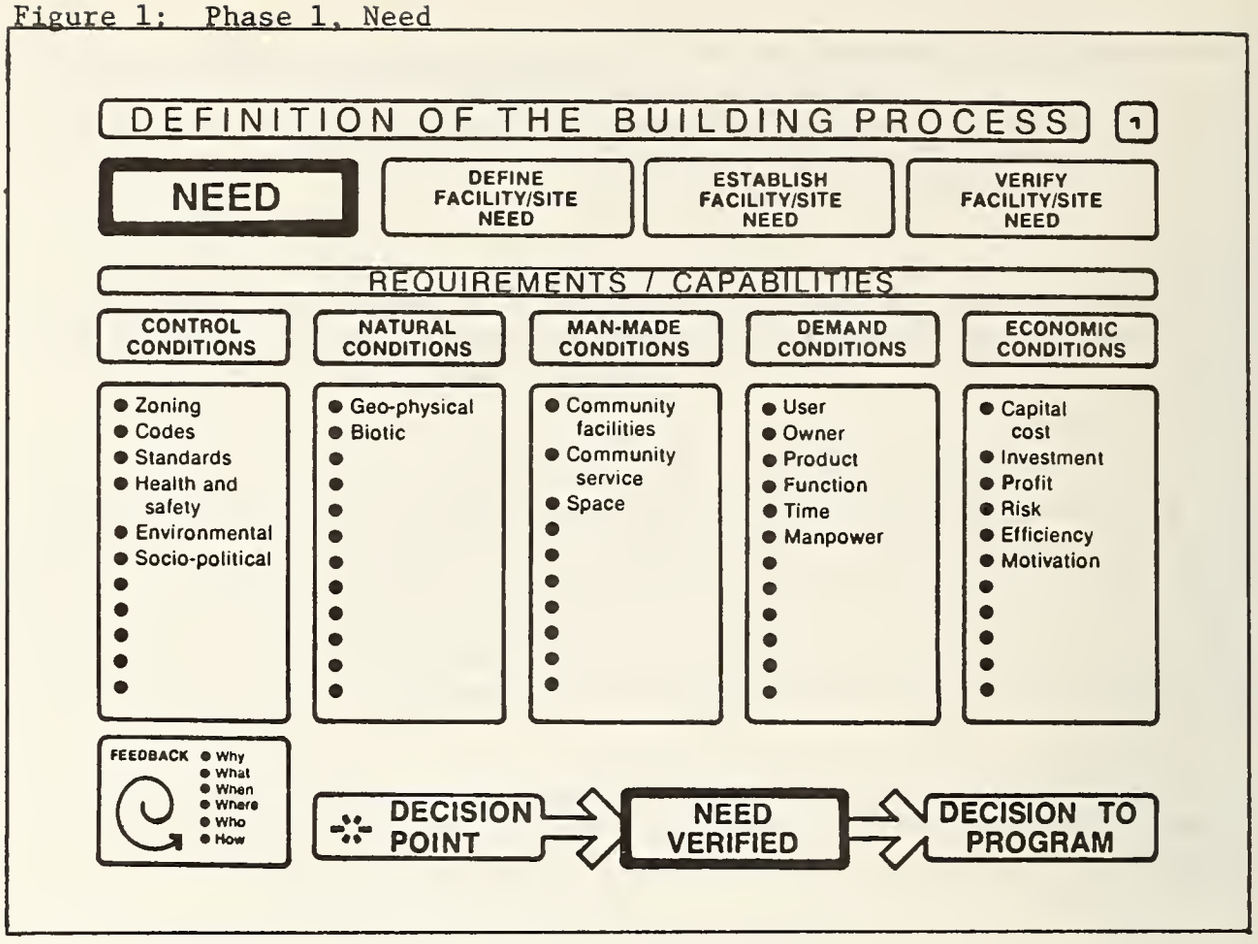


Figure 2: Phase 2, Program

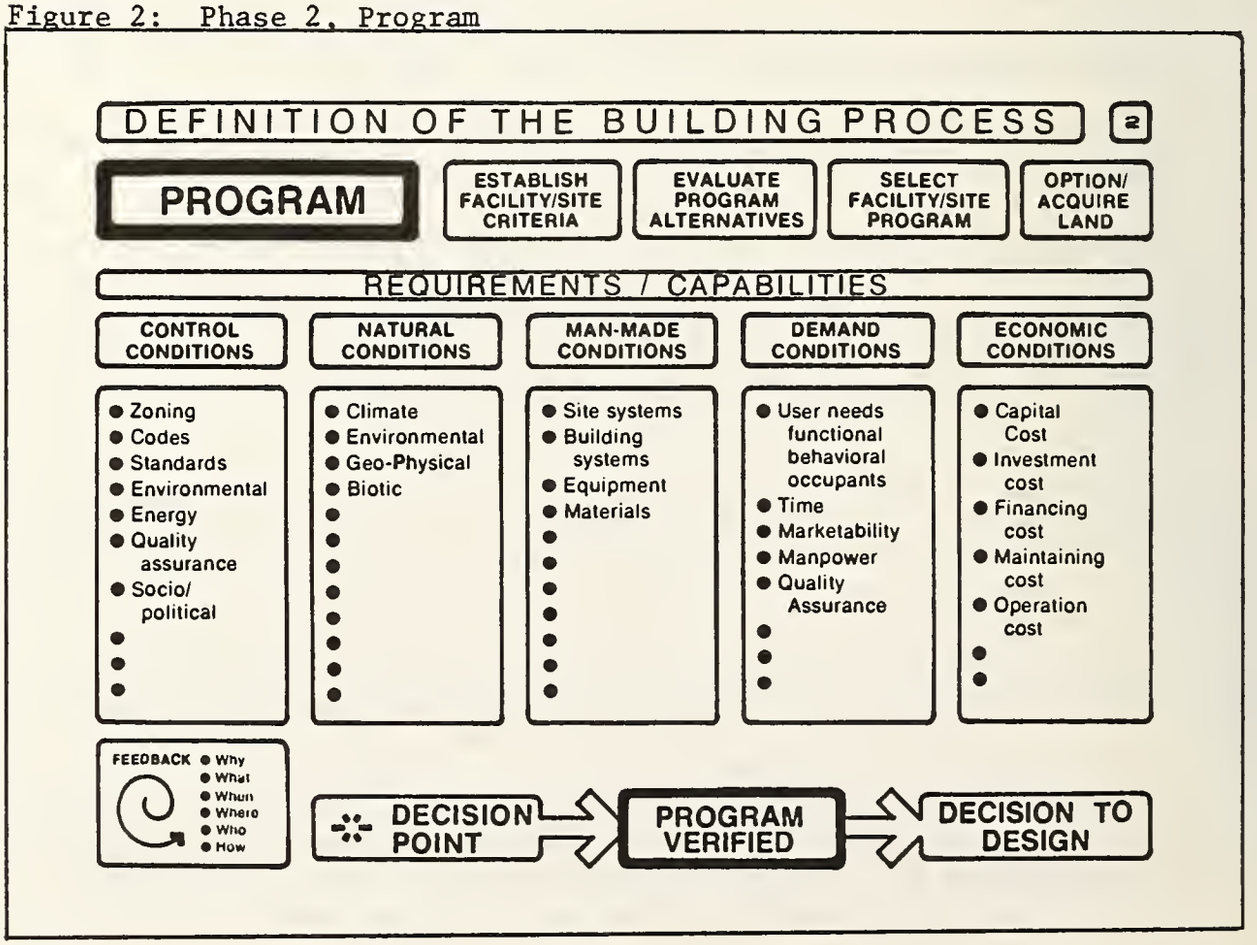


Figure 3: Phase 3, Design

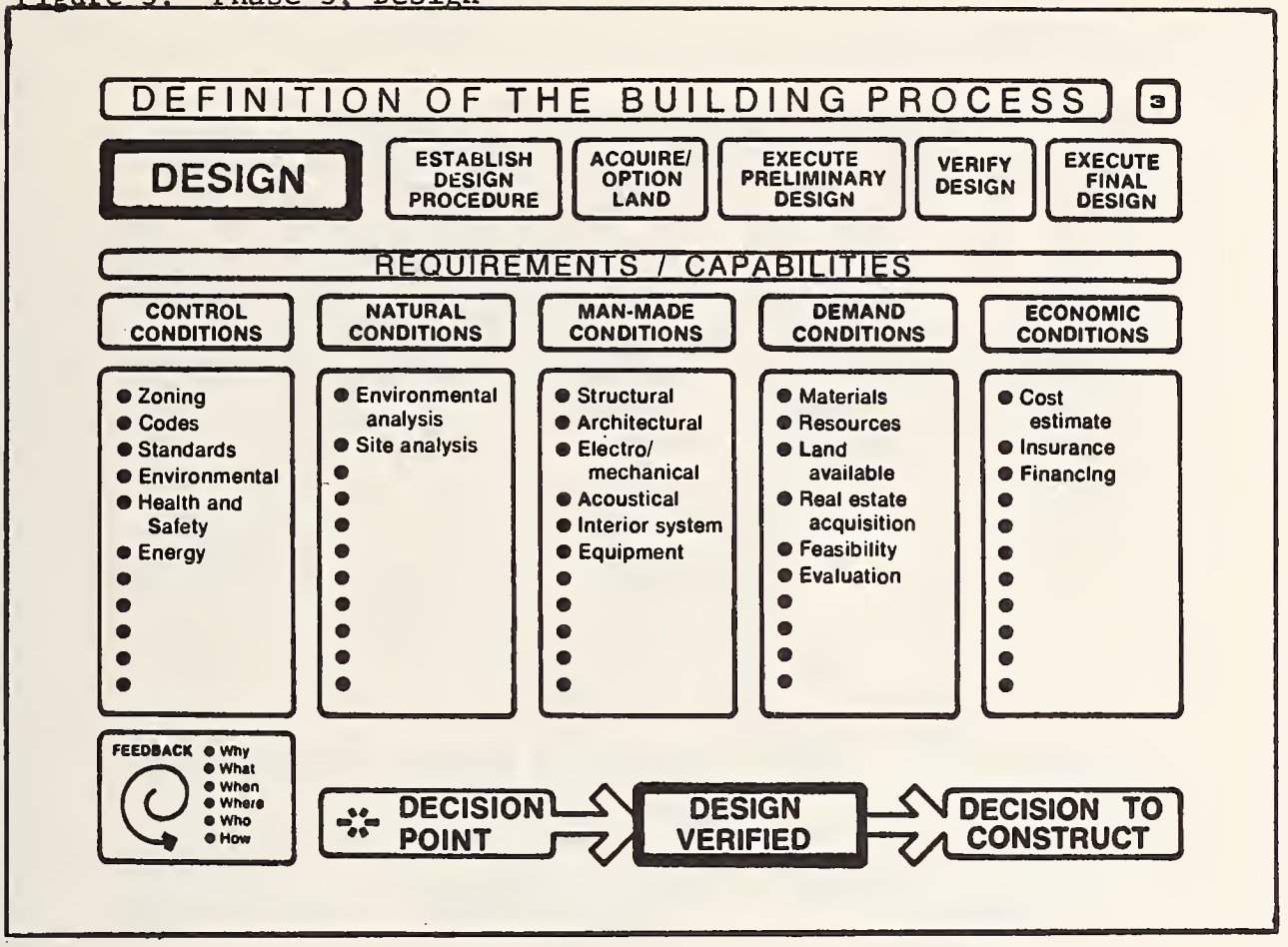


Figure 4: Phase 4, Construction

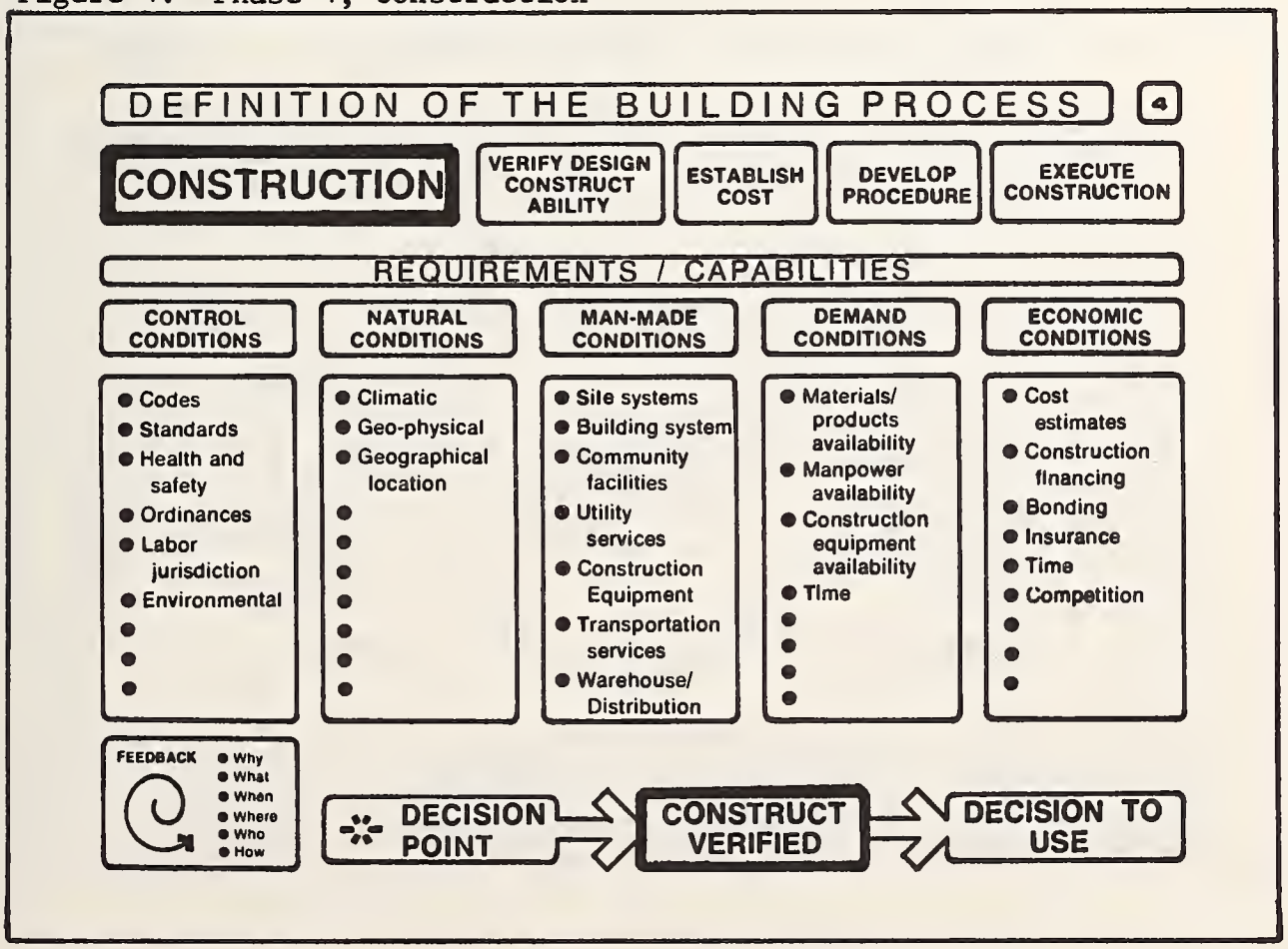


Figure 5: Phase 5, Use

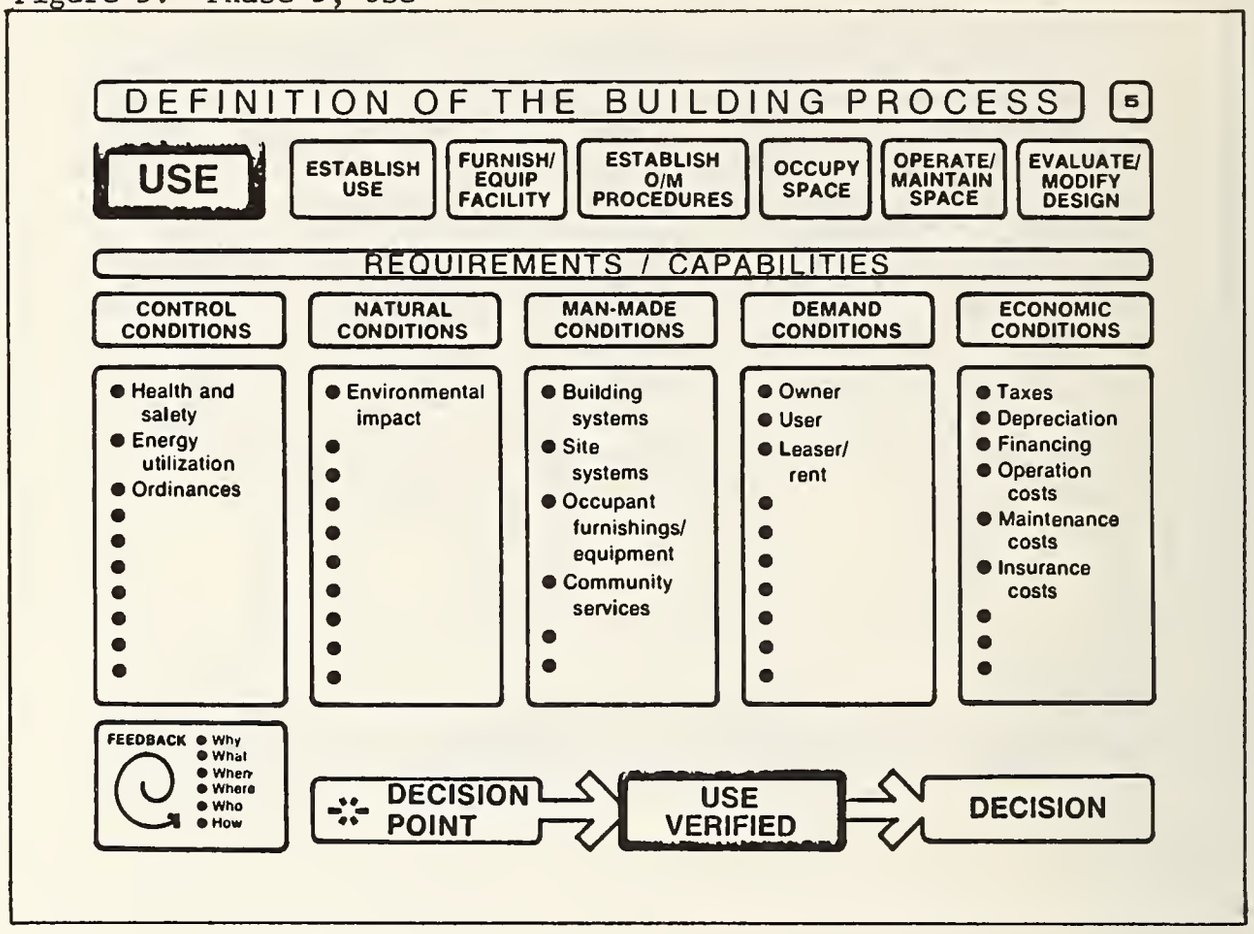


Figure 6: Management of the Development Process

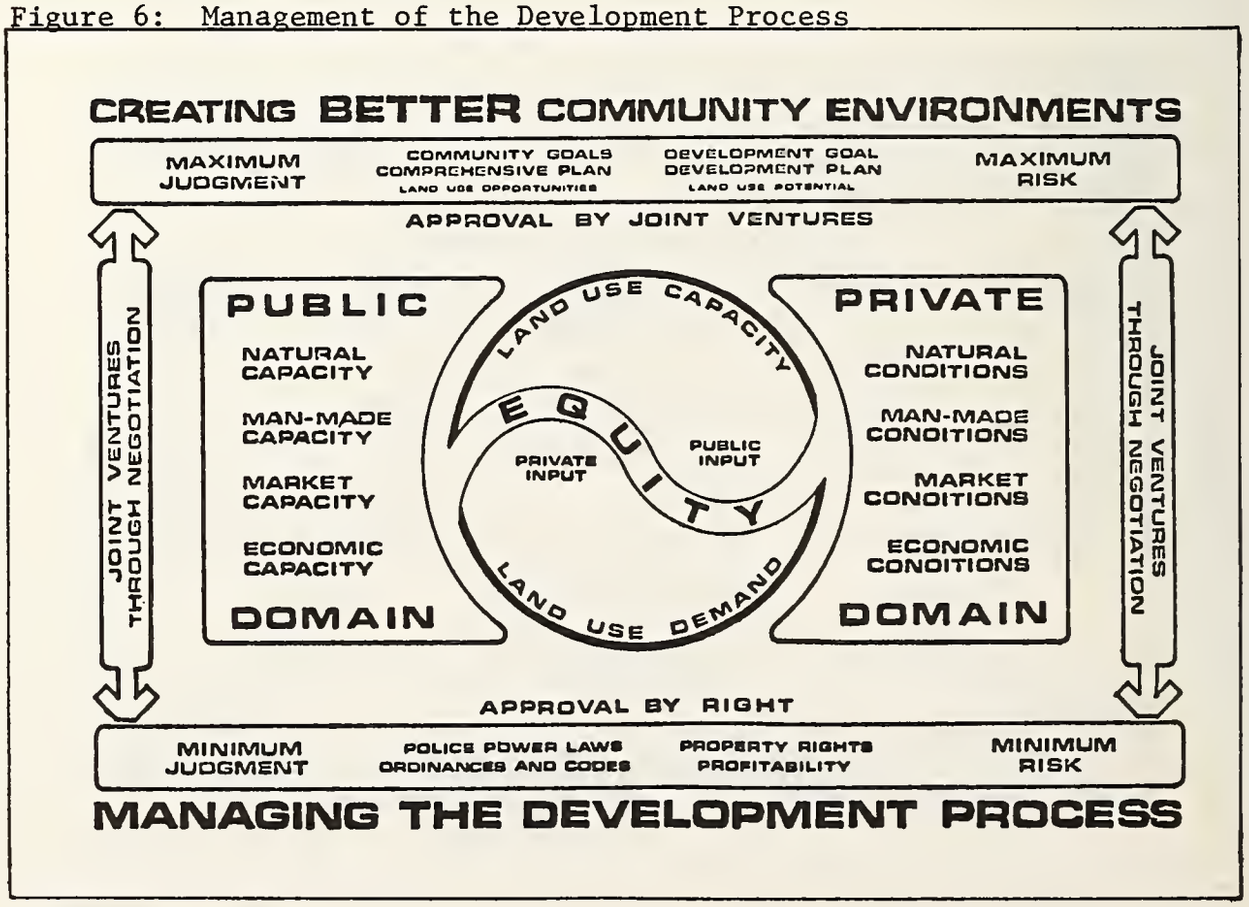


Figure 7: Use/Zoning Base Map

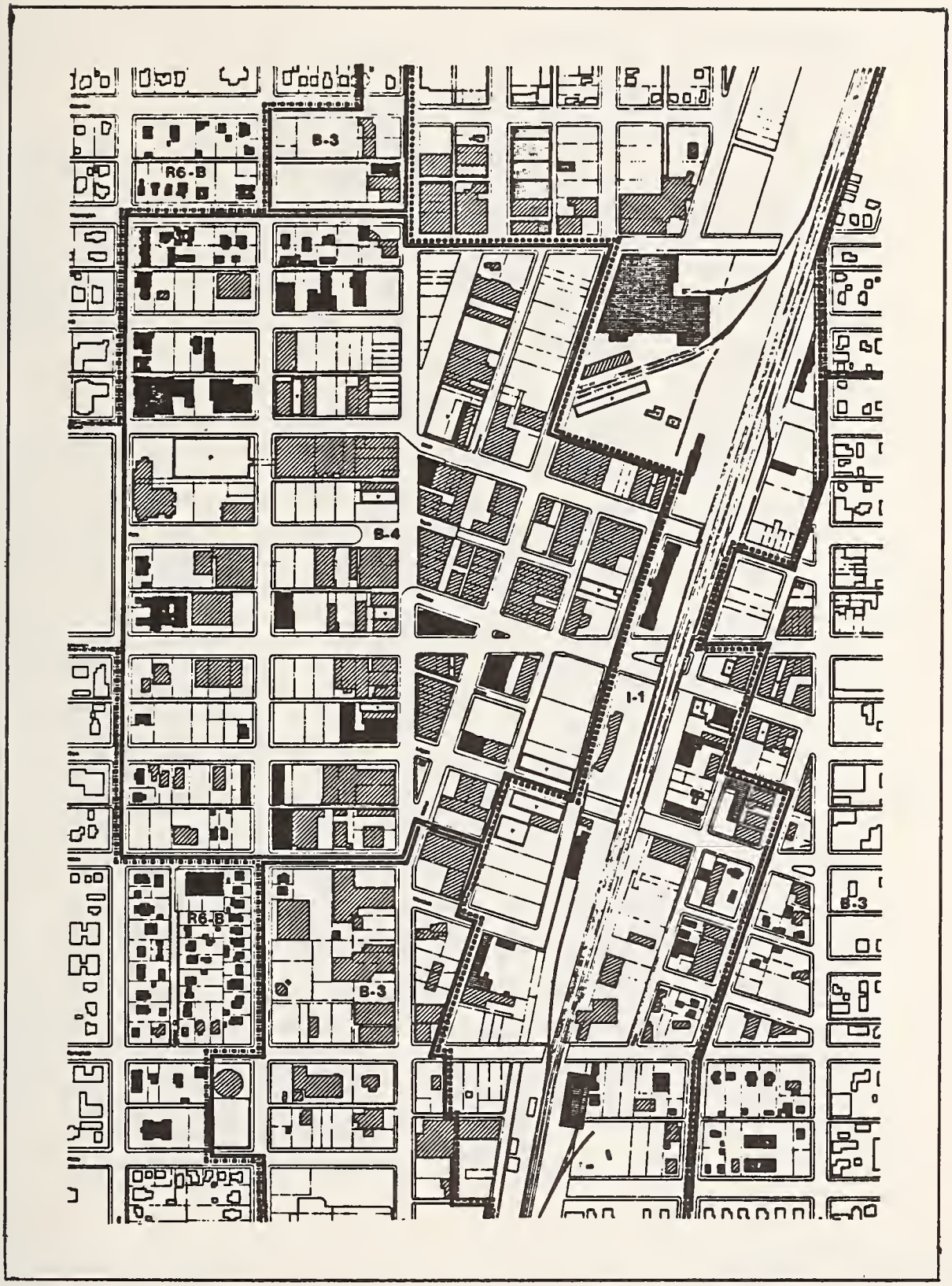


Figure 8: Building Value Base Map

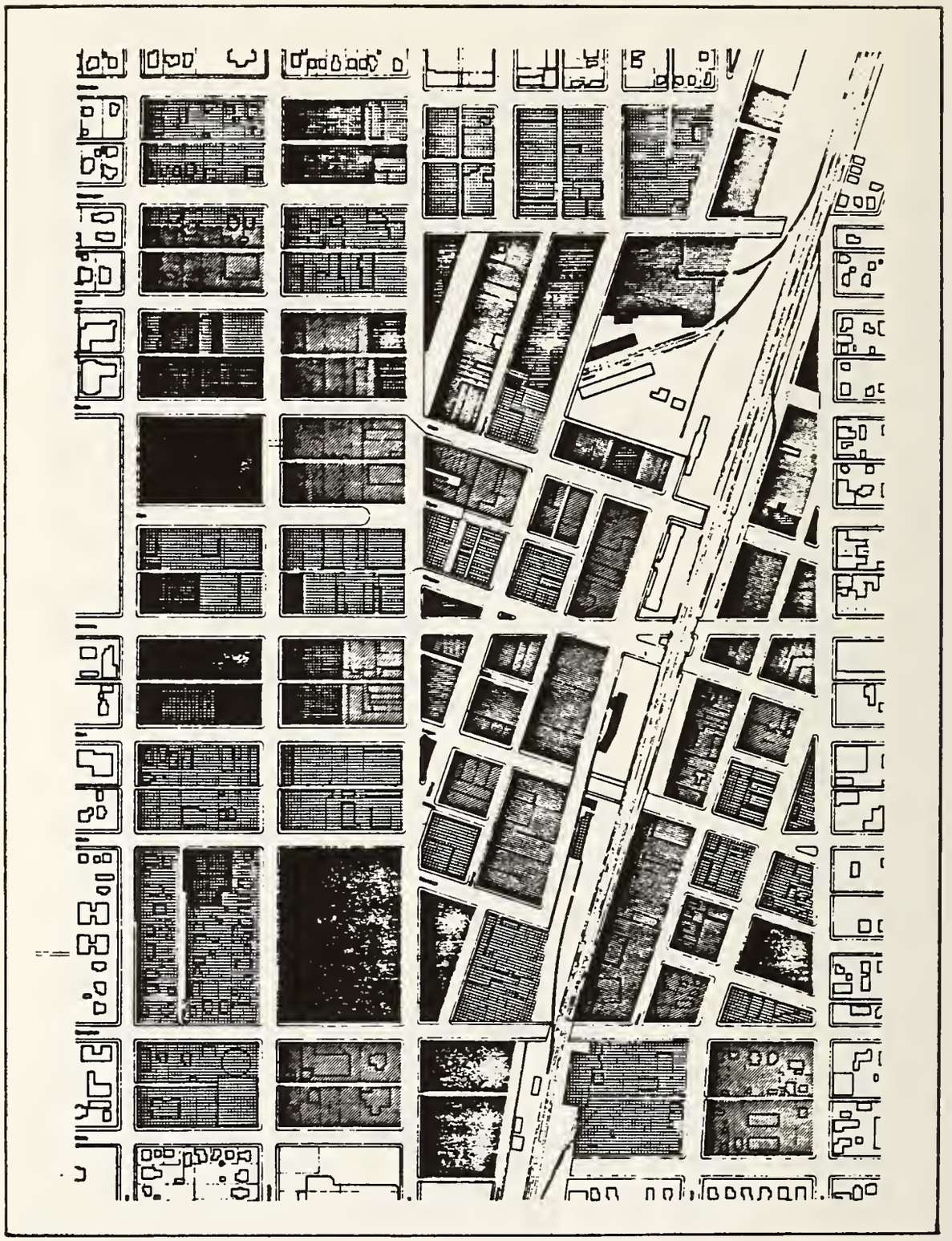


Figure 9: Small Scale Drawing of Fourth Floor

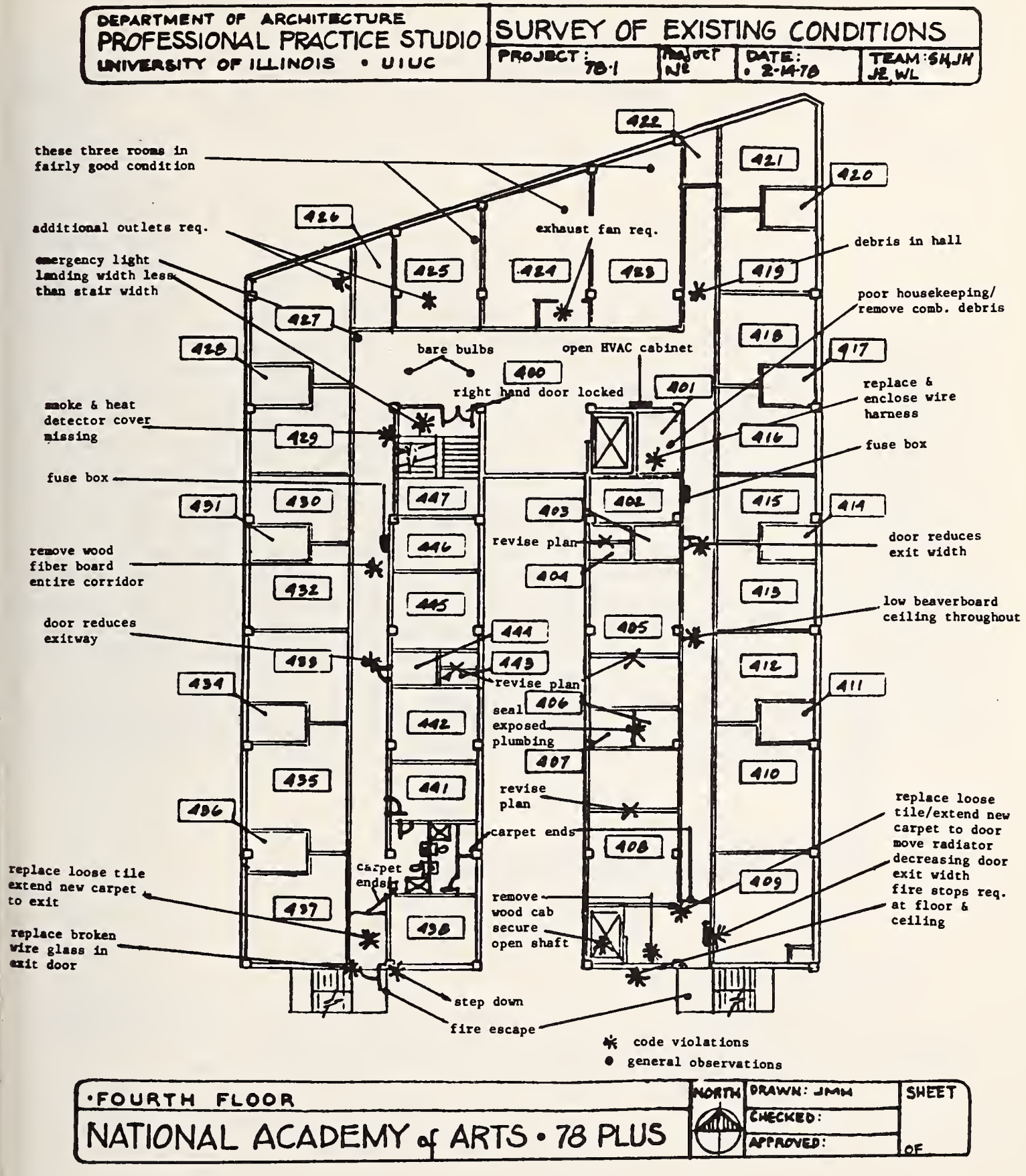


Figure 10: Form Used to Portray Existing Conditions and Rehabilitation Needed

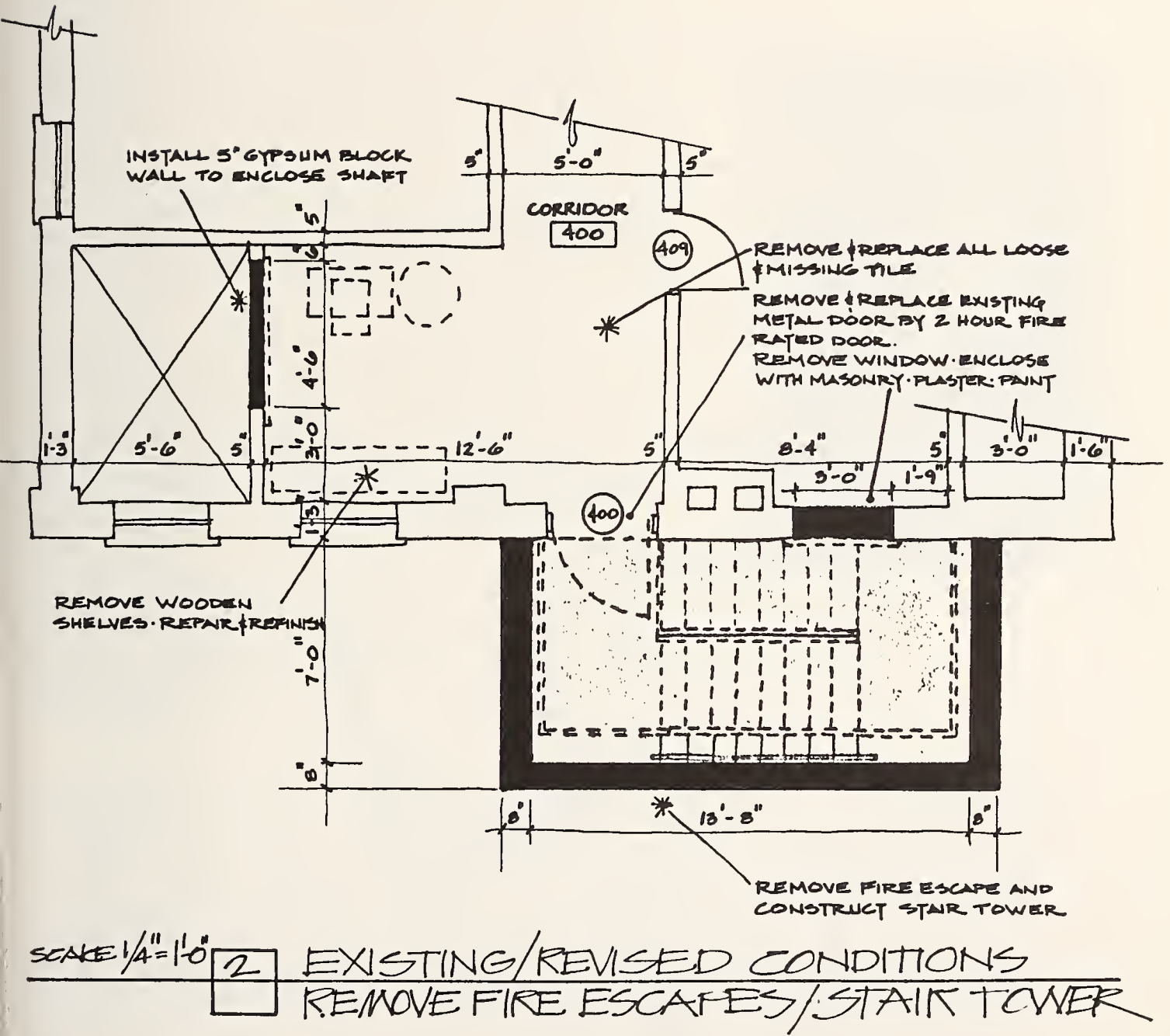
floor	project name :	contractor:	proj no:	date:	sh no:
4	NATIONAL ACADEMY OF ARTS 78-PLUS	GENERAL	78-1	3-1-78	3

SCHEDULE OF EXISTING CONDITIONS

ROOM		floor				bases				walls				ceiling				doors				windows				LEGEND	
																										APPLICABLE	
																										NOT APPLICABLE	
																										1 repair & refinish	
																										2 remove & replace	
																										3 alter: as per plan	
																										4 stet: leave as is	
																										• code violation	
NO	NAME	CARPET	TERRAZZO	TILE	CEMENT FINISH	CEMENT FINISH	WOOD	TERRAZZO	TILE	PLASTER/PAINT				PLASTER/PAINT	FIBER BOARD			WOOD PANEL TO SOLID CORE (1 HR.)				WOOD FRAME WITH GLASS	ALUMINUM FRAME WITH GLASS			see det	REMARKS
432	MUSIC PRACTICE RM	2					1			1				1				2				2					
433	MUSIC PRACTICE RM	2					1			1				1				2				2					
434	TOILET		1					1		1				1				2				2					
435	MUSIC PRACTICE RM	2					1			1				1				2				2					
436	TOILET		1					1		1				1				2				2					
437	MUSIC PRACTICE RM	2					1			1				1				2				2					
438	MUSIC PRACTICE RM	2					1			1				1				2				2					
439	TOILET			1					1	1				1				2				2					
440	TOILET			1					1	1				1				2				2					
441	MUSIC PRACTICE RM	2	1				1			1				1				2				2					
442	MUSIC PRACTICE RM	2					1			1				1				2				2					
443	TOILET		1					1		1				1				2				2					
444	TOILET		1					1		1				1				*2									
445	MUSIC PRATICE RM	2	1				1			1				1				2				2					
446	MUSIC PRACTICE RM	2	1				1			1				1				2				2					
447	STAIRS	2	1				1			1				1				*3				*2					

1978 - Professional Practice Studio

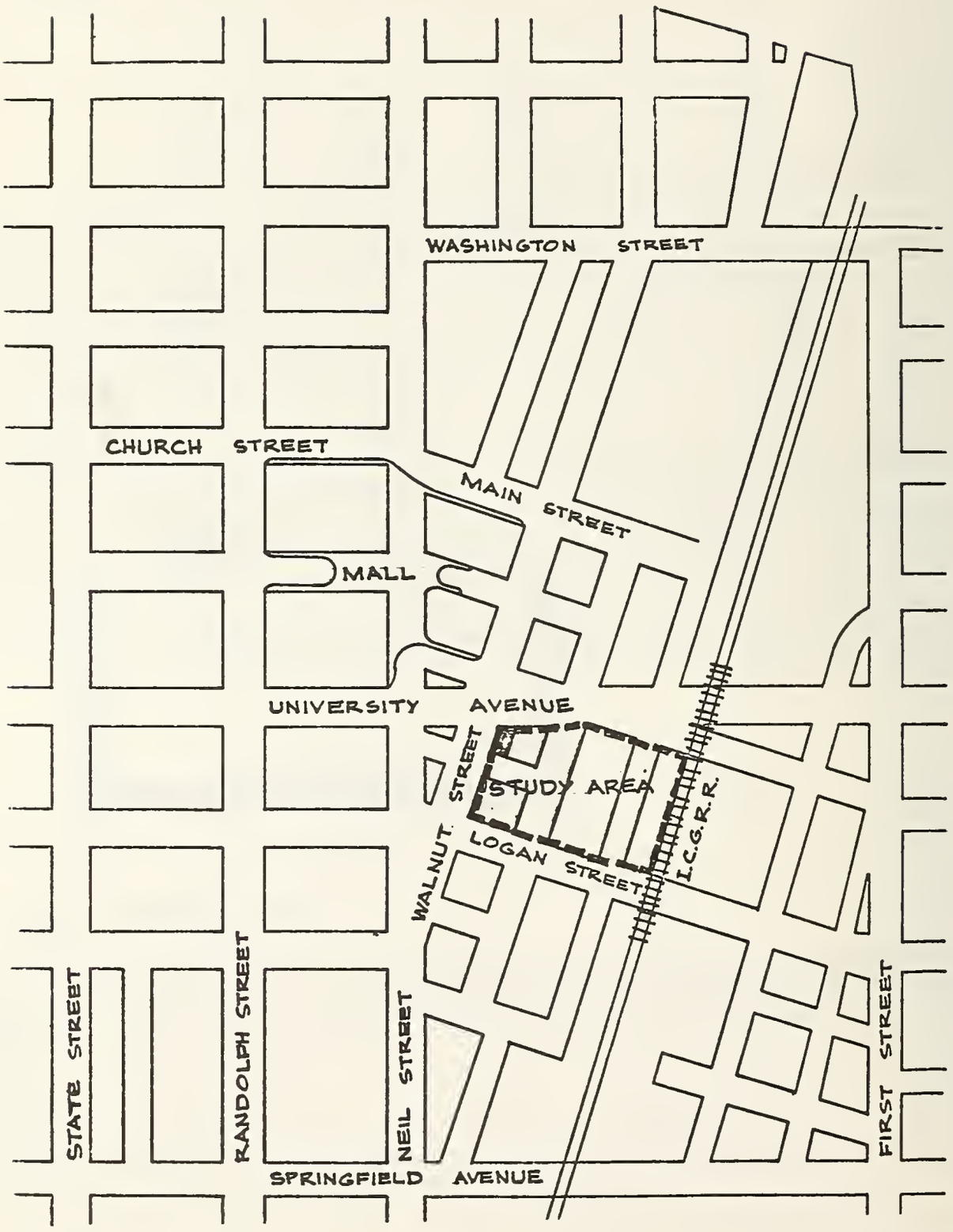
Figure 11: Scale Drawing Noting Existing/Revised Conditions



SCALE 1/4" = 1'-0"

2 EXISTING/REVISED CONDITIONS
REMOVE FIRE ESCAPES/STAIR TOWER

Figure 12: Street Map Illustrating Study Area



A Fire Evaluation System for Health Care Facilities

by

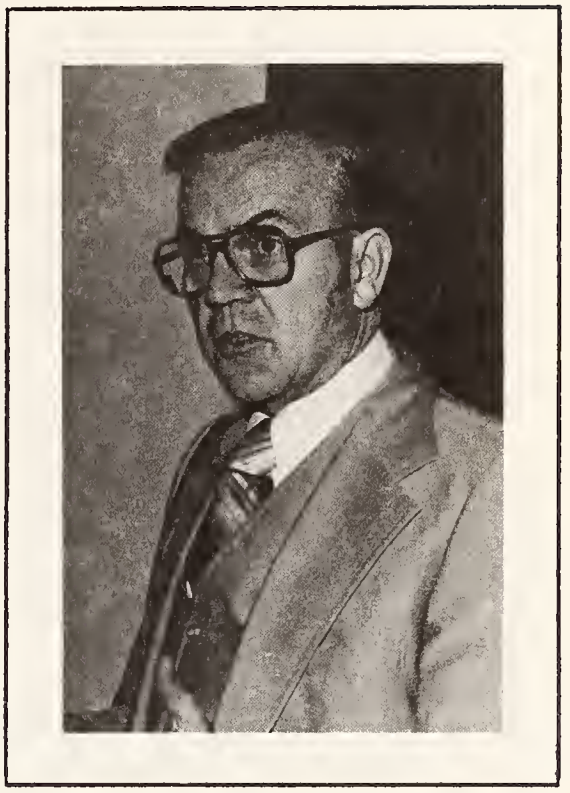
Harold E. Nelson
Chief, Program for Fire Design Concepts
Center for Fire Research
National Bureau of Standards

Mr. Nelson received a B.S. in Fire Protection and Safety Engineering from the Illinois Institute of Technology in 1950.

Since joining the staff of the National Bureau of Standards, Mr. Nelson has worked in several safety and fire related programs. Prior to joining NBS, he served as the Director, Accident and Fire Prevention Division of the General Services Administration, providing advice on safety and fire considerations of GSA, including design, construction, operation and repair of Federal buildings.

Currently, Mr. Nelson is Chief of the Program for Design Concepts in the Center for Fire Research, where he heads an interdisciplinary effort to synthesize and integrate research and technology into rational and applicable technology and concepts usable in design, regulation, inspection and maintenance.

Mr. Nelson is a member of several professional societies and serves on a number of national committees. He is the author of numerous technical papers in safety and fire-related areas.



