

A COMMISSION REPORT

BUILDING CODES:
A Program For
Intergovernmental Reform



ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS
JANUARY 1966

A-28

**ADVISORY COMMISSION ON
INTERGOVERNMENTAL RELATIONS**

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PREFACE

This report is a study of the intergovernmental problems arising from the preparation, adoption, and enforcement of building codes. It seeks to identify problems in the relationships between Federal, State, and local governments and elements of the building industry most directly affected by building code regulation.

Adoption, administration, and enforcement of building codes traditionally has been the primary responsibility of local governments. However, there have been a number of programs and activities at both the State and Federal levels of government that have a direct bearing on building codes and the regulation of building construction. These activities range from State minimum requirements for construction, to the standards development programs for Federal procurement and the well-known Minimum Property Standards of the Federal Housing Administration.

The Commission, pursuant to its statutory responsibilities established by Public Law 86-380, has been concerned with many problems arising between the levels of government because of population growth and scientific developments. Within this context the Commission, in this report, reviews the technology and economics of building and housing and analyzes the intergovernmental problems arising in the preparation and administration of building codes. Eleven recommendations for intergovernmental action are presented. These recommendations are designed to:

- (1) modernize building codes;
- (2) stimulate building research;
- (3) reduce housing costs due to excessive and diverse code requirements;
- (4) expedite the acceptance of new building products; and
- (5) enhance the quality of building code administration.

In brief, the Commission calls for a restructuring of intergovernmental responsibilities for building codes to help meet anticipated housing and commercial construction needs of twentieth century America.

This report was adopted by the Commission on January 13-14, 1966.

Frank Bane
Chairman

ACKNOWLEDGEMENTS

Work for this report was conducted by James H. Pickford with the assistance of Page L. Ingraham, both of whom are staff members of the Commission.

The Commission and its staff profited from an informal review of an early draft of the report by a number of individuals, including Mr. Paul E. Baseler, Mr. George Basich, Mr. Neil A. Connor, Mr. Robert M. Dillon, Mr. John Garvey, Mr. D. C. Goldberg, Mr. Bernard F. Hillenbrand, Mr. Harold E. Horn, Mr. Burnham Kelly, Mr. Charles J. Mahaffey, Mr. Wayne Moore, Jr., Mr. Frederick Pavlicek, Jr., Mr. Robert C. Reichel, Mr. Henry B. Schechter, Mr. M. W. Smithman, and Mr. Leo Stern. The draft was submitted also for review and comment to a number of officials representing building trade associations and government officials having an interest in building code modernization, uniformity, and administration.

Information on State building regulation practices was developed from questionnaires circulated jointly by the Council of State Governments and the Commission. Replies and program descriptions were received from officials in forty-eight States.

The Commission appreciates the contribution of these persons to this report. Responsibility for content and accuracy rests, of course, with the Commission and its staff.

Wm. G. Colman
Executive Director

Norman Beckman
Assistant Director

THE COMMISSION AND ITS WORKING PROCEDURES

This statement of the procedures followed by the Advisory Commission on Intergovernmental Relations is intended to assist the reader's consideration of this report. The Commission was established by Public Law 380, passed by the first session of the 86th Congress, and approved by the President September 24, 1959. Section 2 of the Act sets forth the following declaration of purpose and specific responsibilities for the Commission:

Sec. 2. Because the complexity of modern life intensifies the need in a federal form of government for the fullest cooperation and coordination of activities between the levels of government, and because population growth and scientific developments portend an increasingly complex society in future years, it is essential that an appropriate agency be established to give continuing attention to intergovernmental problems.

It is intended that the Commission in the performance of its duties, will--

- (1) bring together representatives of the Federal, State, and local governments for the consideration of common problems;
- (2) provide a forum for discussing the administration and coordination of Federal grant and other programs requiring intergovernmental cooperation;
- (3) give critical attention to the conditions and controls involved in the administration of Federal grant programs;
- (4) make available technical assistance to the executive and legislative branches of the Federal Government in the review of proposed legislation to determine its overall effect on the federal system;
- (5) encourage discussion and study at an early stage of emerging public problems that are likely to require intergovernmental cooperation;
- (6) recommend, within the framework of the Constitution, the most desirable allocation of governmental functions, responsibilities, and revenues among the several levels of government; and

- (7) recommend methods of coordinating and simplifying tax laws and administrative practices to achieve a more orderly and less competitive fiscal relationship between the levels of government and to reduce the burden of compliance for taxpayers.

The Commission, made up of busy public officials and private persons occupying positions of major responsibility, must deal with diverse and specialized subjects. It is important, therefore, in evaluating reports and recommendations of the Commission to know the processes of consultation, criticism, and review to which particular reports are subjected.

The Commission selects specific, discrete intergovernmental problems for analysis and policy recommendation. In some cases, matters proposed for study are introduced by individual members of the Commission; in other cases, public officials, professional organizations, or scholars propose projects. In still others, possible subjects are suggested by the staff. Frequently, two or more subjects compete for a single "slot" on the Commission's work program. In such instances selection is by majority vote.

Once a subject is placed on the work program, a staff member is assigned to it. In limited instances the study is contracted for with an expert in the field or a research organization. The staff's job is to assemble and analyze the facts, identify the differing points of view involved, and develop a range of possible, frequently alternative, policy considerations and recommendations which the Commission might wish to consider. This is all developed and set forth in a preliminary draft report, containing (a) historical and factual background, (b) analysis of the issues, and (c) alternative solutions.

The preliminary draft is reviewed within the staff of the Commission and after revision is placed before an informal group of "critics" for searching review and criticism. In assembling these reviewers, care is taken to provide (a) expert knowledge and (b) a diversity of substantive and philosophical viewpoints. Additionally, representatives of the National League of Cities, The Council of State Governments, National Association of Counties, U. S. Conference of Mayors, U. S. Bureau of the Budget and any Federal agencies directly concerned with the subject matter participate, along with the other "critics" in reviewing the draft. It should be emphasized that participation by an individual or organization in the review process does not imply in any way endorsement of the draft report. Criticisms and suggestions are presented; some may be adopted, others rejected by the Commission staff.

The draft report is then revised by the staff in light of criticisms and comments received and transmitted to the members of the Commission at least two weeks in advance of the meeting at which it is to be considered.

In its formal consideration of the draft report, the Commission registers any general opinion it may have as to further staff work or other considerations which it believes warranted. However, most of the time available is devoted to a specific and detailed examination of conclusions and possible recommendations. Differences of opinion are aired, suggested revisions discussed, amendments considered and voted upon, and finally a recommendation adopted (or modified or diluted as the case may be) with individual dissents registered. The report is then revised in the light of Commission decisions and sent to the printer, with footnotes of dissent by individual members, if any, recorded as appropriate in the copy.

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Chapter I

THE SETTING OF THE PROBLEM

Thousands of local jurisdictions in the United States administer and enforce building regulations designed (1) to establish minimum safeguards in the construction of buildings, (2) to protect occupants from fire hazards or the collapse of a structure, and (3) to prohibit unhealthy or unsanitary conditions.

During the past decade, impressive gains have been made providing housing for our growing population and facilities for business and industry. The building industry has changed during this period through introduction of many important innovations covering areas ranging from finance to technology.

Much has been written about the impact of local building code restrictions upon building technology and economics. Most of it has been critical. It is alleged that incentives to advance new building materials and construction methods are thwarted because codes vary so widely from place to place and because many local jurisdictions are enforcing obsolete requirements. The mere existence of more than 5,000 different local codes presents a formidable barrier to the development of a broadly based building industry.¹ Under such circumstances, it is difficult for any building organization or manufacturer of building products to take advantage of the economics of mass production that have contributed so significantly to other sectors of our economy.

The purpose of this study is to identify and analyze intergovernmental problems of building code preparation and administration, including maintaining up-to-date code provisions and uniformity of requirements among code jurisdictions. In a broad sense, the basic problem is to determine the proper role of local, State, and Federal governments and the building industry and ways in which they can more effectively deal with problems of building regulation.

Traditionally, building code preparation, administration, and enforcement has been delegated to local government by the State as an exercise of State police powers. State governments, however, are also involved in administering their own building and mechanical codes and several Federal government agencies have established building standards for their construction and financing programs, such as the Federal Housing Administration, the Department of Defense, the General Services Administration, and the Farmers Home Administration. In many instances, the requirements established at all three levels of government differ, adding to duplication and overlapping authority.

The building industry itself has a major role in the development of testing procedures and standards that may be incorporated in government regulations and codes applying to materials and construction methods. A high degree of

cooperation, therefore, must exist between public authorities and private industry in the development of controls.