The ideal goal of life/fire safety design is to prevent all fire deaths, injuries and losses under all imaginable circumstances. Practically, however, society can neither forestall all loss of life nor spend limitlessly to avert loss of life due to fire. Building codes are designed to provide a minimum acceptable level of life safety at a cost society is able and willing to support. The Life Safety Code of the National Fire Protection Association (NFPA No. 101) is a voluntary code widely accepted for setting acceptable fire safety levels. The code provides fixed solutions for life safety in designated occupancies, but allows "equivalent" solutions. However, it does not define alternative solutions nor provide a mechanism for evaluating equivalence.

The Center for Fire Research, with support from the Department of Health, Education and Welfare, has developed a system for determining how combinations of widely-accepted fire safety systems and arrangements may provide a level of safety equivalent to that required in the 1973

Life Safety Code. The system provides flexibility to the designer of new facilities and to the renovator of existing health care facilities.

The major concepts forming the basis for code-equivalence are:

a. Occupancy Risk - the number of people affected by a given fire, the level of fire they are likely to encounter, and their ability to protect themselves.

b. Building Safety Features - the ability of the building and its fire protection systems to provide measures of safety commensurate with the occupancy risk.

c. Safety Redundancy - in-depth (redundancy) protection, through the simultaneous provision of alternative safety methodologies such as containment, extinguishment, and people movement methodologies. Each methodology provides at least its own independent minimum code level of protection. The design of the complete fire safety system is intended to ensure that the failure of a single protection device or method will not result in a major failure of the entire system.

An adequate life safety system must include a building safety system commensurate with the occupancy risk. The Fire Safety Evaluation System provides a model for evaluating the fire risk in a building, by incorporating factors such as mobility of people, number of people at risk, height of building, etc. The calculated risk level provides a minimum target for which levels of protection must be provided by the nature of the building design supplemented by appropriate passive and active fire protection devices.

The evaluation system is also a technique for obtaining a quantitative measure of the level of safety provided by a protected building. This level is determined from an evaluation of the various construction elements and fire protection features. The system measures both the gross level of safety and a set of safety subsystems related to containment, extinguishment and people movement. These subsystems are individually graded to evaluate the depth of redundancy in the building fire safety system. The evaluation system is a mechanism by which the designer can combine a wide variety of fire safety elements into a health care facility plan that provides the level of fire safety required to balance the calculated risk levels.

This evaluation system applies to institutional buildings used for health care purposes, involving sleeping facilities for the occupants. In its present form, it was not designed for outpatient clinics or other facilities where all of the occupants are normally awake.

The system to be described covers all of the aspects of building fire safety currently covered by the Life Safety Code. A few of the items related to built-in utility systems and to operational features and furnishings (fire evacuation plans, fire drills, draperies, etc.) have

been excluded from the grading systems. However, these are covered as mandated items in an attachment to the evaluation form. To be considered as having demonstrated equivalent fire safety, it is necessary that the facility satisfy these requirements in addition to the basic fire safety evaluation.