Questions illustrating some of the intergovernmental issues are: Should building codes remain the sole or primary responsibility of local governments at the possible expense of wider uniformity? Should code requirements go beyond those considered essential for public health and safety? Should the States assume a more active role in building code preparation, administration, and enforcement? What is the proper relationship between governments and industry in encouraging research in building? Should the Federal Government take action to remove barriers to the free movement in interstate commerce of building products and components? What is the role of the Federal Government in encouraging and assisting State and local building code activities? Is the general public interest adequately represented in the present process by which codes are developed? How can national building standards for use by all levels of government best be developed? Does the severity of the problem in metropolitan areas justify establishment of a single areawide code?

Background

Problems of uniformity and modernization of local building codes have been recognized for nearly half a century. Immediately after World War II, the post-War depression stimulated Congress to hold hearings on ways to invigorate the building industry. In 1920, the Senate Select Committee on Reconstruction and Production concluded that:

The building codes of the country have not been developed upon scientific data, but rather on compromises; they are not uniform in principle and in many instances involve an additional cost of construction without assuring most useful or more durable buildings.²

It is an insult to the ingenuity and enterprise of the American people to assume that structural...costs cannot be satisfactorily reduced. If there is anything in which the American people have confidence, it has been their own ingenuity and low-cost quantity production. Why is it, then, that the ingenuity which has reduced the costs of all mechanical appliances has not functioned during the past two years and has not manifested itself to such an extent in structural development as it formerly did in mechanical development?³

In 1922, Herbert Hoover, then Secretary of Commerce, reported to Congress that conflicting and antiquated building codes were increasing building costs in the United States between 10 and 20 percent.

In more recent years, building industry trade magazines have contended regularly that local building codes are obsolete or arbitrary. Probably the most celebrated--and most controversial--contemporary statement about code waste was reported by House and Home magazine on its two-day conference of nearly 70 home building experts. The conferees agreed that "Today's (1958) chaos and confusion of hundreds of conflicting local building codes is costing home buyers an average of at least \$1,000 a house." This figure has been widely quoted. Many vigorously support the findings of the conferees, contending that, taken as a

national average, the figure is a reasonably accurate portrayal of unnecessary requirements in poorly drafted building codes. Others, just as vigorously, have assailed the findings of the conference. While agreeing that excessive code requirements do raise the cost of construction, they claim the estimate is greatly overdrawn. They point out that local codes calling for more than the minimum standards usually have only a few of these higher requirements but that no code is completely composed of them. The costs of such excessive requirements, therefore, are limited to a few code provisions. The conferees, however, were quick to point out that the \$1,000 per house waste is a compound of unnecessary requirements and the higher, but harder to measure, cost of code diversity.

Obstacles to Production and Construction Progress. Code diversity is undoubtedly one of several factors contributing to lack of progress by the construction industry in exploiting mass production techniques such as prefabrication, use of components, mechanical cores, prefinished materials, and modular construction. Diversity blocks nationwide use of standard components, discourages efforts by architects and builders to introduce new ways to build better for less, and discourages materials' manufacturers from introducing innovations because of the time and difficulty it takes to get code clearance to market.

The impact and accomplishments of the mobile home industry--an often overlooked competitor of conventional housing--may indicate the feasibility of development of uniform standards by the residential construction industry and show the future of mass production techniques. Construction of mobile homes is, of course, not regulated by local governments, although local sanitary and land use regulations may be imposed by local officials. In 1964, production of mobile homes reached about 18 percent of private, one-family house starts. Yet, something close to 85 percent of the mobile homes are fixed in place as permanent dwellings. Owners mount them on foundations, skirt them with shrubbery, and locate them in planned trailer parks which qualify for insured mortgage loans from the Federal Housing Administration. Manufacturers actually sell a prefabricated, delivered-to-the-site house that has an added advantage in that it can be easily relocated. While the mobile home escapes local building restrictions, costly site construction, and craft organization of labor--all of which boost the cost of traditional housing--the mobile homes industry has established standards for electrical work, plumbing, and heating that have been accepted by the American Standards Association. Industry officials stated that a uniform performance-type construction code, also being prepared under ASA procedures, would be completed by the end of 1965.

The significance of future mobile home sales for conventional home construction is considerable. At the present time, mobile homes have already absorbed about one-third of the market for homes under \$10,000 and are expected to take one-half by 1970.⁴

The problems of builders operating in some metropolitan areas who want to operate in more than one locality provide a contrast to the national uniformity found in the mobile homes industry:

A contractor who wants to operate in every part of the Cleveland metropolitan area may have to contend with no less than 50 different building codes.

Builders operating in all parts of the Minneapolis metropolitan area must deal with 30 different codes.

Builders in metropolitan Chicago face at least 50 different codes.

Lack of uniformity in building codes has worked a hardship on the distribution of factory-made homes. Prefabricated home manufacturers must depend upon standardization to overcome costs that are higher for shipping finished or partly finished houses than for shipping raw materials. The problem is not that local codes necessarily prohibit prefabricated homes, but that differences in local codes prevent their general use.

For example, one home manufacturer comparing requirements on floor construction in 12 of his market areas found that he had to design for a floor load variation of 33 percent; a span variation from 11 feet 4 inches to 14 feet for two-by-eights, and from 14 feet 4 inches to 17 feet for two-by-tens; and a difference in width for plywood slab floors from three-eighths of an inch to five-eighths of an inch. If the manufacturer intends to produce a low-priced house, he has no alternative but to design his product to meet the requirements of the municipality with the maximum specifications. Home manufacturers also point to many other varying requirements that obstruct economies of production, such as window size, room size, plumbing, and so forth.

Factory-made single-family homes--a prefabricated building package consisting, at a minimum, of roof trusses, gable ends, exterior walls, interior partitions, and factory installed windows and doors--are now over a billion dollar a year industry. They account for more than 20 percent of the single-family housing starts. Industry officials feel that if changes could be achieved in the existing code situation, factory-made homes could increase to 55 or 60 percent by 1975.⁵ These figures do not include housing starts where other prefabrication construction techniques are used such as shell or pre-cut construction, prefabrication plants servicing a single large housing development, building operations that utilize prefabricated components ordered from several different manufacturers, and, of course, mobile homes.

Two other construction techniques--mechanical cores and modular construction--hold promise for reducing costs of housing. In recent years, about 25 percent of the cost of a house is represented by equipment that can be assembled in cores to hasten installation and reduce labor costs. For example, all the kitchen and bathroom fixtures, lighting, heating, and cooling units and central wiring may be prefabricated. One home manufacturer, however, points out that a "core house" can be used only in 1 out of 100 towns of over 3,000 population in his market area. Labor unions and some contractors have resisted more extensive use of cores. Modular construction advocates agree that much more research, experimentation, and compromise within the building industry must first be achieved before the cost advantages of this construction technique are passed along to the general public. If some general consensus can be reached on the performance concept of building, progress in modular construction would likely be substantially accelerated.

Individual architects have also been vocal in pointing out code waste in the cost of house building, but many contend the problem is far more serious and costly in commercial and industrial construction. One critic points out that the common practice under which local architects are retained by the out-of-town firm selected to design any large construction project has evolved because of the need for someone to be associated with the project who knows the building code. Under such arrangements, the client will encounter less delay and trouble

with local official red tape. General contractors who erect commercial and industrial buildings have little profit incentive to fight against code waste. Since the architect has already designed what they must put up, with or without waste, before they bid on a job, the winning bid takes actual specifications into account at the outset.

Home builders, on the other hand, are competing in the market place for customers who have a number of alternative demands on their incomes for other services. These may not only be other buildings, but also such items as education, vacations, and a host of the more expensive commodities.

Finally, the importance of reductions in the cost of a house to lower-income families cannot be overlooked. Any restrictions, especially those established in public regulatory measures, denying opportunities to the building industry to reduce production and construction costs should be examined critically. One keystone of U. S. social objectives is to provide safe, economical housing to the largest possible number of families.

Problems in Using New Materials. Difficult enough as they are, problems that confront a building materials producer who wants to introduce a new idea, material, or system, are exacerbated by the baffling array of provisions written into building codes by local jurisdictions.

In the first place, the merits of an idea are hard to gauge because the success of a new material often depends on a complex interaction with other parts of a building. It is difficult to determine the behavior of composite materials in the presence of heat, cold, moisture, ultra-violet, and many other natural causes of aging. For example, skin panels with faces of known, predictable properties, such as aluminum and asbestos, may behave completely differently if a plastic foam core is inserted between them.

Innovations in building techniques are also difficult to measure. When trusses were developed about 20 years ago, for example, they could not be sold purely as a substitute for roof rafters since they were (and are) more expensive to buy. Today, however, trusses are popular because builders have saved on labor, time, and cost at the construction site to more than offset their higher first-cost. Furthermore, trusses permit desirable flexibility in interior room layout because the need for interior walls to help support the roof is eliminated.