The purpose of the evaluation system is to provide a technically-based mechanism applicable to health care facilities for:

a. Evaluation of an existing health care facility to determine how the actual level of fire safety in that facility compares to the level of fire safety that would be provided by explicit conformance to the requirements of the 1973 Life Safety Code.

b. Evaluation of various alternative approaches available to upgrade an existing facility to a level of fire safety that meets or exceeds the level prescribed by the Life Safety Code.

c. Evaluation of a proposed new facility design to determine how its level of fire safety would compare to that required for such a facility by the Life Safety Code. In this aspect, the system can also be used as a design instrument to determine various alternatives that can be considered.

d. Evaluation of the cost effectiveness of alternate fire safety designs and methodologies.

e. Quantitative evaluations of the relative degree of protection involved in a facility or a design feature, as compared with that required by the Life Safety Code.

The evaluation system provides a method for determining the design features needed to provide equivalence to the 1973 Life Safety Code. Equivalency, for the purpose of the system, is judged by comparing the total fire safety level prescribed by the Life Safety Code for health care facilities to the actual safety level of a particular design or an actual facility.

The Life Safety Code represents a consensus view by knowledgeable professionals of the minimum standard for fire safety necessary to safeguard the public interest.

Equivalency determination is based on the concept that, while the Life Safety Code does not include a specific statement of the level of safety provided, it is possible by examination of the Code requirements to establish a baseline for comparing the level of safety provided by strict conformance to its requirements with the level of safety provided by alternative systems of safeguards. This comparison can be made on the basis of the total safety performance of the building, including all of its safeguards; without making direct comparisons between a specific Code requirement for an element and the corresponding element as it

exists in the building. The concept is suitable for use with any of the recent editions of the NFPA Life Safety Codes for 1967, 1970, 1973 and 1976. The following reference sections are quoted from NFPA 101-1973:

> "1-3118. Nothing in this Code is intended to prevent the use of new methods or new devices, providing sufficient technical data is submitted to the authority having jurisdiction to demonstrate that the new method or device is equivalent in quality, strength, fire resistance, effectiveness, durability, and safety to that prescribed by this Code."
>
> "1-4113(c). The specific requirements of this Code for existing buildings may be modified by the authority having jurisdiction to allow alternative arrangements that will secure as nearly equivalent safety to life from fire as practical, but in no case shall the modification be less restrictive or afford less safety to life than compliance with the corresponding provisions contained in this Code for existing buildings. (See also 1-3118)."

Evaluation of equivalency of fire safety is through consideration of three separate concepts. The first is occupancy risk, judged primarily on: how many people are susceptible to a single fire exposure (level of risk), what is their capability to safeguard themselves, and what is the nature of the exposure to which they are being subjected. The second is the capacity of the building and its fire protection systems to provide a safe environment commensurate with the risk. The third is the degree of redundant capabilities to ensure the preservation of safety in case of the failure of any one safeguard or method.

Development of the fire safety evaluation system consisted of three operations: system design, professional judgment review and critique, and system testing.

a. System Design. This consisted of: (1) analysis of the stated requirements of the 1973 Life Safety Code versus the fire safety function(s) of each requirement; (2) organization of the results of this analysis into a format suitable for obtaining professional judgments of the comparative worth of the fundamental code requirements relative to the Life Safety Code objectives for health care facilities; (3) development of a computer program to evaluate alternative designs and fire protection systems; and, (4) iterative incorporation of system changes resulting from the professional judgment review and system tests.

b. Professional Judgment Review. The professional judgment review was made by two different groups: (1) an NBS group, through the mechanism of a "Delphi" exercise; and, (2) an outside review group. The Delphi group (an ad hoc group of qualified fire protection engineers from the Center for Fire Research, NBS) refined the format, established initial values of the safety parameters, and

provided judgment values for selecting individual safety parameters in the redundancy evaluations. The outside consulting group consisted of prominent persons in the field of regulation and specification of fire safety requirements in health care facilities. The group provided broad-based technical and judgmental information, improving both the format and the final values assigned to the safety parameters and the redundancy factors.

c. System Testing. The testing involved a series of exercises to determine the validity of the fire safety evaluation system. These exercises included: field tests of actual facilities by NBS personnel; examination of many evaluation worksheets completed by health care facilities' owners and engineering staff, and by code certification and inspection authorities; and, computer analysis of alternative design systems.

The system that has evolved from this effort provides a means of mixing recognized and proven fire safety systems and approaches and evaluating these mixes in terms of the overall fire safety performance of a facility. It permits comparative evaluations of the fire risks and fire safety factors actually present in individual facilities or design. Those features that are in excess of minimum safety requirments are given appropriate credit, reflecting the degree of additional safety actually provided. The credit, however, is limited in this application to the methodological areas where the safeguards provide credible improvements in safety. Conversely, features that increase one or more aspects of fire risk are appropriately charged for their detrimental impact on safety. The result is intended to be an assessment of total safety performance as compared to a minimum code safety level, which provides opportunity for cost reduction, wider choice of design alternatives, and operational flexibility at greater levels than currently available through explicit compliance with the Life Safety Code.

The most important limitations of the evaluation system are:

a. As presently developed the evaluation system applies only to health care facilities of the types covered under Chapter 10 of the 1973 Life Safety Code.

b. The results are expressed in equivalency to the level of safety achieved by the Life Safety Code, and should not be construed as a measure of total or absolute fire safety.

c. The system, like all existing methods for regulating or evaluating fire safety, is only partially supported by technical information or statistics. The professional judgment of experts in a series of balanced peer-consensus groups is used to bridge the technology gaps.

d. In general, the evaluation system is limited to evaluating the interrelationships of those fire safety methodologies and approaches that are defined in the Life Safety Code. There is no basis in the system for accommodating completely innovative approaches (such as automatic venting at the point of fire or the use of halogenated gases as a general protection system) for which equivalency with the Life Safety Code cannot be determined.

e. While the parameter measurements of the system cover built-in structural materials and elements, space arrangement, and fire protection systems and devices, the system does not permit alternate approaches to meeting the Life Safety Code requirements for:

   (1) Utilities such as heating, air conditioning, electrical, and incinerator systems.

   (2) Furnishings such as draperies, curtains, wastebaskets, and beds.

   (3) Administrative activities such as emergency plans and fire drills.

   When using the evaluation system, the existing requirements in these three areas are applied in the traditional manner of explicit conformance with the established standards and requirements as described and/or referenced in the Life Safety Code.

The logic of the system is that the level of risk imposed upon persons in a facility must be met by a system of safeguards that provides sufficient safety to protect against that risk, using several interacting but separate design approaches.

The evaluation is made on a "FIRE/SMOKE ZONE" basis. This is in recognition of both the history of fires in health care facilities and the traditional arrangements of patient care areas. The evaluation of fire safety is relevant both to the capability of patients surviving fire initiated in such a unit, and to the ability of the unit to exclude the impact of fires external to it. The term "fire/smoke zone" is defined as a space separated from all other spaces by floors, and horizontal exits or smoke barriers. Where a floor is not subdivided by horizontal exits or smoke barriers, the entire floor is the zone.

The evaluation system applies this logic to each patient use fire/smoke zone through the following steps.

a. Measure RISK.

b. Measure overall (GENERAL) level of safety.

c. Measure depth (redundancy) of safeguards in terms of:

(1) Fire CONTAINMENT capabilities.

(2) EXTINGUISHMENT, suppression, and control capabilties.

(3) PEOPLE MOVEMENT and other occupant protective features.

d. Determine equivalency to the prescribed requirements of the Life Safety Code. Equivalency occurs when the values as measured by this system are such that:

(1) The GENERAL safety level equals or exceeds the occupancy RISK level, and

(2) The CONTAINMENT, EXTINGUISHMENT and PEOPLE MOVEMENT safety levels each independently equals or exceeds the minimum value corresponding to the level of that category required by the Life Safety Code.

In establishing a system for evaluating risk, it is recognized that there is a basic level of fire risk inherent in every health care facility. It is also recognized that the amount of furniture, equipment, and supplies (plus the arrangement of these within the space available) depends on the occupant and is not quantified in the safety equivalency measurement. The evaluation system baseline for occupancy risk rests on the assumption that the furniture, equipment, and supplies will be combustible, most adversely located from a fire-safety standpoint, and typical of those normally found in health care facilities. Facility furniture could be expected to vary ad hoc so they cannot be considered as known in a system analysis.

The factors used to judge the variations in fire risk are given in Table 1 of the evaluation form. They are applied to individual fire/smoke zones and cover the following risk controlling parameters: the number of patients in the zone, their degree of mobility, their average age, the ratio of patients to attendants, and the height of the zone above street level. These five specific occupancy risk parameters were initially chosen based on the experience and judgment of selected members of the staff of the Fire Safety Engineering Division, Center for Fire Research, and because they are considered to represent the occupancy variables that control the risk in health care facilities. The assessment of the specific parameters and the determination of their relative importance was also based on judgment, plus the exercising of the system on test cases to reveal inconsistencies or deviations from accepted safety practice. (See Figure 1.)

The occupancy risk factor for any health care building is the product of five individual risk parameter factors based on the risk factor values shown in the evaluation form.

The minimum risk conditions have been defined as: a zone containing fewer than five patients, all of whom are of sufficient health to be

Figure 1: Fire Smoke Zone Evaluation Work Sheet for Health Care Facilities

FIRE/SMOKE ZONE* EVALUATION WORK SHEET FOR HEALTH CARE FACILITIES

FACILITY _____ BUILDING _____

ZONE(S) EVALUATED _____

EVALUATOR _____ DATE _____

Complete this work sheet for each zone. Where conditions are the same in several zones, one work sheet can be used for those zones.

Step 1: Determine Occupancy Risk Parameter Factors - Use Table 1.

A. For each Risk Parameter in Table 1, select and circle the appropriate risk factor value. Choose only one for each of the five Risk Parameters.

Table 1. OCCUPANCY RISK PARAMETER FACTORS

RISK PARAMETERS		RISK FACTOR VALUES				
1. PATIENT MOBILITY (M)	MOBILITY STATUS	MOBILE	LIMITED MOBILITY	NOT MOBILE	NOT MOVABLE	
	RISK FACTOR	1.0	1.6	3.2	4.5	
2. PATIENT DENSITY (D)	PATIENT	1-5	6-10	11-30	-30	
	RISK FACTOR	1.0	1.2	1.5	2.0	
3. ZONE LOCATION (L)	FLOOR	1ST	2ND OR 3RD	4TH TO 6TH	7TH AND ABOVE	BASEMENTS
	RISK FACTOR	1.1	1.2	1.4	1.6	1.0
4 RATIO OF PATIENTS TO ATTENDANTS (T)	PATIENTS / ATTENDANT	1-2 / 1	3-5 / 1	6-10 / 1	-11 / 1	ONE OR MORE / NONE
	RISK FACTOR	1.0	1.1	1.2	1.5	4.0
5. PATIENT AVERAGE AGE (A)	AGE	UNDER 65 YEARS AND OVER 1 YEAR		65 YEARS & OVER 1 YEAR & YOUNGER		
	RISK FACTOR	1.0		1.2		

* RISK FACTOR OF 4.0 IS CHARGED TO ANY ZONE THAT HOUSES PATIENTS WITHOUT ANY STAFF IN IMMEDIATE ATTENDANCE

Step 2: Compute Occupancy Risk Factor (F) - Use Table 2.

A. Transfer the circled risk factor values from Table 1 to the corresponding blocks in Table 2.

B. Compute F by multiplying the risk factor values as indicated in Table 2.

Table 2. OCCUPANCY RISK FACTOR CALCULATION

	M		D		L		T		A		F
OCCUPANCY RISK	☐	×	☐	×	☐	×	☐	×	☐	=	☐

Step 3: Compute Adjusted Building Status (R) - Use Table 3A or 3B.

A. If building is classified as NEW use Table 3A. If building is classified as existing use Table 3B.

B. Transfer the value of F from Table 2 to Table 3A or Table 3B as appropriate. Calculate "R."

C. Transfer "R" to the block labeled "R" in Table 7 on page 4 of the work sheet.

Table 3A. (NEW BUILDINGS)

	F		R
1.0^{X}	☐	=	☐

Table 3B. (EXISTING BUILDINGS)

	F		R
0.5^{X}	☐	=	☐

*FIRE/SMOKE ZONE is a space separated from all other spaces by floors, horizontal exits, or smoke barriers

Figure 1 (continued)

Step 4: Determine Safety Parameter Values - Use Table 4.

A. Select and circle the safety value for each safety parameter in Table 4 that best describes the conditions in the zone. Choose only one value for each of the 13 parameters. If two or more appear to apply choose the one with the lowest print value.

Table 4. SAFETY PARAMETERS VALUES

PARAMETERS	PARAMETERS VALUES						
1. CONSTRUCTION	COMBUSTIBLE				NON-COMBUSTIBLE		
	WOOD FRAME		ORDINARY				
FLOOR OF ZONE	UNPROTECTED	PROTECTED	UNPROTECTED	PROTECTED	UNPROTECTED	PROTECTED	FIRE RESIST
FIRST	-2	0	-2	0	0	0	2
SECOND	-7	-7	-7	-2	-7	2	4
THIRD	-9	-7	-7	-7	-7	2	4
4TH & ABOVE	-13	-7	-13	-7	-9	-7	4

2. INTERIOR FINISH (Corr. & Exit)	CLASS C	CLASS B	CLASS B		
	-5	3	3		
3. INTERIOR FINISH (Rooms)	CLASS C	CLASS B	CLASS B		
	-3	1	1		
4. CORRIDOR PARTITIONS/WALLS	NONE OR INCOMPLETE	<1/3 HR	>1/3 <1 0 HR	≥1 0 HR	
	-10 [0]*	0	1 [0]*	2 [0]*	
5. DOORS TO CORRIDOR	NO DOOR	<20 MIN FR	>20 MIN FR	>20 MIN FR & AUTO CLOS	
	-10	2	1 [0]***	2 [0]***	
6. ZONE DIMENSIONS	DEAD END MORE THAN 100	DEAD END 30 -100	NO DEAD ENDS >30' & ZONE LENGTH IS		
			>150	100 -150	<100
	-6 [0]**	-4 [0]**	-2	0	1
7. VERTICAL OPENINGS	OPEN 4 OR MORE FLOORS	OPEN 2 OR 3 FLOORS	ENCLOSED WITH INDICATED FIRE RESIST		
			<1 HR	≥1HR <2 HR	≥2 HR
	-14	-10	0	2 [0]*	3 [0]*
8. HAZARDOUS AREAS	DOUBLE DEFICIENCY		SINGLE DEFICIENCY		NO DEFICIENCIES
	IN ZONE	OUTSIDE ZONE	IN ZONE	IN ADJACENT ZONE	
	-11	-5	-6	-2	0
9. SMOKE CONTROL	NO CONTROL	SMOKE PARTITION	MECH ASSISTED SYSTEMS		
			BY ZONE	BY CORRIDOR	
	-2 [0]***	0	5	0	
10. EMERGENCY MOVEMENT ROUTES	<2 ROUTES	MULTIPLE ROUTES			
		DEFICIENT CAPACITY	W/O HORIZONTAL EXIT s	HORIZONTAL EXIT.s	DIRECT EXIT.s
	-8	-2	3	3	5
11. MANUAL FIRE ALARM	NO MANUAL FIRE ALARM		MANUAL FIRE ALARM		
			W/O F D CONN	W/F D CONN	
	-4		1	2	
12. SMOKE DETECTION & ALARM	NONE	CORRIDOR ONLY	ROOMS ONLY	CORRIDOR & HABIT SPACE	TOTAL SPACE
	0	2	3	4	5
13. AUTOMATIC SPRINKLERS	NONE	CORRIDOR	CORRIDOR & HABIT SPACE	TOTAL SPACE	
	0	2 [0]**	8	10	

NOTE
- *Use [0] when item 5 is -10
- **Use [0] when item 10 is -8
- ***Use [0] in zone with less than 31 patients in existing buildings
- *Use [0] when item 1 is based on first floor zone or on an unprotected type of construction.
- **Use [0] when item 1 is based on an unprotected type of construction
- ***Use [0] when item 4 is -10

Figure 1 (continued)

Step 5: Compute Individual Safety Evaluations - Use Table 5.

A. Transfer each of the 13 circled Safety Parameter Value from Table 4 to every unshaded blocks in the line with the corresponding Safety Parameter in Table 5. For Safety Parameter 13 (Sprinklers) the value entered in the (People Movement Safety) is recorded in Table 5 as 1/2 the corresponding value circled in Table 4.

B. Add the four columns, keeping in mind that any negative numbers deduct.

C. Transfer the resulting total values for S_1, S_2, S_3, S_G to the blocks labeled S_1, S_2, S_3, S_G in Table 7 on page 4 of this sheet.

Table 5. INDIVIDUAL SAFETY EVALUATIONS

SAFETY PARAMETERS	CONTAINMENT SAFETY (S_1)	EXTINGUISHMENT SAFETY (S_2)	PEOPLE MOVEMENT SAFETY (S_3)	GENERAL SAFETY (S_G)
1. CONSTRUCTION				
2. INTERIOR FINISH (Corr. & Exit)				
3. INTERIOR FINISH (Rooms)				
4. CORRIDOR PARTITIONS/WALLS				
5. DOORS TO CORRIDOR				
6. ZONE DIMENSIONS				
7. VERTICAL OPENINGS				
8. HAZARDOUS AREAS				
9. SMOKE CONTROL				
10. EMERGENCY MOVEMENT ROUTES				
11. MANUAL FIRE ALARM				
12. SMOKE DETECTION & ALARM				
13. AUTOMATIC SPRINKLERS			÷ 2 =	
TOTAL VALUE	S_1 =	S_2 =	S_3 =	S_G =

Figure 1 (continued)

Step 6: Determine Mandatory Safety Requirement Values - Use Table 6.

A. Using the classification of the building (i.e., New or Existing) and the floor where the zone is located, circle the appropriate value in each of the three columns in Table 6.

B. Transfer the three circled values from Table 6 to the blocks marked S_a, S_b, and S_c in Table 7.

Table 6. MANDATORY SAFETY REQUIREMENTS						
	CONTAINMENT S_a		EXTINGUISHMENT S_b		PEOPLE MOVEMENT S_c	
ZONE LOCATION	New	Exist.	New	Exist.	New	Exist.
FIRST FLOOR	9.0	4.0	6.0	3.0	6.0	1.0
ABOVE FIRST FLOOR	14.0	8.0	8.0	5.0	9.0	3.0

Step 7: Evaluation Fire Safety Equivalency - Use Table 7.

A. Perform the indicated subtractions in Table 7. Enter the differences in the appropriate answer blocks.

B. For each row check "Yes" if the value in the answer block is zero or greater. Check "No" if the value in the answer block is a negative number.

Table 7. ZONE SAFETY EQUIVALENCY EVALUATION				S_1 − S_a = C	YES	NO
CONTAINMENT SAFETY (S_1)	less	MANDATORY CONTAINMENT (S_a)	≥0	S_1 − S_a = C		
EXTINGUISHMENT SAFETY (S_2)	less	MANDATORY EXTINGUISHMENT (S_b)	≥0	S_2 − S_b = E		
PEOPLE MOVEMENT SAFETY (S_3)	less	MANDATORY PEOPLE MOVEMENT (S_c)	≥0	S_3 − S_c = P		
GENERAL SAFETY (S_G)	less	OCCUPANCY RISK (R)	≥0	S_G − R = G		

CONCLUSIONS:

1. [ ] All of the checks in Table 7 are in the "Yes" column. The level of fire safety is at least equivalent to that prescribed by the Life Safety Code*

2. [ ] One or more of the checks in Table 7 are in the "No" column. The level of fire safety is not shown by this system to be equivalent to that prescribed by the Life Safety Code.*

*The equivalency covered by this worksheet includes the majority of considerations covered by the Life Safety Code. There are a few considerations that are not evaluated by this method. These must be separately considered. These additional considerations are covered in the "Facility Fire Safety Requirements Worksheet." One copy of this separate worksheet is to be completed for each facility.

This form has been prepared by the Fire Safety Engineering Division, Center for Fire Research, NBS, as part of the HEW NBS Life Safety Fire Safety project.

June 27, 1977
Revised March 15, 1978

considered fully mobile and capable of evacuating themselves, their average age being less than 65 and over one; a ratio of patients to attendants of 2:1 or less; and the zone located on the first floor of the building. This condition is assigned an occupancy risk factor of 1.1.

In contrast, the conditions evaluated as representing the upper range of risk as contemplated by the Life Safety Code are based on: more than 30 patients in the zone, all of whom are unable to move without assistance; their average age is over 65 or under one; a ratio of patients to attendants of 10:1 or more; and the zone located above the sixth floor or in the basement. This was assigned an occupancy risk factor of 18. Greater risk values are assigned to patients who cannot be moved and to fire zones which are unstaffed. The maximum possible risk has a factor of 69.

The general safety factors are measures of those building and fire protection features that bear upon the safety of patients (and other occupants) who may be in the particular fire/smoke zone at the time of a fire.

The safety parameters were selected by examining the specific code element requirements for health care facilities, Chapters 10 and 17 of the 1973 Life Safety Code, and by evaluating the impact of various elements of the Code. The selected safety parameters were modified first by the NBS Delphi panel and later by the consultant groups.

Each of the safety parameters was analyzed. Where the current Code requirements recognized several different levels of a parameter (e.g. the Life Safety Code recognizes eight different types of construction) the most important alternatives were listed. In addition, conditions likely to be encountered in situations failing to meet the explicit Code requirements, and conditions exceeding those required by the Code but available for increased protection, were also listed. Table 4 of the evaluation form shows the final "matrix" form of the breakdown of the 13 selected safety parameters, each having three to seven subdivisions. (See Figure 1.)

The safety parameters are designed to constitute a complete assembly of all of the basic building factors determining the level of safety in a health care facility for which equivalency could be expressed. In addition, we collected and attached to the inspection form an additional series of items required by the Life Safety Code but outside the scope of the equivalency covered by the listed safety parameters. These relate primarily to building utilities, operational features and furnishings, and they are listed in the separate Facility Fire Safety Requirements Worksheet that accompanies the evaluation form. (See Figure 2.)

In order to provide a method bringing the best available consensus judgment and experience together to judge the relative impact on general

Figure 2: FACILITY FIRE SAFETY REQUIREMENTS WORKSHEET

	COMPLETE ONE COPY OF THIS WORKSHEET FOR EACH FACILITY FOR EACH CONSIDERATION SELECT AND MARK THE APPROPRIATE COLUMN	MET	NOT MET	NOT APP.
A.	Building utilities conform to the requirements of paragraph 7-1111 (Section 7-1) of the Life Safety Code.			
B.	In new facilities alarms, emergency communication systems and illumination of generator set locations are powered from the Life Safety Branch as described in the National Electrical Code, NFPA 70.			
C.	Heating and air conditioning systems conform with the air conditioning, heating, and ventilating systems conform with paragraph 7-1111 (Section 7-2) of the, Life Safety Code.			
D.	Fuel burning space heaters and portable electrical space heaters are not used.			
E.	There are no flue fed incinerators.			
F.	An evacuation plan is provided and fire drills conducted in accordance with Life Safety Code paragraphs 17-1111 through 17-1118 (17-1.4 through 17-1.4.6) and 17-4111 through 17-4126 (17-4.1 through 17-4.2.6).			
G.	Smoking regulations have been adopted and implemented in accordance with Life Safety Code paragraph 17-4.4.1 (17-4141).			
H.	Cumbustible draperies, furnishings and decorations are prohibited in accordance with Life Safety Code paragraph 17-415 (17-4.5 and 17-4.6).			
I.	Fire extinguishers are provided in accordance with the requirements of 10-1369 (10-2.3.4.5) and 10-2.3.5.5 (10-3.3.4.5).			
J.	Exit signs are provided in accordance with the requirements of 10-1283 (10-2.2.11.1) and 10-2272 (10-3.2.11.1).			

safety of each of the parameters in each of the potential conditions listed, a Delphi type peer group was established. This peer group consisted of members of the Fire Safety Engineering Division, Center for Fire Research, NBS, with the greatest background and experience in the application of fire protection engineering principles and practices to buildings.