Probably an even more important retardant to the introduction of new ideas and new technology is that a decision to adopt or use a new material or system must be made thousands of times by thousands of individual architects and builders before the material is likely to be profitable to the manufacturer. Usually an innovation must prove itself a good performer over a fairly long span of time before it will be widely used. Finally, a new idea that catches on in one part of the Nation may fail to gain much of a market elsewhere, not only because of backward local building codes blocking access to markets, but also because of consumer preferences. Research and production costs, availability of raw materials, and distribution problems also contribute to inertia.

The building material manufacturer who wants to market his products on a national scale is also confronted by a bewildering multiplicity of requirements. Acceptance of a new material for use in FHA insured housing obtained in Washington must still be endorsed and supported locally. Approval by any one of

the national model code organizations must still be supplemented by specific approval from local building inspectors in hundreds of different localities. Even if the new material is familiar and readily understood by local authorities, the task of obtaining approvals requires much time and effort. If a product is unusual in design or application, the problem of approval is formidable.

There is, therefore, a temptation to stay with standard materials which are already accepted. Obstacles to obtaining required approvals or to gaining market acceptance reinforce the status quo for well-known materials and tend to limit changes to items which generally conform with existing practice. Test results can be more reliably predicted and thus approvals more readily granted. Changes, if any, are usually in small steps.

Problems of change in materials and building systems are often so troublesome and costly that only the richest producer dares innovate at all--and even the boldest will usually find that he must innovate moderately or risk financial disaster. Although local code agencies are aware of the problem and are trying to cope with it, they often lack personnel, facilities, and, in some instances, specialized technological competence to judge and pass upon new materials.

Building materials' suppliers are, for the most part, spending their available research funds on the actual development of materials and material systems and cannot be expected to carry the burden of developing basic test criteria. Some authorities argue that the product-by-product approach of existing test procedures in evaluating the performance of a new material is wholly inadequate. They contend that the problem is too big for any segment of the building industry and too big even for the building industry as a whole. Acceptance of innovations utilizing traditional materials such as lumber, gypsum, steel, and brick is much easier than it is with those using newer products such as plastics. Not only must manufacturers of some of the new materials overcome restrictive building code requirements, they must also devise better performance standards, better tests, and quality control production techniques to prove their durability over the passage of time.

Obstacles to Local Code Uniformity. Many building codes call for exaggerated standards of public safety reflecting a natural and understandable tendency of many local officials to favor the most conservative practices of a conventional system under which they have developed their experience. Exaggerated standards also result from the very real difficulty of defining public safety so as to assure production without penalizing innovation and advance. Some argue that technical requirements should vary according to locality because of climate, wind, and earthquake hazards. Buildings in the northern part of the United States must be designed for heavier snow loads than in the South. Buildings in southern Florida must be built to withstand hurricanes and those in California must be more quake resistant than those in Chicago. Such differences, however, can be resolved within a single code. The statewide building code of New York State makes allowances for the substantial differences in snow loads in various parts of the State. Local climatic variances have been recognized by the Federal Housing Administration for its minimum property standards by designating special regions or zones where differences are likely. Canada has developed a national building code which can be adopted by reference by any community and includes allowances for local and regional variations.

The autonomy of local government also tends to preclude building code

uniformity. Building regulation is traditionally considered a local police power function with the construction standards to be determined by the communities themselves.

It is about time the critics of the codes recalled a fundamental of government. Building regulations are a legislative problem subject to local legislative choice. City councils are free to choose a building code consistent with their ideas of local needs. If they wish, they are free to provide protection ranging from no code at all to one that is highly restrictive and which would provide complete protection. Most cities select a reasonable building code which will provide a reasonable degree of protection.⁶

The level or quality of services--water, sewer, public education--is customarily left for localities to decide for themselves, so long as they meet or exceed minimum State requirements. Why should they not establish their own levels for building construction?