Each member of the group was provided with copies of the initial matrix similar to the one shown in Table 4 of the form, but without numerical parameter values. Each person then evaluated the relative importance of each item in the entire matrix of parameters without consultation with other members of the group. The members of the Delphi group were advised that the risk being considered covered new and existing health care facilities and that the objective was a system to measure equivalency with the 1973 Safety Code. The value judgments made by this group are, therefore, considered to be based on the character and needs of patients in health care facilities and the current approach to these embodied in the Life Safety Code. In addition, each member of the group evaluated separately the same matrix in relation to the redundant subsystems. In executing the matrix, each peer group member was requested to assign a value of +10 to that safety parameter element (or level) considered to be the single most important to safety to life and to compare all other elements in the matrix to that base. A zero value represented a neutral condition; i.e. a safety parameter at this level would not increase or decrease the safety conditions of a fire zone. Negative values represented deficiencies, i.e. safety parameters at this level decreased the safety conditions of a fire/smoke zone.

After an initial analysis of the results, the peer group was asked to meet in conference on several occasions. The peer group on those occasions deviated from the traditional Delphi approach but instead reviewed differences and concepts, with a view to achieving consensus agreement on categories and on selection of the numerical values.

Several categories were modified and qualified. A significant adjustment was to shift the numbers so that a baseline would be established in which negative charges would not be made against any general safety parameter that was in explicit conformity with the requirements of the 1973 Life Safety Code.

The relationship between the safety parameter values and the code requirements was established by summing the value of all of the credits and deficits of the safety parameter elements for a health care facility that exactly met all of the requirements prescribed by the 1973 Life Safety Code. Attempts to do this disclosed that the Life Safety Code actually had eleven sets of requirements, seven for sprinklered facilities and four for non-sprinklered facilities. Based on the relative value of protection methodologies developed by the Delphi group and refined by the review process described later in this report, the levels of safety prescribed by these requirements are:

	General Safety Value Required	
	Non-Sprinklered Buildings	Sprinklered Buildings
1. New buildings 1-story in height.	13	16
2. New buildings over 1-story in height.	18	23(a)
3. Existing buildings 1-story in height.	5	8
4. Existing buildings over 1-story in height. 9 16(b)	9	16(b)

(a) 20 for 2- or 3-story buildings.
(b) 14 for 3-story and 10 for 2-story buildings.

These values represent the level of general safety required by the 1973 Life Safety Code to house health care occupants in the class and height of building indicated. The analysis demonstrates that, in terms of the values in the evaluation system, the Life Safety Code minimum requirements are those for non-sprinklered buildings. The highest total value developed for a non-sprinklered building is 18. The importance of this value is that it was used as the approximate baseline for the establishment of measurement of risk in a multi-story building and is the principal balance point for comparing occupancy risk with general safety. Thirteen is the comparable value for a single story building.

The values for existing buildings demonstrate the reduced level of general safety accepted by the Life Safety Code for these buildings. For a one-story building, the general safety value is +13 for a new building and +5 for an existing building, indicating that for an existing one-story building only 38% of the score expected of a new one-story building is required. Similarly, the ratio of existing multi-story buildings to that for new multi-story buildings is 1/2. The 0.5 factor in Table 3B of the Fire/Smoke Zone Evaluation work sheet reflects this ratio. (See Figure 1.)

A basic principal of the Life Safety Code is that there will be a redundancy of protection so that the failure of a single protection device or method will not result in a major failure of the entire safety system. In addition, the development of a redundant approach, as used in this safety evaluation system, avoids the pitfall of traditional approaches to developing grading systems where all of the elements are considered mutually exclusive of each other and a single total score determines acceptability. Under such a system, it is possible to completely disguise the absence of a critical element. The evaluation system establishes redundancy on the basis of in-depth coverage of the principal fire safety methodologies. The redundant methodologies used

in the system are those related to fire safety through containment, through extinguishment, and through people movement (including refuge).

The redundant methodologies were chosen after examination of decision tree approaches. These divide fire protection by element. Four different methodologies of managing fire impact were identified. These are control of the fuel and arrangement; compartmentation and other mechanisms of containment of the fire and its impact; extinguishment, suppression and other means of terminating fire development; and the provision of safe locations of refuge either by evacuation or by establishment of safe areas of refuge. Those elements related to the control of fuel and its arrangement are incorporated into the risk analysis portion, in terms of the occupancy risk baseline. Therefore, only three redundant methodologies were used in the analysis.

As part of the initial Delphi exercise, each member of the Delphi group completed a matrix establishing his judgment on the relative importance of the items in the general safety parameter matrix, he also made additional judgments on the same matrix elements related to the separate fire safety methodologies of containment, extinguishment, and people movement. These were then processed, and analyzed and reviewed in subsequent conference meetings of the Delphi group. By this process, the parameters that have a significant impact on each of the redundant methodologies were identified. Many of the parameters impact on more than one of the methodologies. In the judgment of the group only sprinkler protection impacts on all three. Table 5 of the evaluation form shows the breakdown in terms of which parameters apply to which methodologies. (See Figure 1.)

Each of these subsystems was then evaluated to determine the point value that would result from explicit compliance with the requirements of the Life Safety Code for that subsystem. Because of the variance between new and existing buildings and between single story and multi-story type buildings, four values were determined for each of the redundant safety methodologies.

In this fire safety evaluation system, these values are mandatory minimum values that must be met regardless of the overall evaluated level of occupancy risk or the overall evaluated level of general safety.

This evaluation system determines the efficacy of any arrangement of the listed fire safety subsystem elements in a fire/smoke zone by considering the risk factors and safety parameters relative to the level of safety that would be achieved by explicit conformance with the specific requirement of the Life Safety Code (NFPA 101-1973). To be determined as equivalent, the measurement must demonstrate that:

a. The general safety level produces a value that equals or exceeds the determined value or charge for risk.

b. Each of the three individual redundancy groupings (containment safety; extinguishment safety; and people movement safety) must have an arrangement of safeguards that meet the prescribed minimum for that redundant grouping independent of the other condition.

All of the parameters, variables and formulas for determining the facility safety equivalency with the Life Safety Code are contained in a self-instructing form. A separate manual has been prepared to assist in completion of the evaluation form. The manual provides expanded discussions and definitions of various items in the evaluation sheet to assist the surveyor or reviewer when questions of definitions, interpretations, or meanings arise. To evaluate totally a health care facility, it is necessary to evaluate each of the different fire/smoke zones.

The evaluation system has a theoretical capability of evaluating about 230 million combinations of the 13 safety parameters and variations. Practical arrangements in existing buildings and future design are of the order of a few thousand. For the purpose of verifying the original proposed system, as well as to analyze potential proposed changes, a computer program was developed. The program generates all arrangements that are valid, based on data given for the safety parameters. Using the Fire Safety Evaluation Worksheet, an experienced engineer or facility can manually analyze 10 to 15 differently organized zones, and establish the most suitable configuration for the facility. By using the computer program, the evaluator is able to review all posible solutions to his problem, and he can also be assured that answers are not biased by individual preference. The printouts of the zone arrangements can be easily analyzed by an experienced individual to estabish equivalency of solutions.

An effort has been made to make the system consistent with accepted and sound fire protection engineering practice and theory. While the most advanced scientific knowledge has been used in developing the system, the state-of-the-art requires that the insight and professional judgment of experts in the field serve as the base for information in developing the system, and the available technical knowledge (including results of fire tests, statistical analyses, fire investigations, etc.) serves a supportive role. In the development of the fire safety evaluation system, therefore, both the NBS Delphi group and the professional consulting panel were selected on the basis of expertise and interest.

In the systems proofing effort, the capacity of these panels was broadened by using a two-step judgment approach. In the first step the relative worth of each parameter was individually judged on its relationship to other parameters. This evaluation was made in terms of each parameter's contribution to both general safety and to each of the redundant safety requirements. In the second phase, the parameter values, developed in the preceding phase, were applied to a large number of test cases, scenarios and reviews of specific facilities. The resulting fire safety system configurations were then judged on overall

equivalency to configurations prescribed by the 1973 Life Safety Code. This process provided a balance and cross-check between judgments of the value of the individual parameters and evaluations of the overall product.

Throughout the project, the project staff maintained liaison and a flow through the described review groups and a recently established task group of the National Fire Protection Association Committee on Safety to Life. This task group is studying the evaluation system for inclusion in the NFPA Life Safety Code.

The conclusions resulting from this study are briefly stated as follows:

a. A methodology has been developed and described for generating equivalency to a specified set of occupancy safety requirements. It is based on the understanding of level of occupancy risk, building safety, and redundancy of safeguards. This methodology can provide the necessary flexibility for a designer to achieve minimum cost solutions for a specified level of safety.

b. The described methodology, "System for Fire Safety Evaluation of Health Care Facilities," is a specific example of an equivalency approach. The system provides equivalency to the minimum life requirements for the health care facility, as prescribed by Life Safety Code 101-1973. The system can be updated for later Life Safety Code editions for health care facilities.

c. Other equivalency systems can be developed for other occupancies, but this will require detailed analysis of the risk level, the variety of building safety requirements, the necessary redundance equations, and other aspects of the specific occupancy involved.

Rehabilitation Standards: What Are They? Who is to Develop, Maintain, and Enforce Them?

by

Bernard A. Cummings
National Association of
Housing and Redevelopment Officials

Mr. Cummings holds a B.S. in Environmental Health and a Master of Public Administration.

Mr. Cummings has 27 years of experience in housing code enforcement, neighborhood conservation and housing rehabilitation in the cities of Pasadena, Oakland and San Francisco, California.

Mr. Cummings is the Assistant Superintendent of the Bureau of Inspection and Secretary of the Abatement Appeals Board of the City and County of San Francisco.

In addition, he is currently the Chairman of the Codes and Standards Subcommittee of the Conservation and Rehabilitation Committee, National Association of Housing and Redevelopment Officials.

Those of you who are building officials know what the bible for construction is--your building code. Those of you who have housing codes know this is the bible of rehabilitation. This is the San Francisco housing code. It is a very small document. In addition, you have field inspection manuals that give you equivalents, explanations on how to apply the codes to the gray areas in existing buildings. And, then you have maybe a 4-inch thick document of administrative bulletins and code rulings which go into the details of day-to-day decision-making by the building official in the solving of particular problems as they arise.

The reason I am here is that I represent the National Association of Housing and Redevelopment Officials (NAHRO). NAHRO is an organization involving people in the fields of redevelopment, public housing and community development and rehabilitation, with many of their agencies

involved in Federally-financed rehabilitation. NAHRO's concern is with the model code groups. We wondered how the impediments to conserving our existing buildings could be removed from the model codes. I think we are being told we are on the way to seeing these impediments removed and that the model code groups are interested and committed to removing them.

The particular contribution I made to the Massachusetts proposal is the field inspection manual. You will see in some of its sections certain equivalents or solutions to problems where alternatives are acceptable depending on the condition that you find in a particular building.

Twenty years ago, in 1958, the city of San Francisco adopted its housing code. I think there are about 1,000 communities in the United States that adopted housing codes as part of the workable program, a former Federal requirement for receiving Federal funds for redevelopment and other U.S. Department of Housing and Urban Development (HUD) programs. Many of these cities had no housing code. San Francisco adopted its own housing code, although the State of California had a State housing act that went back to 1923. The problem with working with a housing code in dealing with rehabilitation on a building-by-building, block-by-block basis, is how to deal with the variety of conditions that you run into that are not covered in any code.

How do you apply the retro-active provisions of the code? To solve this, in 1957, we adopted our first field inspection manual. How did we do it? We had our first designated conservation area in 1959. We spent the first six months going through buildings and inspecting them, bringing in all the various experts from the various departments involved in code standards, such as the zoning ordinance, the fire code, health, building, plumbing and electrical codes, and the housing codes. Working together, walking through buildings, we tried to determine solutions to code problems to allow us to retain these buildings. In San Francisco, we had a very tight housing market 20 years ago. We still do.

This first conservation area was an area that had large mansions that had been converted to rooming houses and boarding houses, and there was a great need for that type of housing for single individuals, low income people, and students. How do you retain these buildings? What do you do to make a boarding house or rooming house comply with the building code requirement for a hotel? Most of these buildings had been converted illegally; i.e., had been converted without a permit. So, the philosophy was developed in that first six months that you accepted the building as it was originally built and you required it to at least meet the requirements at the date of the conversion.

The idea was not to penalize the property owners for someone else in the past not having taken out a permit if, at that time, the use could have been allowed. Whatever that use was or whatever materials were used, those materials were acceptable 20 years ago; thus, they would be acceptable

today. Simply because someone had not taken out a piece of paper and paid a fee was not grounds for not accepting the existing condition. That was the basic philosophy; to retain and legalize.

We developed the manual following the logic of going through the building. First going through the yards and courts, fences, retaining walls, and patios, and then through the buildings from the foundations and wood floors to the roof. We researched the requirements in room dimensions at different periods of time. In 1906, a 7'2" ceiling height was a requirement of a code. In 1910, it was 7'6". At different periods of time there were different code requirements. These earlier requirements whatever they were, are acceptable today. The use existed at that time.

How do you achieve equivalency in safety? As the time has gone on, this field inspection manual has been revised, repeatedly, continuously. Our housing code has been revised. Many of the conditions that were originally covered by our field inspection manual were later adopted into the housing code so that the policy is very clearly set forth in the housing code on what you do with existing buildings. This is the law of the City of San Francisco concerning existing buildings. It is not an administrative bulletin anymore or a field inspection manual that was developed to guide the instructors, it is now part of the code.

In the building code there are several sections that have to do with existing buildings. They address how you treat existing buildings and how you convert existing buildings. You have a matrix, as was described by the previous speaker. It is located in Section 501 of the San Francisco building code, which describes the uses of buildings that you can convert from to another less hazardous use, without providing additional requirements to meet today's new construction codes. So, you can go from one use to another use, and not provide any additional requirements to meet today's new construction standards in converting the use of a building, like a warehouse to an office building, as an example.

There are certain things that you do have to provide that have to do with life safety, and in San Francisco one of those conditions is seismic safety. We are in an earthquake prone area and have to look at the seismic resistance of the building. So, in the building code we cover existing buildings, we talk about conversion and new construction. In our housing code, we talk about existing residential buildings. In our field inspection manual we talk about the solutions to problems that you run into in the field, so that the inspector knows how to recognize and deal with the gray areas of what is the code requirement and what is acceptable at less than code, and at what point you may have to go to an appeals board.

There are several appeals boards in San Francisco. We have a board of examiners which is made up of representatives of professional organizations; the engineers, architects and so forth. They review design problems. Several years ago a cathedral was built in San Francisco. The concept of its design had never been used before and the codes certainly could not handle this type of building. Wind tests and all sorts of other tests had

to be carried out to establish, to the satisfaction of this board of examiners, that the design of this building could withstand various conditions including seismic which might impair its safety. This has been the approach we have used in San Francisco over the last 20 years and it now appears that this is the approach Massachusetts is planning to follow.

From what we have heard from the previous speakers, there is nothing magic about this approach, it can be done. However, it does require a competent trained staff. This is where I am concerned. I believe we should all be concerned with where we are going to get the people who are going to be able to deal with this systems analysis approach to code enforcement--someone who can determine whether a particular system of exitways is going to work if smoke detectors, heat detectors, sprinkler systems, stairway enclosures, smoke barriers and/or some combination thereof is installed. The people who are going to have to make these decisions--your inspectors--have to be competent, they have to be trained and there has to be a continuing mechanism for this.

These codes, field inspection manuals, administrative bulletins and code rulings require regular revision and updating. Where is this going to occur? How do these decisions that are reached in the field get to the Administrator so that they will be in writing, where everyone is aware what is an acceptable alternative, and is there a method for it to be passed on to others who are faced with this same problem? In the City and County of San Francisco we have this mechanism, but how do we do it on a national basis? Thus, training, competent staff, adequate pay, are the problems we hear about in talking to our co-workers in NAHRO about nepotism and the incompetent people they run into in the codes field. The quality of the inspectors who are given this responsibility is very important to avoid the payoffs and the kick-backs. In Chicago 20 years ago you needed seven or eight people to make an inspection so that the payoff would be too large for the property owner. We saw the same thing again in Chicago on "60 Minutes," just last year. So, things have not changed that much in 20 years.

And, you know, the real world is out there. Where are these people coming from, where is this professionalism going to come from and how is this system going to be kept up-to-date on a continuing basis?

PANEL DISCUSSION

QUESTION: James H. Pielert, National Bureau of Standards (NBS)

How are your housing code and inspection manual revised? What is the input of the professionals in the area? Is it done by your department? What is the mechanism?

RESPONSE: Bernard Cummings, National Association of Housing and Redevelopment Officials (NAHRO)

The latest version of our field inspection manual is dated August 1978, and here we are several months later trying to get it out to all the people who use it. This is done by committee. The Chief of the Division of Apartment House and Hotel Inspection, the Chief of the Plumbing Division, the Chief of the Electrical Division, the Chief of our Abatement Section, the Chief of our Rehabilitation Assistance Program, and the Chief of our District Building Inspectors, work together as a team and go over it item-by-item, page-by-page.

People are submitting changes and suggested changes to the field inspection manual and the housing code based on problems they see, through a regular process of filling out a form and submitting it to the Superintendent's Office, and these are accumulating. Ideas are coming up, problems are coming up, solutions are coming up all the time. How do you get these into the system for discussion?

There are discussions going on of all sorts. As Mr. Lewis mentioned about the inspectors quarrelling with each other; well, this does happen. I do not think we have ever completely gotten our plumbing inspectors and electrical inspectors in line with the philosophy of not trying to sell complete electrical or plumbing jobs when only a minimum amount of work is necessary to correct the problem if the intent of the code is followed. And so, it is a team effort. It goes up through a process of review and it takes months of doing and it is a continuing thing. And, it is required that the codes have to be updated every three years.

QUESTION: James H. Pielert, NBS

Mr. Nelson, would you like to say a few words about the status of the work you are doing for the U.S. Department of Housing and Urban Development (HUD) on the minimum property standards?

RESPONSE: Harold E. Nelson, NBS

We are just beginning. What we have done to-date is two-fold. One, we extended the matrix of safety items to a broader consideration. It has been sent to all 70 HUD Offices and each was asked to circle every one that it ever uses. We expect to find some that never get applied and we do not expect to get answers from every office. Secondly, we took the same matrix of elements and then we put across the top of the matrix the bottom inputs of a typical fire safety decision tree.

What we are in the process of doing is attempting to analyze the code. First of all, to say, what pieces of code hardware deliver what elements of fire safety and which pieces of code hardware deliver multiple elements, and then to mark it in such a way that the level of requirement is shown. We hope to get on one sheet of paper a complete description of a code which would be kind of nice to work with. It is using the matrix system.

Actually, when you go through a building and you mark it on that evaluation system and you circle the thirteen items that apply, it is amazing how complete a description you have of a code of a building right in front of you, as far as this problem area goes. We also expect to see this trade-off matrix. If you are attempting to maintain equality and you start playing with a piece of hardware or a requirement, it would be very nice to know where that piece of hardware impacted on which elements of safety so that when you replaced it you could be sure that your replacement covered all those same elements. Or, conversely, if somebody had an especially good thing in the building and wanted to know if he could get credit for it, you could show him in which areas it applied.

So we think it is useful. But beyond that, that is our stage. We will be moving into the development of a matrix and then gathering together the experts and the oracles that we will use to help us assign the numbers.

QUESTION: Ben Brungraber, B and B Engineered Timber

In the past I have been a building inspector, a pretty underpaid, unappreciated field, and I do not see any potential building inspectors in the audience. I wonder if Mr. Cummings would address the situation. We seem to be going to fancier, more explicit codes and equations among other things, and it seems that they are taking all the decision-making out of it. We are trying to keep everybody covered so we do not get sued. I wonder if another way to go about it might be to just establish guidelines and pay inspectors and let them make their own decisions and be creative, and get people willing to make decisions.

RESPONSE: Bernard Cummings, NAHRO

I know that paying inspectors properly is very important. I remember 20 years ago telling our superintendent building inspector about an article in House and Home magazine about the building inspectors in Oklahoma City who could not afford to buy a house in Oklahoma City--the buildings that they were inspecting. I thought this was a good excuse of why we should be doing something better in San Francisco. When we held an examination for building inspectors, we received 250 applications and ended up with 20 who were on the civil service list. They were registered architects, licensed engineers, and general contractors, and we are talking about $25,000 or maybe $30,000 a year, including fringe benefits. You are not going to attract anyone from the private sector. They can do much better out there.

COMMENT: Ben Brungraber, B and B Engineered Timber

It seems to be a problem in any code we have; they are only as good as the people who go out and inspect them.

COMMENT: Bernard Cummings, NAHRO

That is right!

COMMENT: Walter Lewis, University of Illinois

The need for increasing the amount of remuneration that code enforcement officials receive was the question, was it not?

COMMENT: Ben Brungraber, B and B Engineered Timber

I am just curious about another philosophy I picture where, instead of writing fancier codes to take away the responsibility for decisions, set guidelines and hire some more creative people who are willing to go out and do the inspections.

RESPONSE: Walter Lewis, University of Illinois

I think, legally, the code has to be written in language that is understandable. I think we are talking about a need for competency on the part of those who design buildings and build them, and an increased competency, in many places, on those who enforce the provisions of the code. The one thing that I would comment on is that the competency of those who are enforcing the code is a different level of competency than those who are designing and building the buildings.

For instance, in the School of Architecture, we are teaching people about how to design a building that has to be built. The code enforcement official does not need to build buildings, does not have to construct buildings; however, the code enforcement official does need the competency to determine that those who do build it or design it, do it according to the law. At least we should be paying and attracting those with competency who can do that job. In many cases, we do not have the support of city councils, we do not have the support of city managers, that is one of the reasons why; although we need the technical back-up and capability, that is one of the reasons we did what we did.

The city council has to appropriate more money. The city manager has to believe that the building department and those who are involved in code enforcement really are a part of the community development and redevelopment team. I think in many communities, that is not given the importance that it should have.

COMMENT: Bernard Cummings, NAHRO

I think one of the things that gives you some evidence of community support is when you go to your city council or board of supervisors for your fee adjustments. The Bureau of Building Inspections in San Francisco is 100 percent self-supporting through fees as of one month ago. Prior to that, it was 70 percent self-supporting. Those fees were raised for the first time in 10 years rather astronomically, yet the industry, the Chamber of Commerce, the Apartment House Owners Association, and all the others who are contractor's associations who are affected by those fees, felt that as long as they were getting a service, they wanted the service and were willing to pay for it. If they are satisfied with the service, they will support the request.

COMMENT: Ben Brungraber, B and B Engineered Timber

One of the differences between writing codes and enforcing is - I just wonder if you compared how many people died in fires because a staircase is two inches narrower than it might be to the number who died because the fire exits are locked to keep people from sneaking in the back doors of night clubs. If you compared these two, I think we have probably lost more from locked doors that should not have been locked, and an inspector might have caught it if there had been a more steady inspection.

Session on Administrative Procedures and Their Effectiveness

Moderator: William Plouffe, President
Charleswater Associates, Inc.

PANEL

Creighton Lederer
Commissioner, City of Detroit
Department of Buildings and Safety Engineering

Frederick A. Stahl
Principal
Perry, Dean, Stahl and Rogers, Architects

Joseph Stein
Principal
Joseph Stein and Associates

SESSION MODERATOR

William Plouffe
President, Charleswater Associates, Inc.

Mr. Plouffe received a S.B. in Mechanical Engineering from the Massachusetts Institute of Technology, and a M.B.A. from Harvard Business School.

As President of Charleswater Associates, Inc., a management consulting firm specializing in studies of the impact of government regulations, directed many projects in the building regulatory field including industrialized housing, third-party inspection programs, housing codes, energy codes for buildings, training of building and housing code officials and development of a statewide building code program.

As a consultant to the National Conference of States on Building Codes and Standards, serves as project coordinator for the pilot program for the State of Massachusetts to develop interim provisions for alterations and additions to existing buildings.

The topic of this session is Administrative Procedures and Their Effectiveness, particularly as related to the rehabilitation code under the pilot program for Massachusetts.

This program was started nearly a year ago when I made a brief survey of selected building officials, sponsored by the National Bureau of Standards (NBS), to determine first of all, is there a need for a special way of handling the regulation of rehabilitation; and, secondly, what are the characteristics of such special regulation? I see in the audience, several building officials who I talked with in the course of this survey. The point is, that the conclusions we will be reporting and discussing today are the results of what you--the building officials--have told us. They are not factors which the project team dreamed up.

Figure 1 is a summary of our survey conclusions regarding the need for a special way of regulating rehabilitation.

FIGURE 1: SUMMARY OF SURVEY CONCLUSIONS

IS THERE A NEED FOR A SPECIAL WAY OF HANDLING REGULATION OF REHAB?

REVIEW OF PAST ACTIVITIES AND RECENT SURVEY OF BUILDING AND REHAB OFFICIALS INDICATES THAT THERE IS A NEED.

PERCEIVED NEED VARIES AMONG AREAS:

- Greatest in older areas with changing socio-economic patterns.
- Attitudes of community as reflected in code interpretation
- Impact of judicial decisions on building official liability and limits to interpretative judgment.

BUT

ANY NEW REHAB REGULATORY SYSTEM:

- Must not add still more prescriptive rules
- Must increase flexibility of code interpretation
- Must provide interpretative guidelines to building officials

The team concluded from the survey that such a need did, indeed, exist. This need, however, was not consistent throughout the country, and the perceived need by building officials varied among various geographic areas. Some of the parameters which affected the perceived need included:

- The perceived need was greatest in older areas with changing socio-economic patterns. In many geographic areas, older mill buildings and waterfront warehouses are being turned into condominiums, apartments, retail and mixed-use buildings; schools are being considered for other uses; old Victorian single-family houses are being turned into apartments--this "adaptive re-use" is limited only to the imagination of developers and architects and changing market requirements for space.

- The perceived need for special rehab regulation is a function of attitudes of the community as reflected in code interpretation. For example, it was reported that in California at one stage of the development of some areas, the "50% rule" was used to demolish buildings. The same concept was reported from Massachusetts; when the city of Boston was made up primarily of

wood frame structures with great potential for conflagration, the community desired to replace these structures for the safety of the community. At present, even the older buildings are primarily masonry construction, basically sound structurally, and the community desires to preserve and utilize these structures to the fullest extent.

- Another perceived need for encouraging special regulations and procedures for rehab was the concern expressed by several building officials of their legal liability when interpretative judgment is required. The need for judgment in interpreting code requirements and determining the intent of the code is greater for rehabilitation work than for new construction. Our respondents indicated that judgment on the part of the building official is currently being utilized in the field. Several instances were pointed out, however, where when a building official did use judgment and did not necessarily enforce to prescriptive code requirements, he was held personally liable for a resulting accident.

Our respondents also told us, however, that any rehab regulatory system must have the following characteristics:

1. Must not add still more prescriptive rules;
2. Must increase flexibility of code interpretation; and,
3. Must provide interpretative guidelines to the building official.

In other words, the building officials told us not to add merely another set of prescriptive-type standards--for example, an eight percent window area requirement instead of ten percent. Interpretative judgment is being used in the field now, but some method must be developed to "institutionalize" this judgment and put it on a sound, rational basis which can be consistently applied, recognizing, however, the uniqueness of each structure in a rehab situation.

In general, the rehab code problem can be categorized into two main issues as shown in Figure 2.

1. The first general problem is the documents themselves; e.g., the codes, guidelines, standards, and technical manuals governing rehabilitation.

2. The second general problem is the delivery system; e.g., the agencies and personnel involved, legal problems, procedures and community values as reflected in code interpretation.

Breaking down these two major categories led us to six major identifiable problem areas as shown in Figure 3.

FIGURE 2: THE REHAB CODE PROBLEM

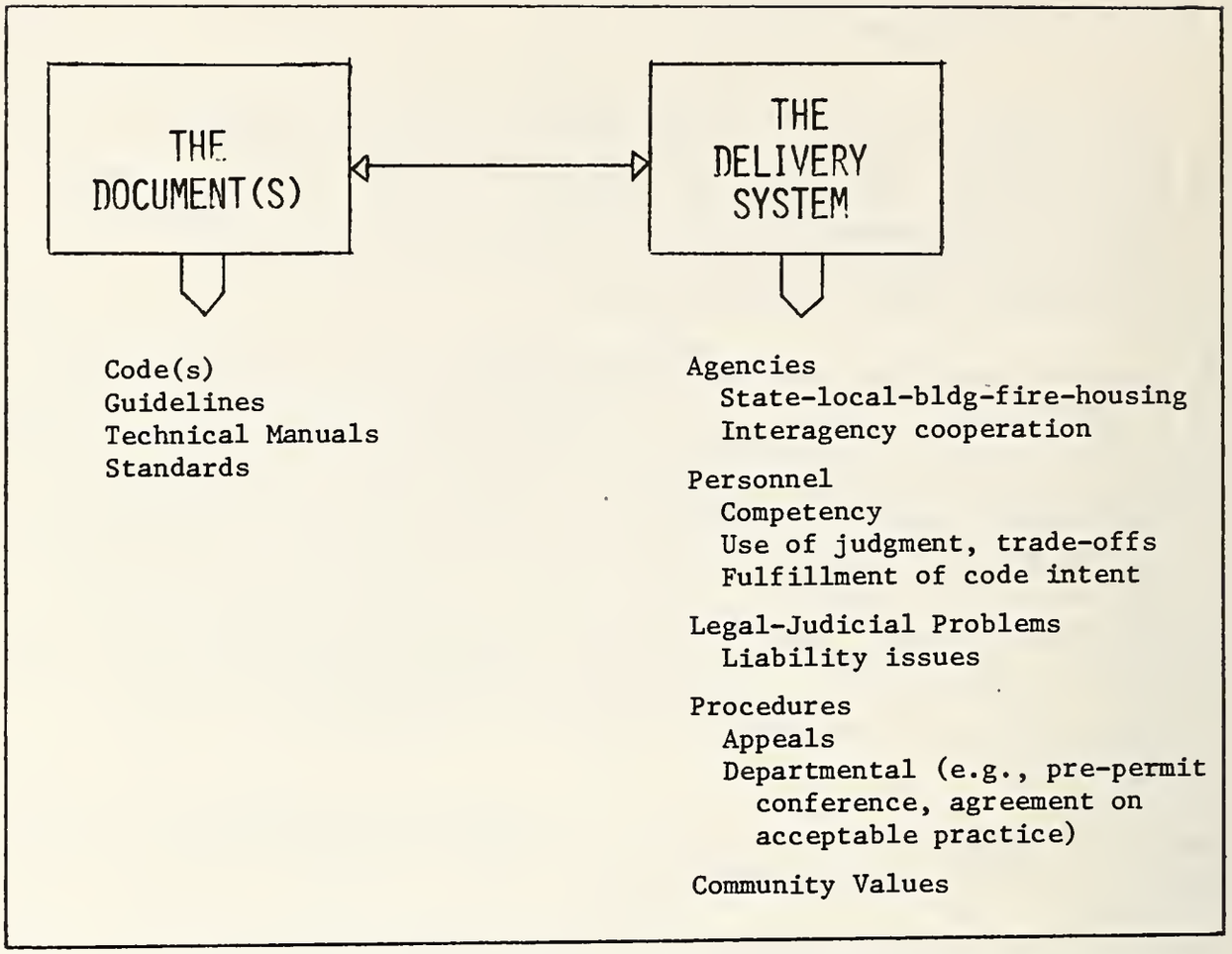


FIGURE 3: PROBLEMS WITH CURRENT CODES RELATIVE TO REHABILITATION

1. Current Codes Represent New Construction
   - Language and Structure Delineate the Construction Process
   - Obsolete Constructions Replaced by More Modern Techniques
2. Requirements for Compliance Are Arbitrary
   - Change of Occupancy - Complete Compliance
   - 25% to 50%
3. Nature of Codes Limits Alternate Solutions
   - Prescriptive Language
   - Lack of Technical Basis to Approve Alternate Methods
4. Regulatory Organization and Procedures
   - Multiplicity of Codes (Building, Plumbing, Electrical, etc.)
   - Split Responsibility for Enforcement
5. Legal Problems with Alternate Solutions
   - Court Decisions Have Tended to Discourage Judgment on Trade-offs
6. Background and Skills of Enforcement Personnel
   - Tend to Be Prescriptive-Oriented

First, current codes represent new construction. The language and the structure delineate the construction process as opposed to an analytical process which is generally required to analyze a rehabilitation situation. Obsolete constructions, although perhaps suitable, are replaced by more modern techniques in current codes.

The second item was that the requirements for compliance are arbitrary. Of critical importance here is the traditional 25-50% rule, and the fact that with a change of occupancy normally complete compliance with code is required.

Three, the nature of codes limits alternate solutions. Once again, the prescriptive language and secondly, the lack of a technical basis to approve alternate methods was cited as being more critical in rehabilitation than for new construction.

The fourth is regulatory organizations and procedures. The multiplicity of codes; building, plumbing, electrical; and the split of responsibility for enforcement, although also a problem in new construction, appears to be a worse problem in rehabilitation. In new construction, somehow our system, our private system of contractors, architects, and engineers has managed to find ways of living with the multiplicity of codes and the split responsibility for enforcement. However, when in a rehabilitation situation the problem is more critical because it is difficult to know all of the problems beforehand. When starting with an existing structure, the problems may not be discovered until construction is actually started. Hence, the problem of regulatory organizational structure seems to be worse in rehabilitation than it is in new construction.

The fifth problem deals with the legal liability issues in approving alternate solutions. It was reported that court decisions have tended to discourage judgment on trade-offs or alternate solutions, which tend to be more prevalent in rehabilitation situations than for new construction.

The sixth was the background and skills of enforcement personnel; in general many of the code enforcement agencies are staffed by building inspectors who have come out of the trades. They tend to be more prescriptive-oriented in terms of how they interpret codes and this was noted as a problem which was more serious in rehabilitation than new construction.

This, then is just a brief background of where we are and the panelists in this session will be giving their insights into the delivery system and the real world problems of working with performance-oriented rehabilitation documents.

Rehabilitation, Performance and the 'Real World' of the Code Official

by

Joseph Stein, P.E.
Construction Industry Consultant
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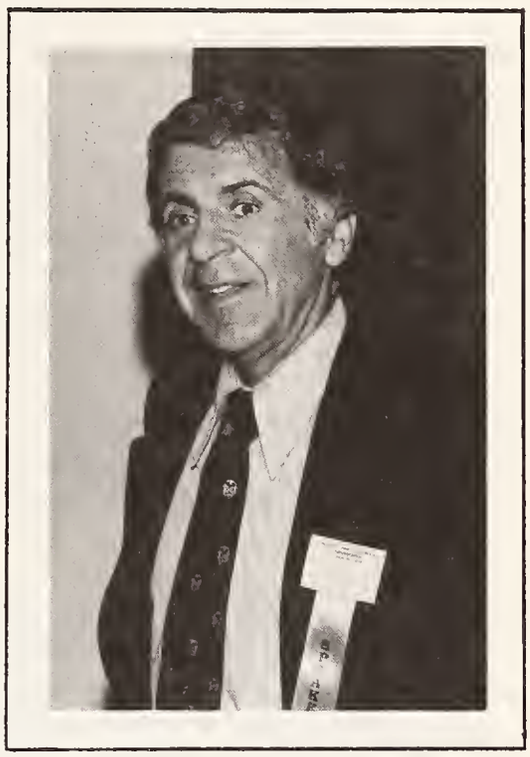


Mr. Stein received a degree in Engineering from the Columbia School of Engineering and did graduate work in Structural Engineering at the Brooklyn Polytechnic Institute.

Prior to establishing his own consulting firm in 1978, Mr. Stein was First Vice President of Tishman Construction and Research Company, Inc., where he was responsible for the firm's midwestern Construction Management activities. Before joining Tishman he was Commissioner of the New York City Department of Buildings--the world's largest building regulatory agency--and in 1972 was instrumental in formulating an Energy Design Standard. Capitalizing on his extensive background, he is currently providing consulting services to government agencies, owners, building product manufacturers, and other construction interests.

Mr. Stein is a Fellow of the American Society of Civil Engineers (ASCE), as well as numerous other national organizations. He represents ASCE on several professional committees and was instrumental in organizing the Association of Major City Building Officials.

An advocate of better regulation and improvement of the regulatory delivery process, he has participated in a number of national panels on such subjects as codes and standards, energy, and metrication. Mr. Stein is a registered Professional Engineer in the States of Illinois, Pennsylvania and New Jersey.

What I intend to present are some real world problems that I think you have to face when you talk about a performance approach of any kind. Not only in dealing with rehabilitation, but any time you mention the word performance to a code official, I think he shudders. Not that he is less intelligent than the rest of us; he recognizes that, really, given the two options, performance makes much more sense than a prescriptive approach. Why should we be told specifically what is required when rather we should be told how a system should perform! I think most of us here today are committed to that approach.

The code official is the policeman who monitors the system--the impartial (or supposed to be impartial), third-party monitor--and he runs into problems when he is forced to take other than a very low risk profile or when he has to depend on subordinates to make the flexible decisions which he will have to defend. Often he is limited by the capabilities of his staff, although this is not always the case. But before I touch on those restraints, I would like to discuss some issues that were raised before, particularly something which sometimes goes unsaid or is said very quietly--the exposure to graft and corruption.

Flexible requirements are conducive to bribery offers by the private sector and coercion by corrupt officials. When I was a code official, this was indeed a problem that I think we attacked forthrightly. We recognized it was there and we did not try to sweep it under a carpet. At that time, I thought that low salaries catalyzed whether or not an inspector took a bribe. The situation in Chicago recently disproved that. Some of the inspectors who took $25 and $50 handouts were making $26,000 and $28,000 a year. If someone is intrinsically honest, his salary will not influence his taking a bribe!

We also found that when an employee did take a bribe he was not going to do something which would leave a monument for future exposure by violating a technical code requirement. He, instead, took it for moving paper, expediting, or what have you.

Often when you try to attack that problem, you transfer the tendency or the susceptibility of bribery to another sector. We actually ran into bribery cases when we took some of the code responsibilities away from the government and transferred them to the design professions. Are not improper decisions which are made based on a financial consideration called bribes? The treat to an architect by a client of loss of future work to influence a code decision is the same thing. This after-the-fact financial consideration is as bad as the bribe given ahead of time. The more flexibility, the greater exposure to all types of illegal actions by both the private and governmental sectors. It is there, it is a difficult problem to handle and there is no question that the performance approach will open many new doors and opportunities for the unscrupulous. Many in the private sector feel that when they want an inspection or a decision, they want it on their terms and feel that graft is money well spent. Let me get off this subject, but this is as much a private sector problem as it is a governmental one.

I intend raising some restraints, constraints, and other perceived problems with the process. It is like the senator who was in a rush and needed a speech, directed his underpaid and harrassed speechwriter to produce a speech on very short notice even though he had a very important family affair to attend and he had to work all night on it. He vainly protested and was given an ultimatum to produce. The senator grabbed the speech the next morning without reading it and went to make his big presentation. He went through all the world problems, the peace problem in the mid-east, the shrinking dollar, the oil shortage, the environment and he said, "Ladies and Gentlemen, I am not just going to throw these problems at you, I am going to give you definitive solutions to every one of them." Flipping the page he reads, "You '*!*', I quit, you can improvise from here."

I think I have some solutions to the problems. But, basically most code officials, because of their conditioning, have adopted a very protective no or low-risk philosophy in making their decisions. One of the reasons is a very practical one; it is the scapegoat system, particularly where the code official is a political appointee and not protected by a contract or by civil service. There is also sensitivity to the action by the media. There is never good press for the building department; it is always the collapse, the bribery scandal, the unpopular decision that was made. Positive PR is very rare! It is easier to say no or to study something to death; that way you are going to limit that kind of exposure.

Also, I found that where the code official is a political appointee, and something goes wrong, the code official is left there to hang by his own thumbs. Nobody comes to his help; he has got to take the heat. If the mayor is quoted, it is generally, "I don't know anything about these technical matters." The code official generally hangs alone when there is a problem. And that I speak from personal experience.

Another reason for code official sensitivity in taking risks is the first grand jury hearing he appears before or the first legislative investigative commission that grills him. Just go through one of those and you too would adopt a low profile from there on in. You just say, I am not going to stick my neck out again.

The exposure to personal liability is real. Even where there is not that personal exposure in this litigation-happy society, the nuisance of a law suit or a mandamus can deter a code official from making an innovative decision or taking a risk that is properly motivated. In that general area, I will give you a true personal experience where the code permitted me, as Building Commissioner, to make discretionary rehab decisions. I exercised them in the South Bronx for a non-profit minority church group and nobody batted an eyelash. I did exactly the same interpretation for a profit-motivated developer and I was "exposed" on television as being in the back pocket of "real estate interests." Generally, you will find if there is an issue, the media will not make a favorable interpretation of anything that the code official does.

In terms of personal litigation, I think I still have a $2 million suit personally pending against me because of an adaptive re-use of existing building situation. A lot of the old lofts around 42nd Street in New York City were converted to massage parlors and the City adopted a campaign against them. Of course, I was sued for singling out one area for enforcement and being accused of maintaining dual standards. The issue of dual standards is one that lurks in the background of rehab as well.

I will give you a few reasons why the private sector does not like a performance approach, although we all know why it is good. The private entrepreneural sector traditionally makes large up front investments in terms of purchasing property, retaining design teams, and so on. The private sector will feel very uncomfortable in not knowing, or being able to predict what kind of decisions are going to come out of the other end in

a performance approach negotiation, unless there are some very clear guidelines or case histories as to what types of decisions will be made in interpreting the performance requirements. With a prescriptive approach, he knows exactly what is going to be required and what he is going to have to do and how much it is going to cost. From his point of view he might even be happier with a 25-50% approach in terms of predictability of what is required, with less uncertainty as to the risk of his up front investments.

Another area--the less affluent rehab sector--I think will have technical difficulty in dealing with a performance approach, and I predict that we are going to have some problems there in terms of requiring an architect's input, which might not be required under the old 25-50% rule.

Aside from the constitutionality of the question of dual standards, I had a protest once from a minority community group that protested some of our rehab decisions in terms of reinforcing their "second class status" vis-a-vis, not getting full "new code" protection. I think you can appreciate their reaction, "Why do we deserve less than new code safety protection? This is another proof that we are second class citizens."

I can go on, but I only have four or five minutes left. To minimize the uncertainty of future determinations by code officials, prefiling procedures, hearings, or conferences ought to be established. This will set the philosophy of approach to trade-offs, to permit the developer (before he goes marching down the road) to have a good idea as to what the code officials will probably require in terms of performance solutions to the problems. I think it is a good meeting ground, on an informal basis before plans for the project even start, to have this type of interchange.

I personally do not think the old 25-50% rule ought to be abolished completely. I think it ought to be retained as an option on the part of the applicant. I believe that for every performance requirement we ought to have a prescriptive option, or to retain the old prescriptive requirement as an option if it is being replaced by a new performance statement. We should require the design professional to evaluate the performance requirement and to certify his recommendations to the code official. I think the administrative portions of the code ought to permit the code official, if he so chooses, to base his acceptance on the design professional's certification. I know what I am saying here and I know the exposure to errors and omissions law suits, and everything else, but I think this is what the design professional basically is being paid for anyway. This certification will give the reluctant code official "the hook to hang his hat on," and I think that ought to be an approach, too.

Except for malfeasance in office, the code official should be personally indemnified and, in fact, the municipality should carry appropriate surety or insurance to protect the code official against any personal exposure for any decisions he makes as a code official. I think an employment contract should be considered for the appointed code official or at least that his term of office should straddle two political administrations so he will not be subject to political pressure in any

decision that he makes. This is another area where undue pressure sometimes is placed on the code official, inhibiting a proper determination.

And the last item I have is a possible approach to speed up or to avoid a lengthy appeals process. I discussed the idea with the American Arbitration Association to find out if it would be interesed in administering a rehab arbitration panel, either on a regional basis or on a local basis, depending on the rehabilitation activity. I discussed the idea of creating a rotating panel of say 100 or 200 experts who would sit, on a weekly basis five at a time. The panel would be the back-up for the reluctant code official who is afraid to stick his neck out to make a performance determination. I think this is another possible approach in determining whether or not the performance level of a building has been changed within the same hazard group or whether or not alternate solutions are truly acceptable trade-offs.

An Architect's View of Rehabilitation Regulation

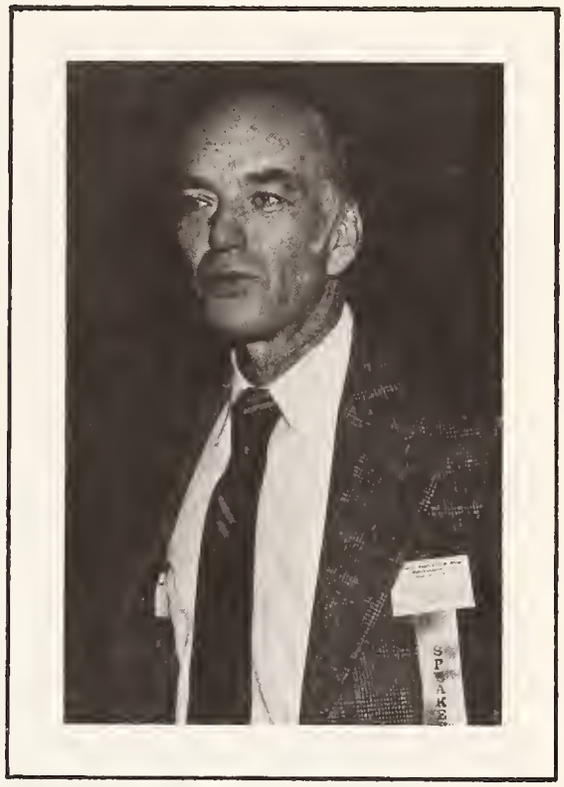
by

Frederick A. Stahl
Principal
Perry, Dean, Stahl and Rogers
Architects

Mr. Stahl received a B.A. from Dartmouth College in 1952, graduated Harvard University Graduate School of Design in 1953, and received a M. Arch. in 1955 from the Massachusetts Institute of Technology.

Mr. Stahl is President of Perry, Dean, Stahl and Rogers, where he is involved in the design, renovation, restoration, and conversion of and additions to various buildings in the State of Massachusetts. These buildings include hospitals, university and school buildings, churches, hotels, government buildings, and residential buildings.

Mr. Stahl has lectured at various schools in Massachusetts and holds professional registration in nine States and the District of Columbia. He is a member of numerous professional organizations and has received many honors for his work, both in the United States and England.



As an architect, I should like to pick up where Mr. Stein left off with the question of liability. Our profession is in the process of re-thinking questions of liability; it seems that we are always looking around the room to see who else is in there with us. I believe there is a good deal of shared responsibility in our dealings with code officials, and I sympathize and empathize with the dilemma of the official representing the public and often not knowing quite how secure his position may be or how he will defend his interpretations. The design professionals increasingly see their responsibility and liability limited to the actual content of the construction documents; the contractors may take a similar view of the actual work as constructed. The position of the code official is frequently less concrete, and often consists of a network of paths taken and interpretations made through the maze of overlapping requirements of the typical code. As a result, in addition to professional competence, an effective

building official requires courage supported by adequate protection against liability. I believe that the most sound basis will be found if we first recognize the very real liability implicit in the actions of each of the major actors in the building process. We have been extremely fortunate in our practice in Boston in that we have almost invariably dealt with building officials and builders who recognize these realities and who are dedicated to getting the right decisions implemented within the circumstances.

I should like to say a few more words about the situation in Massachusetts, to clarify that Article 22 does not represent a new code and is not a replacement for any portion of the administrative system in the Commonwealth. It is a new article of the Massachusetts Code and I believe it is a significant achievement in that it recognizes a process that has been going on more or less implicitly, and successfully, in many communities for a number of years. However, with the creation of a new building code for the Commonwealth, it was advisable to bring out from under the rug a number of things that might have otherwise been left there. Much of what is embodied in Article 22 acknowledges the way (and perhaps the only way) that well-intentioned and properly motivated, properly trained people can deal with the issues as they come up in an existing building and provides a logical formulation and a clear identification of the information required to substantiate a system of trade-offs.

The adoption of Article 22 should not be the end, but the beginning of a series of steps which stem from it; a number of these steps fall within the area of interest of this panel. We will need within the Commonwealth and within the State Building Code Commission, and within the Boston Building Department, training for personnel in the use of this kind of methodology now reduced to a more predictable and logical program. There is a constituency for this way of doing things which includes the code enforcement people who will use it. Our initial salesmanship of this better or more clear and more accessible way of dealing with decision-making, alternatives and risk assessments must be directed first to the building officials before we progress to the next stage in the field with consumers. Money and time and training will be needed and we will have to find the incentives and motivations for people to become interested in a more creative way and in the greater flexibility that this system represents. Parallel tracks on the research side must be initiated as Mr. Nelson referenced earlier, and on the side of reform of the political process. We must make sure that there is a congruency between the manner in which information is collected and sorted and the framework for its use by persons in the field. A few years ago when I served on a task group of the Building Technology Advisory Committee on fire prevention, we discovered that fire statistics do not tend to be collected in a way that is really revealing within the system of building code enforcement. These problems become more and more apparent if data is not organized in a way which relates directly to the categories of risk established in Article 22, for example. A similar situation may obtain in terms of definitions of occupancy and the actual physical

configurations of occupancy in so far as they are a factor of risk. I believe we will find that the characteristics of risk differ in multi-family residential occupancies depending on the vertical division (townhouse) vs. a horizontal division (apartment). A system of scoring and evaluation such as that established by Article 22 of the Massachusetts Code requires a congruent system of data collection in order to be effective; we cannot assume that data in hand is sufficient or that its organization is necessarily appropriate.