...New elements of public policy must enter the picture when the question is one of encouraging the rational development of a top national industry supplying the most expensive product purchased by the average family. Clearly building regulation requires a broader view, but as clearly, this is hard to obtain. The average voter is no more aware of the potential benefits to him of a modernized building industry than the average builder is aware of the long-range effect on the community of the subdivision and construction decisions he makes on the basis of small points of convenience and profit.⁷

Code diversity continues also partly because of selfish and parochial interests. Drywall construction was not permitted in one major city until local plasterers withdrew their objections after conceding that insistence on wet plaster was reducing the amount of work for their trade as designers turned to other materials. In another city, plumbers opposed amendments to the building code that would permit use of plastic pipe. Scarcity of woodframe construction in brickmaking areas, or of masonry in lumber centers, may be a result of materials availability and prices. On the other hand, it also may be a form of favoritism entrenched within a local building code. Some municipalities have inserted such excessive demands in the requirements of their building codes that in effect they are discriminatory, limiting the purchase of new homes to persons of high income. Even Federal agencies are not immune from special interest groups pressuring for, or resisting, change. Recently, a segment of the lumber industry perfected machine stress grading of its product to improve its competitive position and conform to certain codes and standards for use of work as an engineered product. New standards were submitted to the Federal Housing Administration for inclusion in its minimum property standards, but immediately another segment of the lumber industry blocked approval by taking the fight to Congress. In spite of verification by independent and private laboratories asked by FHA and proponents of the standards, the proposed standards have not yet received FHA approval.⁸ Mortgage companies and savings and loan institutions also tend to restrict innovation as they cling to tried and conservative building methods, designs, and materials.

The four codes sponsored by national organizations--International Conference of Building Officials, Building Officials Conference of America, Southern Building Code Congress, and the American Insurance Association (formerly known as the National Board of Fire Underwriters)--are well drafted and flexible. All of them avoid as far as possible the use of specification standards and rely instead on performance criteria to make it easier for new materials and construction methods to qualify for use under their provisions.

In spite of the large number of communities adopting these model proprietary codes, an illusion rather than a reality of uniformity may exist. Local communities that adopt them often change the model provisions. Some changes, of course, are of an administrative nature and are necessary, but many concern technical matters that should not be altered.

Finally, the future administration of building codes will require an increasing emphasis on the professionalization of enforcement officials through good personnel management. As codes specify more and more performance provisions and the pace accelerates in the introduction of new materials and construction innovations, building officials will be hard-pressed to keep up with building technology. Building inspection should be recognized by local and State requirements as a technical administrative function that can be performed competently only by well trained specialists. Programs to assure high quality performance and control are just as essential in building inspection departments as they are in other well organized, professionally staffed administrative agencies of State and local government.

Organization of the Report

In this report the Commission examines the problems of building code modernization, uniformity, and administration. It seeks to identify and analyze intergovernmental problems of building code administration and suggests the possible role in which local, State, and Federal governments can more effectively deal with them. The use of the term "building code" refers to codes regulating the structural aspects of a building, and the construction aspects of plumbing, electrical, and similar mechanical codes. Finally, the impact of building codes on dwellings, rather than on commercial and industrial structures, receives major emphasis because of the broad, general interest in the availability of housing for all economic and social groups. The provisions of building codes can significantly affect such availability.

In Chapter I, the intergovernmental issues in building code modernization and uniformity have been examined and a background provided for the scope and complexity of the problem. The results of code diversity and the impact of codes on the building industry have been sketched.

In Chapter II, the purpose, content, and scope of building codes are examined, the practices of local jurisdictions in administering code requirements, and the machinery for appeal from decisions of the building inspector are described.

In Chapter III, State and Federal activities related to building codes are described. A number of State building codes, including mandatory statewide codes, mandatory codes applicable to buildings constructed with public funds, optional model codes for adoption by local jurisdictions and enabling legislation

for local adoption of building codes are examined in turn. Statewide mechanical codes are considered briefly. Finally, Federal involvement in programs of building code enactment and enforcement is discussed. Emphasis is given to programs concerned with research in building, standards in building products, various loan and grant programs affecting building code preparation, administration and enforcement, and loan guarantee programs.

In Chapter IV, the role and characteristics of industry in building innovation and the requirements for modern building codes are examined. First considered is the significance of the building industry in the country's economy and the unique problems characteristic of industry organization that tend to hinder rapid growth in technology and innovation. The complex system required for approval of new building materials and components is described. The need for research in building to develop performance criteria for building codes and the necessity for appropriate code provisions to take advantage of such research are discussed.

In Chapter V, the extent of local code diversity and efforts to achieve code uniformity are explored. Examples of attempts to achieve areawide uniformity are discussed. Programs in several metropolitan areas to obtain adoption of a single code are described. Finally, a detailed description of the history of endeavors to achieve national uniformity of the model codes sponsored by building officials' organizations and the efforts of governmental groups to encourage code uniformity are presented.