On the administrative side we must be in a position to demonstrate to people in the everyday world that it does make sense to use judgment. I have always found this completely convincing. In our office, we frequently take the code apart, make multiple Xerox copies, and devote a wall to displaying how a particular issue re-appears in multiple sections. We end up with the code displayed in a way that is programmatic and with lines drawn connecting issues in a kind of topological definition. We can then follow a given issue through the code to our satisfaction, and select a scenario to present to the code enforcement people saying, in effect, "Look, these are the tracks that we found, and there are multiple tracks." As Mr. Nelson was saying, there are many, many tracks through that document. Once we have decided pretty much which tracks we ought to be on, we go to the code official and ask for agreement on our identification of the tracks and relationships, and backing for the tracks we have selected. We cannot go on all of them. Nobody can. This is the kind of analytical program that many design professionals go through to be able to talk effectively in code terms about what it is they are trying to do. If you visualize this situation in new construction, you may conceive how much more complex it is when confronted by an existing structure. We try to understand what track it was on at the point in time it became the way it is, and how we can adopt that track to a greater or lesser degree and carry forward making use of systems generic to that building.

I testified at the recent Proxmire Hearings, and have had some dealings with the U. S. Department of Housing and Urban Development (HUD) off and on over the years, although our office currently is not involved in work directly under HUD programs. Most of the subsidized housing produced in Massachusetts results from the activities of the Massachusetts Housing Finance Agency (MHFA), which utilizes HUD subsidy funds but in a more programmatic and flexible fashion which do not rely on the Minimum Property Standards (MPS). Virtually all design professionals would prefer to work with MHFA. I have seen the MPS escalate the price of or the infeasibility of projects to either kill them or to render them so absurd in design terms that they should never have been undertaken. In our area, MHFA provides a system which is realistic with respect to housing created within existing structures. I know that for many years HUD has had rehabilitation guidelines. We have never seen them and I do not know how many others have. At least in our geographical area, under the Federal Housing Administration (FHA), the MPS was the bible. It provided a framework, complete to the last detail, which somehow had to be imposed on every structure in order to become "housing," despite the

demonstrable livability of pre-existing units which did not comply. Local code officials in any community that I know of are much more aware of the reality. Where a local opportunity exists with a committed constituency of professionals, consumers and investors, somehow a creative resolution of code issues is found and found to be satisfactory. I am afraid that unless someone is prepared to confront the MPS issue head-on, that unless the document is physically removed from use, a new set of rehabilitation guidelines will never really be used. It is my view that none of the issues around codes, and code reform to facilitate rehabilitation, are as intractable as is the MPS when used in a categorical fashion.

The Advisory Committee for Building Technology of the National Bureau of Standards had a subcommittee on building rehabilitation of which I was chairman. The membership was broadly representative and highly qualified, including Gordon Davidson (Vice President for Real Estate, Northwestern Mutual Life), Leon Finney (President of the Woodlawn Organization, Chicago), Dr. Sylvia Lane (University of California) and Jeremiah Walsh (New York). We tried to address some of the bedrock issues, to provide outlines of policy and priority and an agenda to the Bureau in what we saw as a very rapidly accelerating activity of national significance.

We gave considerable importance to understanding the market, which is something that anybody in the private sector who wants to stay in business must do. The market in rehabilitation has markedly different characteristics from that of new construction. It is highly localized, much more sensitive to life-style and community aspirations, and sensitive to building types. Very likely along the East Coast there are twenty or thirty major market segments which could be clearly identified. This process has been undertaken in Boston by building type and by neighborhood affinity. We believe this is a useful way to view a building inventory; in effect we are saying that the buildings may be there, and they may be interesting buildings, but unless there is a market, unless there is a constituency and a commitment of financial and emotional capital, it may be interesting but not relevant.

Our motivation might be, "let's find out what people are trying to do with which type of building, and how best to facilitate that endeavor." I believe we should facilitate rather than regulate, wherever possible. The report of the subcommittee was very strong on this point, which is to say that life-style issues, judgmental, cultural, bias kinds of issues ought to be deleted from codes. They are there for all kinds of reasons going back well into the nineteenth century, those idiosyncratic regulations with which everyone is familiar.

Life safety issues must be clarified and documented; but what about everything else a typical code carries with it? We need to divest ourselves of the inheritance of a time when our governing bodies and elected officials felt at ease making sure that people would only live in a certain way and not in certain other ways. I am thinking of regulations of the type which dictate when one may dine in the kitchen and when one may not; when a

child may share a bedroom with a parent, and when not; regulations which treat light and ventilation requirements in offices vs. residences as though we were dealing with different types of human beings. I believe it is time to increase our effectiveness to regulate the parameters that have to do with life safety and to deregulate those which have to do with life-style and cultural decisions.

We should not leave it there, however, recognizing that the starting point for any building rehabilitation is someone who is making a commitment to that building; someone who cares enough about it to live in it, to invest in it or to take a risk with it. We should be responding to that, and a large commitment of our time and effort in "code enforcement" should not be enforcement at all, but assistance and guidance.

Administration of a Rehabilitation Code in a Major City

by

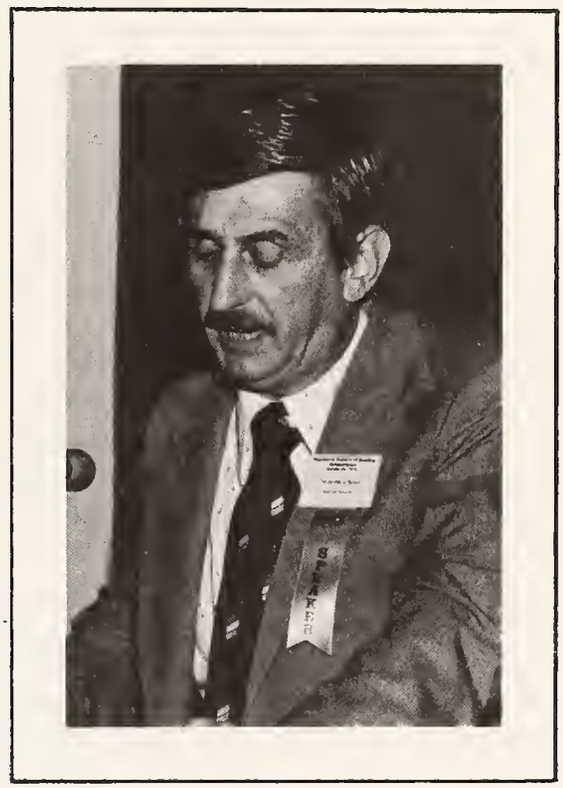
Creighton C. Lederer, Commissioner
Building and Safety Engineering Department
City of Detroit

Mr. Lederer earned a B.S. in Civil Engineering from the University of Michigan.

Mr. Lederer became the Commissioner and Director, Building and Safety Engineering Department of the City of Detroit in 1971. Prior to that he served as the Assistant Chief Engineer.

In addition to membership in the Building Officials and Code Administrators International, Inc., American Railway and Bridge Association, Society of Municipal Engineers, American Public Works Association and the National Academy of Code Administration, Mr. Lederer is a Fellow of both the Engineering Society of Detroit and the American Society of Civil Engineers.

Mr. Lederer has held many offices and received numerous awards in the engineering field and is a Registered Professional Engineer in the State of Michigan.



Detroit's approach to building rehabilitation is somewhat like the old fellow who goes to the doctor and the doctor says, "You need an operation; have you ever had one before?" and the old fellow says, "Yes." The doctor says, "What for?" The fellow says, "For $500." The doctor says, "No, what did you have?" The old fellow answered, "I had $300." "No, no, what was the problem?" "The problem was that I was $200 short and that darn doctor almost bankrupt me!"

That has been our approach to building rehabilitation in Detroit, it seems to me; complying with code provisions that miss the point where the adaptive re-use of buildings is concerned. Let me tell you something of our City.

I think our situation is similar to Boston. We have many of the same problems except on a much broader scale. Detroit is the sixth largest city in the United States. It has 500,000 dwellings units; 350,000 of which are single-family dwellings. It is the largest single-family dwelling home ownership in the United States. Detroit has 12,000 industrial and commercial and multi-family residential buildings that qualify for rehabilitation of some sort. They are older buildings, ready to be re-worked. Many of them are empty and need a stimulus for adaptive re-use. When the opportunity came along to participate in this very innovative experiment by the State of Massachusetts and the City of Boston, I was pleased because I thought it could help Detroit. Also, I was pleased to represent the Association of Major City Building Officials (AMCBO); the 30 largest major cities in the United States, and to be responsible for keeping them informed of the progress. They are a large constituency and are extremely interested in what is going on.

Detroit is the largest City in the United States that uses a model code. We use the 1978 BOCA Code. The State also uses the same code but allows the City special amendments to meet its needs. This has worked out relatively well. The model code has been good for uniformity; it has helped eliminate discriminatory and restrictive practices in the use of building codes. However, there are problems with this code. One of the problems is with multi-family, industrial and commercial rehabilitation where the 25-50% rule is used. The City is obligated to interpret the code fairly rigidly. It uses the replacement value which, in the City of Detroit, is very often interpreted as the market value. Market value is tied by law to the assessed value. Assessed values, particularly in depressed areas, are reduced - and the problem is compounded. As the value of the property goes down, the amount of rehabilitation that can be done without meeting new code requirements, becomes smaller. In addition, as inflation raises the cost of construction, the cost of rehabilitation rises and less and less work can be done before complete new construction is required by code. This is the problem that Detroit has, that Boston has, that Chicago has, that many other cities in the United States - especially the older ones - have in rehabilitating their buildings. For the most part, we enforce new construction code provisions on rehabilitation work.

I also want to review our experience in Detroit on some major rehabilitation programs that have worked. Detroit was probably the hardest hit by the HUD problems in the early 1970's. That large single-family home inventory that I mentioned earlier resulted in HUD owning some 15,000 homes in the City of Detroit. Many unsophisticated people bought these homes, were cheated, and abandoned them. They became HUD property. The City worked out an arrangement with HUD and then with the Veterans' Administration to provide an inspection service that would lead to the upgrading to prevent abandonment of those homes. This inspection service covers the four basic systems of the house; structural, plumbing, electrical and heating. A special furnace inspection was developed that was sensitive and safe. It was an innovative program that demanded very strict administrative control.

It was a program developed in response to a crisis situation. The City underestimated the problem; HUD thought that it was selling 700 homes a month when it was selling 2100 houses a month. Four inspectors were sent out to each house. It did not take long to realize that a more efficient approach had to be developed. One inspector was trained in four disciplines and, I believe, that was the first time that that was successfully done for existing bulldings. The City managed--because of the crisis situation--to overcome the union problems, to overcome training problems, to overcome a host of other problems and make the program work.

The program worked so well that the City Council last year adopted the program in ordinance form. Any home that is now sold in the City of Detroit, whether it is HUD-owned or privately-owned, has to have a City inspection and be brought up to a minimum standard. One of the reasons that that program is so successful is the administrative control that is used. The Detroit rehabilitation program on single-family dwellings was successful because we were able to establish community credibility using a very tight administrative control. In fact, this is what Mr. Lewis was saying, "the inspectors must be trained very carefully." The City of Detroit's were trained in the electrical, heating, plumbing and structural aspects of the building. We also had to make sure that they know where to stop and to bring in the disciplined expert inspector. Detroit used a "prescriptive" approach and restricted the inspectors to a check list. The check list was published so that the community would know exactly what the inspectors would be looking for.

I recognize that the Massachusetts rehabilitation project calls for a completely new administrative approach. But this new approach must be tried. Detroit has tried the prescriptive approach many times in the rehabilitation of larger buildings; on buildings that have an adaptive re-use. We found that the prescriptive approach did not work. I am convinced that a prescriptive approach on large buildings does not necessarily trigger good administrative procedures. I am convinced that with good administrative procedures, you can use innovative approaches as is trying to be done here with the Massachusetts rehabilitation plan and that it can be done in such a way to anticipate problems and manage them successfully.

We have done a lot of talking today about lack of uniformity. It is going to be a problem. A concern that has been expressed to me by Joe Fitzgerald in a letter -- and I quote -- (Joe Fitzgerald, by the way, is the Building Commissioner of the City of Chicago and a very excellent building official), "that one rehab job is continually going to be compared to the next; what you give here is going to be demanded there and, as we well know, economics is what counts. If it is cheaper, it is going to be very hard to hold the line. Maybe we ought to formulize a systems concept."

The problem of uniformity is one of concern to most building officials of the larger cities. They are concerned that they will not be able to maintain uniformity. I am afraid that it is a problem we are going to have to learn to live with. I think we are going to have this problem regardless of what is done. We talked about training. It is important. It is important to understand that in starting a program like this, where the parameters are broad, extra attention must be given to training. But, it seems like

the problem of uniformity is one of concern to most building officials of the larger cities. They are concerned that they will not be able to maintain uniformity. I am afraid that it is a problem we are going to have to learn to live with. I think we are going to have this problem regardless of what is done. We talked about training. It is important. It is important to understand that in starting a program like this, where the parameters are broad, extra attention must be given to training. But it seems like all the pieces may be coming together. The National Academy of Code Administration is dedicated to a program for developing better trained, better qualified building officials and inspectors.

One of the administrative problems that we are going to have is more cases going to a Board of Rules. Some building officials are loathe to take responsibility or use the discretion granted to them under the Massachusetts rehabilitation approach. I believe that this will rectify itself in time. In Detroit, an administrative committee procedure is used to act quickly on matters of interpretation. A select group makes recommendations to the Director and he may refer the matter to the Board of Rules. Administrative committee decisions are made within one week. Those problems requiring code waivers or deviations are transmitted to our Board of Rules.

Some codes do not allow code waivers. The BOCA Code does, and the City utilizes it. A Board of Rules usually consists of citizens, architects, engineers and, in Detroit's case, the heads of four major departments (Health, Fire, Building and Lighting). In my own mind, Board of Rules decisions for rehabilitation will become less frequent once there is an understanding of how the new rehabilitation code process works. More importance will be placed on pre-permit conferences. We all use these conferences to some degree but they should be an intrinsic part of the rehabilitation process. Then monitoring is essential, both by the building officials and the engineer or architect, to make sure the discretionary rules are being followed.

I have tried to review some administrative processes that will help make a Massachusetts rehabilitation code successful. Many of these concerns have been voiced by the building officials from large municipalities. They recognize, however, that this approach has a chance for success where others have failed. The large urban areas of the United States are deeply troubled with physical, social and economic problems. Some are coming back. In my opinion, the Massachusetts rehabilitation code represents a first effort to take an innovative approach to encourage the rehabilitation and adaptive re-use of our major buildings. To that point - in Houston, last week, the Association of Major City Building Officials' Executive Committee reviewed and approved the concept of the Massachusetts rehabilitation code as it has been outlined to you today. We have, I hope, pointed the way for our cities to regain health and momentum in the future.

PANEL DISCUSSION

QUESTION: John McMahon, Institute of the Ironworking Industry

I would pose a set of circumstances to Mr. Stein for his comment. Not the consciencious rehabilitation of an existing building with the design team, but rather the partial, but continual, renovation and rehabilitation of commercial space that occurs every time a lease is up. The building manager says to the new tenant, "I have a brother-in-law who does this nights and weekends," and proceeds to work at nights and weekends on puncturing the integrity of the slab and runs a bunch of holes up through it into partitions and nobody is the wiser. It is beyond the code, and within 10 years the whole building is without code protection and nobody is the wiser. How do you get a handle on that - from the Tishman point-of-view and from the city point-of-view? What do you do with nights and weekends when your people are out with their families like they should be and the city is being remodeled outside the code?

RESPONSE: Joseph Stein, Joseph Stein and Associates

You forgot the result and collapse of the building because a bearing wall was knocked out and some people got killed. Well, I will tell you, that is one aspect of building regulation that some of the codes try to address in requiring periodic inspections of buildings.

In a city like New York, which has close to 900,000 structures --not dwelling units, but structures--it is nearly impossible to do that. I think it is possible in small communities with the inspectorial group to have periodic inspections of the status of the existing building and this is done I know. The City of Chicago does it; they do this rather efficiently and in areas where this leads to other exposure, of course. Many times picky little things are found, where they really do not affect the safety or performance of the building and they merely use this device in that other area I was talking about.

Another device is also used to require periodic inspections, making it the responsibility of the building owner to have such inspections performed on his building by a certified third-party, this could be architect, engineer or some other inspectorial service. We did this in some of the mechanical areas in New York where we just did not have the staff to do it, with elevators for example. Others can be deputized to do this.

When a building is going up, you cannot stand in back of every workman to make sure he is doing his job properly, you can only monitor. And what you are saying, I know happens. The only way to really keep a handle on that is to periodically inspect the building. Other than that, I really do not have an answer to the problem. It does go on and many people do it unknowing that there is a regulation or a requirement, or that they are not allowed to be doing what they are doing. What is your suggestion, do you have any suggestions?

COMMENT: John McMahon, Institute of the Ironworking Industry

No, I was wondering how you do get a handle on it.

COMMENT: Joseph Stein, Joseph Stein and Associates

In most codes there is a requirement that buildings be periodically inspected. In fact, the fire department in many cases, has the responsibility to review the performance of the building after it is erected in terms of fire safety. It is its ongoing responsibility to see that the fire code is being followed.

COMMENT: John McMahon, Institute of the Ironworking Industry

I am very serious about this. When the fire department comes back in for its periodic inspection, if it does, or if anyone does, who is to know where the interior partitions were previously laid out, unless you look into the plans and start looking for holes? I mean it really is an impossible thing to keep up with.

APPENDIX A

ATTENDEES

NATIONAL CONFERENCE ON REGULATORY ASPECTS OF BUILDING REHABILITATION

National Bureau of Standards
October 30, 1978

Charles W. Almand
U. S. Gypsum

Joseph J. Anselmo
Urban-Six Associates, Inc.

Kenneth M. Aughenbaugh, Jr.
Neighborhood Housing Services, Inc.

James R. Bell
National Fire Protection Association

Sandra A. Berry
National Bureau of Standards

David E. Brackett
Gypsum Association

George H. Brattin
Massachusetts State Building Code Commission

Ben Brungraber
B & B Engineered Timber

Roderick Buchan
National Forest Products Association

Jeffrey W. Burton
University of Illinois

Thomas Carcaterra
The Preservation Technology Group, LTD.

T. H. "Nick" Carter, Former Executive Director
International Conference of Building Officials

Elinor J. Champion

Arthur G. Christensen, U. S. Department
of Housing and Urban Development

Patrick W. Cooke
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Calvin L. Cooksey

Donald A. Crews
Delaware Energy Office

Sarah K. Crim
Housing and Urban Development Reporter

Philip E. Crombie, Jr.
U. S. Fire Administration

Bernard A. Cummings, National Association
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APPENDIX B

Massachusetts State Building Code

RECOMMENDED PROVISIONS

ARTICLE 22

REFERENCE STANDARDS

RS 22-1, RS 22-2, RS 22-3, RS 22-4

Repair, Alteration, Additions and Change of Use of Existing Buildings

October 23, 1978

Massachusetts State Building Code

RECOMMENDED PROVISIONS

ARTICLE 22

REPAIRS, ALTERATIONS, ADDITIONS and CHANGE OF USE OF EXISTING BUILDINGS

October 23, 1978

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REPAIRS, ALTERATIONS, ADDITIONS
and CHANGE OF USE

PROPOSED CODE PROVISIONS FOR EXISTING BUILDINGS

ARTICLE 22

REPAIRS, ALTERATIONS, ADDITIONS and CHANGE OF USE

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.

SECTION 2201.0 DEFINITIONS

Definitions shall be construed as being the same as defined in Article 2 except as follows:

Existing Building or Structure: Any completed building or structure.

Occupancy Load: The maximum number of individuals for which the building and the exitway facilities have been designed.

Occupancy: The purpose for which a building, or part thereof, is used or intended to be used.

Use Group: The classification of a building or structure based on the purpose for which it is used as set forth in Sections 203 through 212.

SECTION 2202.0 APPLICATION

2202.1 GENERAL: Where there are no 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 one year.

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.

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: No change shall 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 assemblies 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 the RS 22 series of reference standards when determining compliance with this article.

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 under 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. Reference Standard RS 22-2 contains some acceptable compliance alternatives. The building official may accept compliance alternatives other than those listed in RS 22-2.

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 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 below shall be deemed to be hazardous and shall be corrected. Nothing in this section shall 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:

(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;

(4) the deterioration, decay or inadequacy of its 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, 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, or 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 no further compliance with the requirements of the code for new construction is 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 15% 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: Nothing herein contained shall 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 2203.8. 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 no further compliance with the code for new construction is 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 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 OF STAIRWAYS: Open stairways shall be enclosed except as otherwise permitted by Article 6. For the purpose of this section only, there shall be no minimum fire resistance 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 hazard index number higher

than its present use group as defined Table 2203.8 the entire building must meet the requirements of the code for new construction with the following exceptions:

a. No further 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 fire resistance rating of not less than one (1) hour.

b. No further compliance is required with Section 302.2.

c. No further compliance is 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. No further compliance is 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 to types 3 and 4 construction shall have a fire resistance rating of not less than one (1) hour. Enclosures in buildings of types 1 and 2

construction shall have a fire resistance 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. Earthquake resistance and liquefaction. No further compliance to Sections 718.0 and 723.0 is 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 alterations were made, unless the building or structure as altered meets the requirements of this code for earthquake loads.

g. No further compliance is required with Section 815.0.

h. No further compliance is 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 or more hazard index numbers higher than its present use group as defined in Table 2203.8, the entire building must meet the requirements of this code for new construction.

TABLE 2203.8

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 w/o Stage	5
A-2	Night Club	7
A-3	Restaurant	5
	Lecture Halls, Rec. Centers, Museums, Libraries, Similar Assembly Buildings	4
A-4	Churches & Schools	4
B	Business	2
F	Factory & 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 & 2 Family	2
S-1	Storage, moderate hazard	3
S-2	Storage, low hazard	1

* See Sections 203 through 212 of the Massachusetts State Building Code and Reference Standard RS22-3.

Massachusetts State Building Code

REFERENCE STANDARD

RS22-1

GUIDELINES FOR APPLICATION OF ARTICLE 22

October 23, 1978

REFERENCE STANDARD RS22-1

GUIDELINES FOR APPLICATION OF ARTICLE 22

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REFERENCE STANDARD RS22-1

GUIDELINES FOR APPLICATION OF ARTICLE 22

I. Purpose

The purpose of this guideline is to provide guidance to users of the Massachusetts State Building Code 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 alterations, repairs and additions to existing buildings without requiring the entire building to be brought up to new construction requirements, but 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 or additions to existing buildings that have demonstrated their usefulness and safety.

II. Scope

This guideline and the RS22 series of Reference Standards are intended to demonstrate techniques of analysis and compliance with Article 22 of the Massachusetts State Building Code in the repair, alteration, and additions to existing buildings including change in use.

III. Statement of Concept

Conceptually, it is the intent to allow repairs, alterations, additions to and change in 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;

3) the degree of compliance of the building after changes must not be below that existing before the changes except nothing in this section will require compliance with requirements more stringent than that required for new construction.

IV. Implementation

Implementation of the above concept requires that a framework be established for:

- evaluating the condition of the building;
- determining the potential for modification;
- establishing the acceptability of proposed changes.

A. 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;
- provide a basis for evaluating the impact of the proposed changes on the performance of the building.

The following list of tools can be used for determining the condition of the structure. However, the list may not be complete and the use of others should not be precluded.

1. Available Documentation of Existing Building

A prime source of design information of an existing building 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:

a. 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.

b. Other potential sources (especially if the building is not in use) include the original designer-architect or engineer.

c. The building department which issued the permit for construction may have documentation.

d. 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.

e. 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.

f. 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 a file likely.

g. Historical or archaeological societies may have considered a building to be important enough to develop a file of documentation.

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.

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.

a. Field Tests. Both non-destructive and destructive test procedures can be applied to evaluate the condition of a building.

1. Non-destructive testing - This includes techniques where the structural integrity of the building is not affected, such as:

- analyzing various portions of the building to determine dimensions, types and condition of materials, etc.
- portable apparatus for impact testing
- load application short of failure to determine capacity of materials and components

- magnetic methods for detecting flaws in ferrous metals
- proximity magnetometers (locating rebars in concrete, concealed ferrous fasteners, etc.)
- electronic means for measuring the sonic modulus of elasticity of concrete and masonry in assessing its soundness
- ultrasonic transmission or reflective methods in detecting flaws in various materials
- x-ray or infrared-ray photographic techniques can be used to evaluate portions of elements whose integrity is questionable.

2. Destructive testing

- sample of the building could be removed and tested (e.g., concrete core)
- components of the building could be reconstructed and tested in the laboratory.

b. Laboratory Analysis. In some cases tests can be performed in the laboratory including:

1. Chemical or metallurgical tests.

2. Optical or electronic microscopic examination 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.).

4. Testing of a scale model of the building (computer model, wind tunnel model, etc.).

B. 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 (e.g., fire safety) while decreasing for other attributes (e.g., 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.

1. Data on Archaic Systems. Performance data on architectural and structural systems being encountered in existing buildings in the Commonwealth are tabulated in RS 22-4. This data can be compared to the proposed altered systems to determine if the performance is being adversely affected.

2. Compliance Alternatives. Alternate solutions tabulated in RS 22-2 were developed from appeal data and from accepted practice. The list is not all-inclusive and should not preclude consideration of other alternatives.

3. Analysis Methods. Analytical methods based on good engineering practice may be used to determine changes in performance levels.

4. Test Methods. Test procedures as discussed in A.3.a. and b. can be used to evaluate the performance of existing construction.

5. Professional Judgment. Professional judgment based on previous experience with similar buildings should be used to the fullest extent possible.

Massachusetts State Building Code

REFERENCE STANDARD

RS22-2

ACCEPTABLE COMPLIANCE ALTERNATIVES

October 23, 1978

REFERENCE STANDARD RS22-2

ACCEPTABLE COMPLIANCE ALTERNATIVES

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REFERENCE STANDARD RS22-2

ACCEPTABLE COMPLIANCE ALTERNATIVES

I. PURPOSE AND SCOPE

A. PURPOSE: The purpose of this standard 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.

B. APPLICATION: This standard contains general 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 standard 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.

II. COMPLIANCE ALTERNATIVES FOR EGRESS REQUIREMENTS

A. NUMBER OF EXITS

1. General Compliance Alternatives

a. Provide connecting fire balconies.

b. Provide alternate egress facilities (windows, etc.).

c. Provide a fire escape.

d. Provide fire rated areas of refuge.

2. Examples

Example 1

A 5-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

A building of group R-2 occupancy with 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 sec. 609.4.

B. TRAVEL DISTANCE

1. General Compliance Alternatives

a. Add detection system.

b. Add a partial fire suppression system.

c. Add smoke doors.

d. Increase fire resistance rating of corridor walls and doors.

2. Examples

Example 1

A 4-story building of occupancy group R-2 without a fire suppression system. The length of exitway access travel is 150 ft.

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 ft. 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 fire resistance rating of the exit access corridor from 1 hour to 2 hours and provide 1-1/2 hour "B" label self-closing or automatic closing fire doors in all openings onto the corridor.

C. ENCLOSURE OF EXITWAYS

1. General Compliance Alternatives

a. Improve enclosure of exitway.

b. Add a partial fire suppression system.

c. Add a detection system.

2. Examples

Example 1

A 4-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 paneled doors.

Solution A. Cover partitions on the apartment side with 5/8" Type X gypsum wallboard or its equivalent. Replace or build up panel doors until minimum solid portion is 1-3/8" 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 of the domestic water supply (if adequate). Provide self-closers on all stairwell doors.

3. Commentary

The above example while pertaining to a 4-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

fire-resistive construction, it must be maintained. The primary principle to remember, in the required enclosure of exitway, is that an enclosure must be provided, whether fire-resistive 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, & C in the above example.

III. COMPLIANCE ALTERNATIVES FOR FIRE HAZARDS

A. FIRE SEPARATIONS AND PARTITIONS

1. General Compliance Alternatives

a. Improve fire separation.

b. Add fire suppression system.

c. Add detection system.

2. Examples

Example 1

A 3-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 3 hours.

Solution A. Add a fire suppression system to the first and second floors.

Solution B. Add 5/8" 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

The separation between two tenants is a wood lath and plaster on a wood studs partition. The required separation is 1 hour.

Solution A. Add 5/8" Type X gypsum wallboard or its equivalent to either side of the existing partition.

Example 3

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 5/8" 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.

B. OPENINGS AND EXTERIOR WALL PROTECTION

1. General Compliance Alternatives

a. Add fire suppression system.

b. Improve fire resistance.

c. Remove or improve openings.

2. Examples

Example 1

A 2-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 5 feet and between it and the adjacent building is 10 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 5/8" Type X gypsum wallboard to interior side of the wall affected.

Example 2

Same as Example 1 but with doublehung wood windows in affected wall.

Solution A. Remove windows and close opening with 1-hour fire-resistive construction.

Solution B. Remove windows and install fire windows.

Solution C. Install deluge sprinkler system as in Solution A to Example 1.

Massachusetts State Building Code

REFERENCE STANDARD

RS22-3

DETAILED CLASSIFICATION OF OCCUPANCY BY HAZARD INDEX NUMBER AND USE GROUP

October 23, 1978

REFERENCE STANDARD RS 22-3

CLASSIFICATION OF OCCUPANCY BY HAZARD INDEX NUMBER AND USE GROUP

This standard provides a more detailed guide to users of the code to determine hazard index number and use group for various types of occupancies. It supplements Article 2*and Table 2203.8 contained in the body of Article 22.

	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		
Crematorium	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
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

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	Hazard Index Number	Use Group
Sales within a building	3	M
Wrecking	3	F
Washing	3	S-1
Awning manufacture	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

	Hazard Index Number	Use Group
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
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

	Hazard Index Number	Use Group
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)		R-1 or R-2
Department stores	3	M
Dormitories	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
Pick up & delivery station	2	B
Dwellings (see Residences)		

	Hazard Index Number	Use Group
Eating or drinking places		
Lunchrooms, restaurants, cafeterias, etc. primarily enclosed	5	A-3
Drive-in	4	A-3
With entertainment or dancing	7	A-2
Electric		
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 & fish	3	F
Retail sales	3	M
Fraternities or sororities	2	R-1 or R-2
Funeral establishments	4	A-3

	Hazard Index Number	Use Group
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
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

	Hazard Index Number	Use Group
Hospitals		
Including convalescent, nursing or rest homes, and sanitoriums, provided custodial care is not provided for drug addicts, alcoholics, or 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 Animals-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 Animals)		
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
Laundries		
Hand laundry	2	B
Self service; Pick up & delivery station of laundry or dry cleaner	2	B
Steam laundries without limitations	3	F

	Hazard Index Number	Use Group
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
Mattresses manufacture and renovation	3	F
Meat		
Markets	3	M
Slaughtering or packaging	3	F
Medical & dental		
Offices	2	B
(see also Laboratories; Orthopedic and medical appliances; Hospitals)		
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

	Hazard Index Number	Use Group
Orphanages		I-2
Orthopedic or medical appliances manufacture	3	F
Paint, turpentine or varnish		
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
Photographers studio	2	B
Plastics		
Products manufacture	8	H
Raw, manufacture	8	H
Police Stations	2	B
Pool rooms	4	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

	Hazard Index Number	Use Group
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 constituting 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
Sanatoriums		
Not providing custodial care for drug addicts, alcoholics or mentally ill or mentally deficient	4	I-2
Providing care for above	5	I-1
Schools	4	A-4
Seminaries	4 & 2	A-4 & R-1

	Hazard Index Number	Use Group
Settlement houses (depending on nature of activities)	4 or 2	A-3 or B
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 & 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

	Hazard Index Number	Use Group
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
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

	Hazard Index Number	Use Group
Wholesale		
Office, display or sales space	2	B storage restricted to samples
Storage, other than flammable liquids or gases and explosives, in roofed structures	3 or 1	S-1 or S-2 depending on nature of material involved
Window shades manufacture	3	F
Wood		
Distillation	8	H
Products manufacture, including furniture, boxes, crates, barrels, baskets, pencils and the like	3	F
Pulp or fiber reduction or processing, including paper mill operation	3	F
Sales	3	M
Sawmills	8	H
Wool scouring or pulling	3	F
Umbrellas, manufacture	3	F
Upholstering	3	F
Vehicles		
Manufacture	3	F
Venetian blinds, window shades & awnings, manufacture	3	F

Massachusetts State Building Code

REFERENCE STANDARD

RS22-4

ARCHAIC CONSTRUCTION SYSTEMS

October 23, 1978

REFERENCE STANDARD RS22-4

ARCHAIC CONSTRUCTION SYSTEMS

Table of Contents

REFERENCE STANDARD RS 22-4

ARCHAIC CONSTRUCTION SYSTEMS

I. PURPOSE AND SCOPE

A. PURPOSE. The purpose of this standard is to assist the building official and those regulated by this code in evaluating the properties of archaic construction systems.

B. SCOPE. This standard 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 are impacting the performance of the building.

C. APPLICATION. In any given problem, all available data shall be synthesized and professional judgment exercised in arriving at decisions. Evaluative judgment shall be used when test data does not exist or when applying the data contained in this standard.

II. ARCHAIC FIRE RESISTIVE SYSTEMS

This standard contains a list of fire-resistive 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.

A. FIRE-RESISTIVE MATERIALS AND CONSTRUCTION

(a) Materials, to be given the fire-resistive ratings specified in this part, shall have the following minimum qualities:

(1) Concrete of Class 1 shall be so proportioned as to have a strength of at least fifteen hundred pounds per square inch and the coarse aggregate shall consist of limestone, trap rock, blast furnace slag, cinders containing not more than twenty per cent of combustible material, burned clay or shale.

(2) Concrete of Class 2 shall be so proportioned as to have a strength of at least fifteen hundred pounds per square inch, the coarse aggregate consisting of sandstone, granite, quartzite, siliceous gravel or other similar material not over one inch in size.

(3) Masonry 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.

(4) Brick shall be burned clay or shale, concrete or sand-lime brick of Grade C or better.

(5) 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 fire-resistive, shall not be considered fire-protection for structural metal, but may be used in a masonry wall not less than twelve inches thick required to have fire-resistance. Stone masonry shall have the same fire-resistive rating as brick masonry.

(6) Cast stone masonry shall have the same fire-resistive rating as brick masonry.

(7) Concrete blocks, whether solid or hollow, shall have as coarse aggregate limestone, trap rock, blast furnace slag, cinders containing not more than twenty per cent of combustible material, burned clay or shale.

(8) 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.

(9) 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 per cent by weight of wood or other combustible binder or filler.

(10) Gypsum concrete shall not contain more than twelve and one-half per cent by weight of wood or other combustible binder or filler, and shall have a compressive strength of at least five hundred pounds per square inch. It shall not be used where exposed to the elements.

(11) Expanded metal or wire lath as a base or reinforcement for plastering shall weigh not less than two and two-tenths pounds per square yard and shall have not less than two and one-half meshes per inch.

(12) 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.

(13) Metal mesh reinforcement specified for concrete fire protection of structural metal shall consist of wire mesh weighing not less than one and one-half pounds per square yard with wire spaced not over four inches, or not less than number eleven gage steel wire spaced not over four inches apart, or its approved equivalent.

(14) Cement plaster shall be proportioned of one part Portland cement, and not more than two parts of sand measured by volume dry and loose to which may be added lime putty or hydrated lime not exceeding fifteen per cent of the cement.

(15) Gypsum plaster, except where otherwise specified, may contain sand not in excess of three times the weight of the gypsum.

(16) Lime plaster shall consist of a mixture of one part lime, not over three parts sand, and water.

(17) Pneumatically projected mortar made of Portland cement, sand and water shall be rated for fire-protection the same as Class 1 concrete.

(18) Concrete fill, where specified in this chapter 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.

(b) 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 number five wire spaced not over eight inches apart or its equivalent. Reinforcement shall be wrapped around the structural member and so arranged as to be completely embedded in the fire-protective material and to ensure its integrity.

(c) Plaster used as fire-protection or to resist the spread of fire shall be reinforced with metal lath, except plaster less than one inch thick on masonry or concrete.

(d) In the protection of structural metal including reinforcement, one-half inch of cement or gypsum plaster may replace an equal thickne of poured concrete or pneumatically projected mortar as protective material; and one inch of cement or gypsum plaster reinforced with metal lath may replace an equal thickness of poured concrete, pneumatically projected mortar or masonry protection.

(e) Where plaster is required without other specification, it shall consist of one-half inch of cement or gypsum plaster, except that only gypsum plaster shall be used on gypsum masonry.

(f) In this chapter, 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.

(g) 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.

(h) In factories, garages, warehouses and other buildings in which the fire-protective covering required for steel or iron columns may be injured by the movement of vehicles, materials or equipment, the

such covering shall be protected by metal or other material in a manner satisfactory to him.

(i) Fire-stopping 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. Fire-stopping shall consist of wood not less than one and one-half inches thick, of sheet metal not less than twenty-four gage or of masonry, or a combination of such materials. Fire-stopping 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.

B. FIRE-PROTECTION OF STEEL COLUMNS

(a) 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.

(b) The following materials shall be assumed to afford to steel columns fire-protection of the rating indicated:

Four-hour rating:

(1) Two inches Class 1 concrete.

(2) Three inches Class 2 concrete, metal mesh reinforcement.

(3) Three and one-half inches brick masonry.

(4) Two layers two-inch structural clay partition tile masonry, metal mesh in beds.

(5) Two inches structural clay partition tile masonry, concrete fill, metal mesh in beds, three-fourths inch gypsum plaster.

(6) Four inches structural clay partition tile masonry, concrete fill, metal mesh in beds, five-eighths inch lime plaster.

(7) Four inches structural clay partition tile or concrete block masonry, concrete fill, plaster.

(8) Three inches hollow gypsum tile masonry and plaster.

(9) Two inches gypsum concrete, metal mesh reinforcement.

(10) Two inches solid gypsum tile masonry and plaster.

(11) Three inches solid cinder concrete block masonry and plaster.

(12) Four inches hollow cinder concrete block masonry and plaster.

Three-hour rating:

(13) One and three-fourths inches Class 1 concrete.

(14) Two inches Class 2 concrete, metal mesh reinforcement.

(15) Two inches gypsum concrete.

(16) Two inches solid cinder concrete block masonry and plaster.

(17) Two inches structural clay partition tile masonry, concrete fill.

Two-hour rating:

(18) One and one-half inches Class 1 concrete.

(19) Two inches Class 2 concrete, metal mesh reinforcement.

(20) One inch Class 1 or Class 2 concrete encased in standard weight steel or wrought iron pipe.

(21) Two inches structural clay partition tile masonry and plaster.

(22) Two layers plaster, each on metal lath, with three-fourths inch air space between, two inches total thickness.

(23) Two-inches gypsum concrete.

(24) Two inches solid or three inches hollow gypsum tile masonry.

One-hour rating:

(25) One inch Class 1 concrete.

(26) One and one-half inches Class 2 concrete with metal mesh reinforcement.

(27) Two and one-fourth inches brick masonry.

(28) Two inches structural clay partition tile or concrete block masonry.

(29) One inch cement or gypsum plaster on metal lath.

(c) The thickness of protection on the outer edges of lugs or brackets need not exceed one inch.

C. FIRE-PROTECTION OF CAST IRON COLUMNS

(a) 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. Re-entrant 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.

(b) The following materials shall be assumed to afford to cast iron columns fire-protection of the rating indicated:

Four-hour rating:

Cast iron columns shall not be used where protection of four-hour rating is required.

Three-hour rating:

(1) Two inches Class 1 concrete.

(2) Three inches Class 2 concrete, metal mesh reinforcement.

(3) Two inches structural clay partition tile or concrete block masonry concrete fill.

(4) One and one-half inches cement or gypsum plaster on metal lath and metal furring to form one-half inch air space.

(5) One and one-half inches Class 1 concrete.

(6) Two inches Class 2 concrete with metal mesh reinforcement.

One-hour rating:

(7) One inch Class 1 concrete.

(8) One and one-half inches Class 2 concrete with metal mesh reinforcement.

(9) One inch cement or gypsum plaster on metal lath.

D. FIRE-PROTECTION OF STEEL IN REINFORCED CONCRETE COLUMNS

(a) The main steel reinforcement, including spiral reinforcement and ties larger than one-half 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:

Four-hour rating:

(1) One and one-half inches Class 1 concrete.

(2) Two inches Class 2 concrete.

Three-hour rating:

(3) One and one-half inches Class 1 or Class 2 concrete.

Two-hour rating:

(4) One inch Class 1 concrete.

(5) One and one-half inches Class 2 concrete.

One-hour rating:

(6) One inch Class 1 or Class 2 concrete.

(b) The thickness of protection on column ties not larger than one-half inch may be one-half inch thinner than that listed above.

E. FIRE-PROTECTION OF STEEL BEAMS, GIRDERS AND TRUSSES

(a) 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.

(b) The following materials shall be assumed to afford steel beams, girders and trusses, or the members thereof, fire-protection of the rating indicated:

Four-hour rating:

(1) Two inches Class 1 concrete.

(2) Three inches Class 2 concrete.

(3) Three inches structural clay partition tile or concrete block masonry and plaster.

(4) Three inches hollow gypsum tile masonry and plaster.

(5) Two inches gypsum concrete.

(6) Two inches solid gypsum tile masonry and plaster.

Three-hour rating:

(7) One and three-quarters inches Class 1 concrete.

(8) Two and one-half inches Class 2 concrete.

(9) Two inches gypsum concrete.

(10) Two inches structural clay partition tile, or concrete block masonry and plaster.

(11) Two inches solid, or three inches hollow gypsum tile masonry.

Two-hour rating:

(12) One and one-half inches Class 1 concrete.

(13) Two inches gypsum concrete.

(14) Two inches gypsum concrete.

One-hour rating:

(15) One inch Class 1 concrete.

(16) One and one-half inches Class 2 concrete.

(17) Seven-eighths inch cement or gypsum plaster on metal lath.

F. FIRE-PROTECTION OF STEEL IN REINFORCED CONCRETE BEAMS.

(a) The main steel reinforcement, including stirrups larger than one-half 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 G.

Four-hour rating:

(1) One and one-half inches Class 1 concrete.

(2) Two inches Class 2 concrete.

Three-hour rating:

(3) One and one-half inches Class 1 or Class 2 concrete.

Two-hour rating:

(4) One inch Class 1 concrete.

(5) One and one-half inches Class 2 concrete.

One-hour rating:

(6) One inch Class 1 or Class 2 concrete.

(b) The thickness of protection on stirrups not larger than one-half inch may be less than that listed by not more than one-half inch.

G. FIRE-PROTECTION OF STEEL REINFORCING IN FLOORS AND ROOFS

(a) 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 F for steel in reinforced concrete beams.

Four-hour rating:

(1) One inch Class 1 concrete.

(2) One and one-fourth inches Class 2 concrete.

Three-hour rating:

(3) One inch Class 1 or Class 2 concrete.

Two-hour rating:

(4) Three-fourths inch Class 1 concrete.

(5) One inch Class 2 concrete.

One-hour rating:

(6) Three-fourths inch Class 1 or Class 2 concrete.

H. FIRE-RESISTIVE FLOOR AND ROOF CONSTRUCTION

(a) 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-hour or longer resistance to fire shall be constructed of incombustible 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 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.

(b) The following floor or roof construction shall be assumed to afford resistance to the spread of fire of the rating indicated:

Four-hour rating:

(1) Four inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

(2) Four inches solid masonry arches or slabs.

(3) Four inches structural clay floor tile masonry arches or slabs with top covering of not less than two inches of solid masonry or reinforced concrete.

(4) Five inches combination reinforced Portland cement concrete slab consisting of permanent fillers of concrete block, gypsum or structural clay tile and one and one-half inches of concrete topping; but if structural clay partition tiles are used for fillers they shall be plastered on the soffit.

Three-hour rating:

(5) Three inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

(6) Three inches solid masonry arches or slabs.

(7) Four inches structural clay floor tile masonry, arches or slabs with top covering of not less than one and one-half inches of solid masonry or reinforced concrete.

(8) Four inches combination reinforced Portland cement concrete slab consisting of permanent fillers of concrete block, gypsum or structural clay tile and one-inch concrete topping; but if structural clay partition tiles are used for fillers, they shall be plastered on the soffit.

Two-hour rating:

(9) Two and one-half inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

(10) Two and one-half inches solid masonry arches or slabs.

(11) Three inches structural clay floor tile masonry, arches or slabs with top covering of not less than one inch of solid masonry or reinforced concrete.

One-hour rating:

(12) Three inches structural clay floor tile masonry, arches or slabs with all joints thoroughly filled with cement or gypsum mortar.

(13) Wood floor or roof construction with joists not less than one and five-eights inches in least dimension, fire-stopped, double board floor, approved asbetos felt between layers of boards, and with a ceiling of at least three-quarters inch cement or gypsum plaster on metal lath.

(14) Steel beams or steel joists not more than thirty-six inches apart on centers with incombustible floor and a ceiling of at least three-fourths inch cement or gypsum plaster on metal lath metal furring.

I. FIRE-RESISTIVE CEILING CONSTRUCTION

(a) Ceilings required to afford fire-protection of a given rating

to the floor or roof framing under which it is supported shall be of fire-resistive materials of at least the thickness necessary for the given rating. A fire-resistive ceiling and all hangers and fastenings necessary for its support to the protected framing shall be of incombustible 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 G for reinforcing in a floor.

(b) The following ceiling construction shall be assumed to afford to floor or roof framing fire-protection of the rating indicated:

Four-hour rating:

(1) Two and one-half inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

(2) Two inches precast reinforced gypsum concrete, plastered.

Three-hour rating:

(3) Two inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

(4) Two inches precast reinforced gypsum concrete, lapped or rabbeted joints.

Two-hour rating:

(5) One and one-half inches solid slab of reinforced Portland cement concrete or reinforced precast gypsum concrete.

One-hour rating:

(6) Three-fourths inch cement or gypsum plaster on metal lath.

J. FIRE-RESISTIVE BEARING WALLS AND PARTITIONS

(a) Bearing walls and partitions required to have resistance to fire or the spread of fire of a given rating shall be constructed of fire-resistive materials and shall have at least the thickness necessary for the required rating. Walls required to have two-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 G in floors.

(b) Bearing walls and partitions of the following construction and thickness shall be assumed to have resistance to fire and the spread of fire of the rating indicated:

Four-hour rating:

(1) Eight inches solid brick masonry.

(2) Twelve inches hollow wall of brick masonry, minimum eight inch masonry thickness.

(3) Twelve inches structural clay load-bearing tile masonry with two units and not less than three cells in the thickness of the wall.

(4) Eight inches structural clay load-bearing tile masonry with one unit and not less than two cells in the thickness of the wall, plastered both sides.

(5) Twelve inches concrete block masonry with one unit and not less than two cells in the thickness of the wall.

(6) Eight inches one-piece concrete block masonry with shells and webs at least one and one-half inches thick, plastered both sides.

(7) Twelve inches total thickness of brick masonry facing bonded to structural clay load-bearing tile masonry backing.

(8) Eight inches solid concrete.

(9) Six inches solid reinforced concrete.

(10) A steel or reinforced concrete frame bearing wall in which the steel has fire-protection of four-hour rating, with panel filling as specified in section K for a non-bearing wall of four-hour rating.

Three-hour rating:

(11) Eight inches structural clay load-bearing tile masonry with two units and not less than four cells in the thickness of the wall.

(12) Twelve inches structural clay load-bearing tile masonry with one unit and not less than three cells in the thickness of the wall.

(13) Eight inches one-piece concrete block masonry with shells and webs not less than one and one-half inches thick, plastered both sides.

(14) Eight inches one-piece concrete block masonry with shells and webs not less than two inches thick.

(15) Five inches solid reinforced concrete.

(16) A steel or reinforced concrete frame bearing wall in which the steel has fire-protection of three-hour rating, with panel filling as specified in section K for a non-bearing wall of three-hour rating.

Two-hour rating:

(17) Eight inches structural clay load-bearing tile masonry with not less than three cells in the thickness of the wall.

(18) Eight inches concrete block masonry with shells and webs not less than one and one-half inches thick.

(19) A steel or reinforced concrete frame bearing wall in which the steel has fire-protection of two-hour rating, with panel filling as specified in section K for a non-bearing wall of two-hour rating.

One-hour rating:

(20) A steel or wooden stud bearing wall covered on both sides with one-inch cement or gypsum plaster on metal lath, fire-stopped, if of wood.

(21) A steel or reinforced concrete frame bearing wall in which the steel has fire-protection of one-hour rating, with panel filling as specified in section K for a non-bearing wall of one-hour rating.

K. FIRE-RESISTIVE NON-BEARING WALLS AND PARTITIONS

(a) Non-bearing walls and partitions required to have resistance to fire and the spread of fire of a given rating shall be constructed of fire-resistive materials and shall have at least the thickness necessary for the required rating. Walls required to have two-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 G for steel in floors.

(b) Non-bearing walls and partitions of the following construction and thickness shall be assumed to have resistance to fire and the spread of fire of the rating indicated:

Four-hour rating:

(1) Eight inches solid brick masonry.

(2) Three and one-half inches solid brick masonry, plastered both sides.

(3) Six inches structural clay load-bearing tile, plastered both sides.

(4) Six inches solid concrete.

(5) Four inches solid reinforced concrete.

(6) Any wall which, as a bearing wall, has a three-hour or four-hour rating in section J, except the steel or reinforced concrete frame bearing wall.

Three-hour rating:

(7) Three and one-half inches solid brick masonry.

(8) Four inches structural clay load-bearing tile, plastered both sides.

(9) Four inches solid concrete.

(10) Three inches reinforced concrete.

(11) Any wall which, as a bearing wall, has a two-hour rating in section J, except the steel or reinforced concrete frame bearing wall.

Two-hour rating:

(12) Three inches gypsum tile masonry, plastered both sides except in exterior walls.

(13) Eight inches structural clay partition tile masonry, plastered both sides.

(14) Eight inches structural clay load-bearing tile, with three cells in the thickness of the wall.

(15) Four inches concrete block plastered both sides.

(16) Two inches solid neat, fibered, gypsum plaster on metal lath and incombustible studding.

One-hour rating:

(17) Three inches gypsum tile masonry.

(18) Two inches solid gypsum tile masonry plastered both sides.

(19) Three inches structural clay partition tile plastered both sides.

(20) Two and one-half inches solid cement or sanded gypsum plaster on metal lath and incombustible studding.

(21) Three inches total thickness of hollow wall, three-fourths inch cement or gypsum plaster on metal lath and incombustible studding.

(22) Three inches total thickness of hollow wall, three-fourths inch cement or gypsum plaster on metal lath and wooden studding, fire-stopped.

L. FIRE-RESISTIVE DOORS

(a) Doors which are required to be fire doors, fire-resistive doors, or of fire-resistive construction shall conform to the requirements of this section and section M.

(b) Fire doors shall be classified for the purposes of this code as Class A, Class B, and Class C.

(c) Class A fire doors shall be doors of the following construction as specified in Section M.

(1) Tin-clad, three-ply wood core, sliding.

(2) Tin-clad, three-ply wood core, swinging single leaf, doorway not over six feet wide.

(3) Tin-clad, three-ply wood core, swinging in pairs, doorway not over ten feet wide.

(4) Hollow metal, swinging single leaf, doorway not over four feet wide.

(5) Hollow metal, swinging in pairs, doorway not over eight feet wide.

(6) Sheet metal, sliding, single, doorway not over ten feet wide.

(7) Sheet metal, sliding in pairs, doorway not over twelve feet wide.

(8) Sheet metal, swinging single leaf, doorway not over six feet wide.

(9) Sheet metal, swinging in pairs, doorway not over ten feet wide.

(10) Steel rolling, doorway not over twelve feet wide.

(11) Steel plate, doorway not over four feet wide.

(12) Any other construction equal or superior to a tin-clad three-ply wood core door in a standard fire test, for resistance to fire, the spread of fire and smoke, and transmission of heat.

(d) Class B fire doors shall be doors of the following construction as specified in section M.

(13) Tin-clad, three-ply wood core.

(14) Tin-clad, two-ply wood core, sliding, doorway not over ten feet wide.

(15) Tin-clad, two-ply wood core, swinging single leaf, doorway not over six feet wide.

(16) Tin-clad, two-ply wood core, swinging in pairs, doorway not over ten feet wide.

(17) Hollow metal, sliding, doorway not over eight feet wide.

(18) Metal-clad, paneled, swinging single leaf, doorway not over three feet wide.

(19) Metal-clad, paneled, swinging in pairs, doorway not over six feet wide.

(20) Any other construction equal or superior to a tin-clad two-ply wood core door in a standard fire test, for resistance to fire, the spread of fire and smoke, and transmission of heat.

(e) Class C Fire doors shall be doors of the following construction as specified in section M.

(21) Metal-clad, paneled, swinging single leaf, doorway not over four feet wide.

(22) Metal-clad, paneled, swinging in pairs, doorway not over eight feet wide.

(f) 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 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.

(g) Fire-resistive 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 inches or be fitted to a fire-resistive frame with a rabbet the full thickness of the door and with not less than one half 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 inches. A sliding fire door in an enclosure about a passenger elevator shall overlap jambs, head and adjoining panels not less than one half inch. Fire doors shall fit closely at the floor with clearance of not over one quarter inch.

(h) In buildings with combustible floors, doorways required to have fire doors shall have incombustible thresholds the full thickness of the wall, extending at least four inches from the face of the wall where a door is hung and extending laterally at least six inches behond each jamb of the doorway. Thresholds may be flush with the floor.

(i) The rabbeted frame of a swinging fire door shall be constructed of structural steel built into the concrete, masonry or other fire-resistive 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 twenty-six gage in thickness, secured to the wall in the opening.

(j) 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 fire-resistive material of the wall, floor or roof to which it is fitted.

(k) Hinge hardware for fire doors shall be of malleable iron or rolled structural steel not less than one fourth inch thick except that tubular steel track for sliding doors may be not less than one eighth 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.

(l) 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.

(m) 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 masonry or concrete or secured by approved inserts in the concrete or built into masonry in approved manner.

(n) 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 swining fire doors shall have strap hinges.

(o) 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 fourths 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 fourths inch and the other shall be held by latch to the first.

(p) 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.

M. FIRE DOOR CONSTRUCTION

(a) 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.

(b) Class A doors shall not have glass panels. Class B doors may have glass panels not larger than one hundred square inches in exposed area nor more than twelve inches in width or height. Class C doors may have glass panels not larger than two thousand and sixteen square inches in total exposed area, and no single light shall have an exposed area exceeding twelve hundred and ninety-six square inches. Glass in fire doors shall be wire glass not less than one quarter inch thick and shall be set five eighths inch in grooves three quarters of an inch deep.

(c) Fire doors shall be constructed as follows: --

(1) Tin-clad, three-ply wood core doors shall be constructed in accordance with the specifications of the National Boar of Fire Underwriters for such doors in Class A openings, and shall bear the label of the Underwriters Laboratories to this effect.

(2) 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.

(3) 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.

(4) Sheet metal doors shall be constructed with a rolled steel rigid frame covered both sides with one sixteenth inch asbestos board and twenty-six 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.

(5) A steel rolling fire door shall be constructed of sheet steel interlocking slats, sliding in grooves, counter-weighted by springs, the roller and mechanism enclosed in heavy sheet metal.

(6) A steel plate fire door shall be constructed of not less than twelve gage steel plate mounted on a rolled steel frame, assembled by welding or riveting.

(7) A metal clad, paneled fire door shall have a wood core with stiles and rails not less than one and three fourths inches thick covered with twenty-six gage sheet steel; panels three fourths inch thick covered with twenty-six gage sheet steel, set three fourths inch in grooves; joints of metal lapped and well nailed.

(d) 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.

(e) 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 feet shall not be accepted as Class B doors.

(f) 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.

N. FIRE-RESISTIVE SHUTTERS

Shutters required to be fire shutters or fire-resistive shutters shall be constructed and hung as specified for Class B fire-resistive doors in sections L and M.

O. FIRE-RESISTIVE WINDOWS

(a) Windows which are required to be fire windows, fire-resistive windows, or of fire-resistive construction shall conform to the requirements of this section.

(b) Fire-resistive windows may be fixed or arranged to open and close. Fixed fire-resistive windows shall be so secured in the walls in which they are placed that they may expand in case of fire without buckling. Movable fire-resistive windows shall be opened or closed in one of the following manners: --

(1) One or more sashes may slide horizontally in a fire-resistive frame.

(2) One or more sashes may slide vertically with counterweights or with two 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.

(c) Movable sashes in fire-resistive windows shall be fitted to fire-resistive 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 fire-resistive material of the wall and so secured that they may expand in case of fire without buckling.

(d) Glass in fire-resistive windows shall be wire glass not less than one fourth inch thick and the area of a single light shall not exceed seven hundred and twenty square inches. Glass shall be set three eights inch in grooves at least one half inch deep. Glass shall be secured by glazing angles or moldings screwed to the sash and forming continuous grooves for the glass.

(e) Fire-resistive windows shall be of the following construction: --

(6) 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 the Underwriters' Laboratories.

(7) Rolled steel or pressed steel sashes fabricated by pressing, welding, riveting or crimping, of a make and style approved by the commissioner.

(8) Any other approved constructions as fire-resistive as that specified in paragraph (6).

(f) Fixed fire-resistive windows of hollow sheet metal construction shall not exceed seven feet in width nor ten feet in height. Fire-resistive windows of hollow sheet metal construction with movable sashes shall not exceed six feet in width nor ten feet in height.

(g) Fire-resistive windows of rolled steel construction shall not exceed eighty-four square feet in area nor twelve feet in either height or width.

(h) Fire-resistive 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.

(i) Where fire-resistive windows are required, wooden windows and plain glass may be substituted provided the openings are protected by fire-resistive doors or shutters, or, in buildings of approved occupancy and construction, by an approved system of open sprinklers.

P. FIRE-RESISTIVE ROOF COVERING

(a) Roof covering allowed under this code shall be clasified as fire-retardant or ordinary, according to their resistance to fire outside, as provided in this section. Fire-retardant roof covering is the more fire-resistive and may be used on any building. Ordinary roof covering shall not be used where fire-retardant roofing is specified. Roof covering less fire-resistive than ordinary roof covering shall not be used on any building.

(b) 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 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 number twenty-six gage in thickness.

(6) Shingles of natural slate.

(7) Shingles of burned clay tile.

(8) Shingles of sheet metal not less than number twenty-six gage in thickness.

(9) Shingles of asbestos board not less than one-eighth 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 number twenty-six gage in thickness.

(12) Corrugated asbestos board not less than three-sixteenths inch thick.

(c) 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:

(13) Built up roofing consisting of successive layers of roofing felt impregnated with asphalt, coal tar or other approved material, not equal in fire-resistance to a fire-retardant roofing.

(14) 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 fire-retardant roofing.

(15) Canvas stretched tightly and coated with paint.

(d) 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, tile roll roofing shall be well secured to the deck by nailing, bolting, wiring, or other approved methods.

ATTACHMENT A

RECOMMENDATION ON CURRENT SECTIONS
OF MASSACHUSETTS STATE BUILDING CODE
(based on draft attached)

1. Delete Sections 105.0 and 106.0 entirely and substitute the following:

Section 105.0 Existing Buildings and Structures

105.1 General: The repair, alteration, addition to and change in use of existing buildings and structures shall comply with the provisions of Article 22.

2. Add Section 304.1.3 to Section 310.0 as Section 310.1.1; delete the remainder of 304.0 entirely.

3. Delete Sections 405.3 through 405.4.2 entirely.

4. Delete Sections 417.2.6 and 417.2.7 entirely.

5. Revise 436.5.1 to read "This section and Article 22 shall apply to all historic buildings which are not defined as totally preserved buildings".

Delete 436.5.3, 436.5.4, 436.5.6, 436.5.7 and 436.5.8 entirely.

Revise Section 600.1 to read, "600.1 Scope: The provisions of this article shall control the design, construction and arrangement of building elements required to provide a reasonably safe means of egress from all buildings and structures hereafter erected. All existing buildings and all buildings hereafter altered to a new occupancy load or manner of use or inherent fire hazard shall comply with the provisions of Article 22".

Delete Section 604.0 entirely.

8. Revise Section 706.3 to read ".....within the limitations prescribed in Article 22, the structure may be .....".

9. Revise Section 718.67 to read "718.67 Alterations: Structural alterations may be made.....".

Summary of Recommended Action to be Taken on Sections of Proposed Mass. State Building Code Referring to Existing Buildings

Delete	Revise	Remain		
105.1	105.0	102.0	405.1	1005.0
105.2	106.0	104.0	405.2	1102.3
105.3	436.0	111.4	417.2.2	1102.4
105.4	600.1	111.41	417.2.3	1103.0
106.1	706.3	116.0	433.1	1200.3
106.2	718.67	117.0	437.2.1	1200.8
106.3		120.2	505.0	1201.1
106.4		120.3	600.2	1201.2
106.5		121.0	600.3	1305.0
304.0		124.0	605.0	1307.1.1
405.3		125.0	621.0	1307.1.3
405.4		302.0	706.0	1307.2.1
417.2.6		309.0	706.1	1312.0
417.2.7		310.0	706.2	1403.0
604.0		311.0	706.4	1404.0
		312.0	802.3	1805.0
		313.0	803.0	2001.3
		403.0	804.0	2002.0
		405.0	1002.1	

Draft of Sections of the Mass. State Building Code

to be Deleted or Revised

SECTION 105.0 CHANGE IN EXISTING USE

105.1 CONTINUATION OF EXISTING USE: The legal use and occupancy of any structure existing on January 1, 1975, or for which it had been heretofore approved, may be continued without change, except as may be specifically covered in the Basic Code or as may be deemed necessary by the building official for the general safety and welfare of the occupants and the public.

105.2 CHANGE IN USE AND OCCUPANCY: It shall be unlawful to make any change in the use or occupancy of any structure or parts thereof without the building official having issued a certificate of use and occupancy indicating that such structure complies with the provisions of the Basic Code for the proposed new use or occupancy and that such change does not result in any greater hazard to public safety or welfare.

105.3 PART CHANGE IN USE: If a portion of the building is changed in occupancy or to a new use group and that portion is separated from the remainder of the building with the required vertical and horizontal fire division complying with the fire grading in table 9-1, then the construction involved in the change shall be made to conform to the requirements of the Basic Code for the new use and occupancy and the existing portion shall be made to comply with the exitway requirements of the Basic Code.

105.4 REESTABLISHMENT OF A PRIOR USE: After an approved change of use has been made to a building or parts thereof, the reestablishment of a prior use that is not legal to a new building or parts thereof of the same type of construction, is prohibited unless all the applicable provisions of the Basic Code have been met.

SECTION 106.0 ALTERATIONS & REPAIRS

Except as provided in this section, existing buildings or structures when altered or repaired as herein specified shall be made to conform to the full requirements of the Basic Code for new buildings:

106.1 ALTERATIONS EXCEEDING FIFTY PERCENT: If alterations or repairs are made within any period of twelve (12) months, costing in excess of fifty (50) percent of the physical value of the building; or

106.2 DAMAGES EXCEEDING FIFTY PERCENT: f the building is damaged by fire or any other cause to an extent in excess of fifty (50) percent of the physical value of the building before the damage was incurred.

106.3 ALTERATION UNDER FIFTY PERCENT: If the cost of alterations or repairs described herein is between twenty-five (25) and fifty (50) percent of the physical value of the building, the building official shall determine to what degree the portions so altered or repaired shall be made to conform to the requirements for new buildings:

106.4 ALTERATION UNDER TWENTY-FIVE PERCENT: If the cost of alterations or repairs described herein is twenty-five (25) percent or less of the physical value of the building, the building official shall permit the restoration of the building to its condition previous to damage or deterioration with the same kind of materials as those of which the building was constructed; provided that such construction does not endanger the general safety and public welfare and complies with the provisions of article 9 in respect to existing roofs.

106.5 PHYSICAL VALUE: In applying the provisions of this section, the physical value of the building, at the option of the owner, shall be based on the assessed value of the building as recorded in the assessor's office of the municipality or on the basis of the current replacement cost of the building less physical deterioration, provided that satisfactory evidence of the current replacement cost less physical deterioration is submitted to the building official for his approval.

SECTION 304.0 EXISTING BUILDINGS

304.1 Alterations

304.1.1 Limitations: These provisions shall not be deemed to prohibit alterations within the limitations of Section 106.0, provided an unlawful change of use is not involved.

304.1.2 Minor changes: Changes, alterations or repairs to the interior of a building and to the front facing a street or other public space may be permitted, provided such changes, in the opinion of the building official, do not increase the size or the fire hazard of the building, or endanger the public safety, and are not specifically prohibited by this code.

304.1.3 Existing projections: A change or enlargement shall not be made to an existing part of a building now projecting beyond the street lot line or building line where such is established by law, except in conformity to the provisions of Section 310.0 governing new construction.

304.2 Increase in height and area: It shall be unlawful to increase the height or area of an existing building or structure, unless it is of a type of construction permitted for new buildings of the increased height and area, and of a use group within the fire limit in which it is located and as regulated by Table 305.

417.2.6 Existing buildings: Nothing herein contained shall prohibit the alteration of a building heretofore occupied as a place of public assembly for such continued use provided the occupancy load is not increased and seats, aisles, passageways, balconies, stages, appurtenant rooms and all special permanent equipment comply with the requirements of this article.

417.2.7 New buildings: A building not heretofore occupied as a place of public assembly shall not hereafter be altered to be so occupied unless it is made to comply with all the provisions of this article.

436.5.1 APPLICABILITY: This Section shall apply to all HISTORIC BUILDINGS which are NOT defined as TOTALLY PRESERVED BUILDINGS.

436.5.3 REPAIRS AND MAINTENANCE: The owner of a partially preserved building may perform any repairs and maintenance without increased conformity to the Basic Code, as defined in Section 102, and provided that a building permit has been issued and that no change of Use and Occupancy occurs.

436.5.4 NEW SYSTEMS: When an entirely new electrical or mechanical system and/or equipment is installed in a partially preserved building, they shall be subject to the provisions of Section 103.0 and Sections 1102.0, 2201.1a, 2201.2, and 2201.4.

436.5.6 CHANGE IN OCCUPANCY: Before any change in the use or occupancy of any partially preserved building or parts thereof, the building official shall inspect the building and shall determine whether the proposed new use and occupancy constitutes lesser, equal, or greater hazard in accordance with Table 2-6. Any increase in the proposed density or occupancy not in conformance with Sections 605 and 706 and not having a change in use shall also constitute a greater hazard.

Any change in use or occupancy shall be evaluated relative to the last known legal occupancy of the building. After the building official determines that the building conforms to Section he shall issue a Certificate of Use and Occupancy.

436.5.7 LESSER AND EQUAL HAZARD: If a partially preserved building, after a change in use or occupancy, will be in a lower or equal Hazard Group (Table 2-6), no increase in compliance to the Basic Code will be required provided that it conforms to Sections 404, 501, 506, 605, 623, 624, 706 & 1006. The removal of non-original safety features introduced into partially preserved buildings in order to meet more stringent code requirements for prior occupancies may be permitted if lesser hazard exists and if such features are not required for the proposed use or occupancy.

436.5.8 GREATER HAZARD: If a partially preserved building, after a change in use or occupancy, will be in a higher hazard group (Table 2-6), total compliance to the Basic Code shall be required, for that use group.

SECTION 310.0 PERMISSIBLE STREET PROJECTIONS

310.1 General: Subject to such provisions as may be otherwise prescribed by law or ordinance, or by rule of the municipal authorities having jurisdiction over streets, highways, and public spaces, the following projections, as described in Sections 310.2 through 310.11.1, shall be permitted beyond the street lot line or the building line, as the case may be.

310.2 Cornices and eaves: Main cornices or roof eaves located at least twelve (12) feet above the curb level shall project not more than three (3) feet.

405.3 Places of assembly

405.3.1 Change of use: An existing building or structure or part thereof shall not be altered or converted into a place of assembly unless it complies with all provisions of this code applicable to places of public assembly hereafter erected.

405.3.2 Existing use altered: When an existing building or structure heretofore used as a place of public assembly is altered and the cost of such alteration is more than fifty (50) per cent of the physical value of the building as defined in Section 106.8, all provisions of this code relating to new places of public assembly shall be complied with. When the cost of such alteration is less than fifty (50) per cent of the physical value of the building, such alterations shall comply as nearly as is practicable with the provisions of this code which govern the arrangement and construction of seats, aisles, passageways, stage and appurtenant rooms, fire-fighting and extinguishing equipment and the adequacy of means of egress.

405.3.3 Increase in occupancy load: Whenever the occupancy load of an existing place of public assembly is increased beyond the approved capacity of its exitways, the building or part thereof shall be made to comply with the requirements for a new building hereafter erected for such public assembly use.

405.4 Swimming pools

405.4.1 Change of use: An existing pool used for swimming or bathing or accessory equipment or part thereof shall not be altered or converted for any other use unless it complies with all provisions of this code applicable to the use intended.

405.4.2 Continuation of existing use: Existing swimming pools may be continued without change, provided the safety requirements of Section 423.6 are observed where required by the building official.

600.1 SCOPE: The provisions of this Article shall control the design, construction and arrangement of building elements required to provide a reasonably safe means of egress from all buildings hereafter erected, and from all buildings hereafter altered to a new occupancy load, or manner of use, or inherent fire hazard.

SECTION 604.0 EXISTING BUILDINGS

604.1 **Owner responsibility:** The owner or lessee of every existing building and structure shall be responsible for the safety of all persons in, or occupying, such premises with respect to the adequacy of means of egress therefrom.

604.2 **Unsafe means of egress**

604.2.1 **Inadequate exitways:** In any existing building or structure, not provided with exitway facilities as herein prescribed for new buildings and in which the exitways are deemed inadequate for safety by the building official, such additional provision shall be made for safe means of egress as he shall order.

604.2.2 **Appeal from exitway order:** Within seven (7) days after the service of the exitway order of the building official, the owner may file a written appeal therefrom, and the building official shall appoint a board of survey as required in Section 125.0 to make a final determination.

706.3 EXISTING LIVE LOAD: When an existing building heretofore approved is altered or repaired within the limitations prescribed in sections 106.3 or 106.4, the structure may be designed for the loads and stresses applicable at the time of erection, provided the public safety is not endangered thereby.

718.67 MINOR ALTERATIONS: Minor structural alterations may be made in existing buildings and other structures, but the resistance to lateral forces shall be not less than that before such alterations were made, unless the building as altered meets the requirements of this section of the Code.

NBS-114A (REV. 9-78)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NBS SP-549	2. Gov't. Accession No.	3. Recipient's Accession No.

4. TITLE AND SUBTITLE

Proceedings of the National Conference on Regulatory Aspects of Building Rehabilitation

5. Publication Date

August 1979

6. Performing Organization Code

7. AUTHOR(S)

Sandra A. Berry, Editor

8. Performing Organ. Report No.

9. PERFORMING ORGANIZATION NAME AND ADDRESS

NATIONAL BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, DC 20234

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS *(Street, City, State, ZIP)*

National Bureau of Standards
Department of Commerce
Washington, D.C. 20234

13. Type of Report & Period Covered

Final 1979

14. Sponsoring Agency Code

15. SUPPLEMENTARY NOTES

Library of Congress Catalog Card Number: 79-600095

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

This document contains the edited Proceedings of the National Conference on Regulatory Aspects of Building Rehabilitation held October 30, 1978, at the National Bureau of Standards.

It contains a total of 18 presented papers, all of which address the subject of rehabilitation--currently a critical issue in the Nation's effort to revitalize its cities and house its citizens.

Public sector, as well as private sector programs and experiences toward achieving this goal are covered in one general and three technical sessions.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Building; code administration; codes; evaluation; existing buildings; performance standard.

18. AVAILABILITY

☒ Unlimited

☐ For Official Distribution. Do Not Release to NTIS

☒ Order From Sup. of Doc., U.S. Government Printing Office, Washington, DC 20402, SD Stock No. SN003-003-02107-5

☐ Order From National Technical Information Service (NTIS), Springfield, VA, 22161

19. SECURITY CLASS (THIS REPORT)

UNCLASSIFIED

21. NO. OF PRINTED PAGES

220

20. SECURITY CLASS (THIS PAGE)

UNCLASSIFIED

22. Price

$5.50

USCOMM-DC

☆ U.S. GOVERNMENT PRINTING OFFICE : 1979 O—298-595

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