In Chapter VI major findings are summarized and a number of recommendations presented for action by Federal, State, and local governments designed to (a) promote building research necessary for development of modern building codes, (b) achieve reasonable uniformity in building code requirements and administration, and (c) establish steps to encourage professionalization in building inspection personnel.

Footnotes for Chapter I

1. Panel on Civilian Technology, Office of Science and Technology, Better Hous-
For the Future, (Washington, D. C., 1963), p. 10.
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Chapter II

LOCAL BUILDING CODE PRACTICES

Regulation of building construction in the United States by local governments dates back to early colonial times. For many years only the larger cities adopted and enforced building regulations, but today it has been estimated that as many as 12,000 individual communities in the United States are issuing building permits on the basis of authorizing construction within their corporate boundaries.¹ Many jurisdictions have adopted rules and regulations related to buildings, but most prescribe elementary regulatory measures that cannot be considered as comprehensive building regulations. Some may have adopted building codes, electrical codes, or plumbing codes. Others may have adopted only a fire prevention code. Only about half, or 5,000 may have building codes that are sets of legal requirements having to do with the physical structure of buildings.

The Purpose, Scope, and Content of Building Regulations

The object of building codes is to protect the public against faulty design or construction of buildings. The building code must insure that occupants, adjoining properties and neighbors, and passers-by are protected from the erection of structures that are likely to collapse or lead to unhealthy or unsanitary conditions. Building codes must also prohibit conditions conducive to both individual and collective fire hazards.

The police power of the State is today the source of all legal authority to enact building codes. Most States have chosen to delegate a portion of this police power to local governmental units. Laws enabling municipalities to enact building codes may be limited in any way by the legislature, or they may be extremely broad giving the municipality "blanket authority to promote by ordinance the public health, safety, and general welfare."² Any restrictions or conditions established by the State enabling act are controlling.

The form and content of building codes vary widely from municipality to municipality, from State to State. While generally the requirements deal with the physical structure of the building, they are not always limited to new buildings; frequently they apply to repairs and alterations of existing buildings. Components of construction that may be regulated by building codes include: structural and foundation loads and stresses, construction materials, fireproofing, building heights, ventilation, reference to plumbing installation, heating system construction and equipment, electrical installation, elevator and escalator construction, and safety devices. The substantive provisions of codes vary broadly from city to city. Wide variance also exists with reference to code

coverage, inspection procedures, enforcement, and procedures involving appeals from the decisions of the building inspector to an administrative board or to the courts.

Related Laws. Many other laws and regulations relate closely to building codes. Local jurisdictions impose regulations called mechanical codes affecting plumbing, electricity, elevators, and boilers; they adopt fire codes controlling the uses of inflammable materials and requiring fire prevention devices in certain types of structures. All or part of these regulations and codes may or may not be incorporated in building codes. States, as well as local jurisdictions, prepare, administer, and enforce such construction controls.

Other laws related to building codes are:

- (a) Set-back Ordinances--establishing requirements for minimum distances between buildings and property lines.
- (b) Housing Codes--primarily used to maintain minimum standards of living in existing structures, although such codes also cover new residential structures. They establish maintenance standards, number of people that may occupy a building, and minimum standards related to facilities and equipment (bathrooms, heating, hot running water, etc.) of a residence.
- (c) Multiple Dwelling Laws--similar to housing codes, except that they apply to apartment houses, boarding houses, and any other residential buildings occupied by more than one family.
- (d) Zoning Ordinances--regulate the use of land and buildings. Often the building department is responsible for enforcing the zoning ordinance in addition to the building code.
- (e) Health Codes--regulatory measures aimed at establishing health and sanitation standards for the community as to plumbing, sewage, drainage, light and ventilation of a building.
- (f) House Trailer Codes--special laws governing house trailers and mobile home subdivisions. Most communities, however, rely on other codes and ordinances to establish standards over trailer and mobile homes.
- (g) Business and Professional Codes--most States by statute require licensing of architects, construction contractors, electricians, engineers, plumbers, and other persons who do work in building construction. Sometimes the State code provides for revocation of the licenses for willful violation of the municipal building code. Often municipal building codes require that construction work must be done by a person licensed under the State law.

Reasonableness. Setting standards in building codes to insure the basic objectives of public health and safety is difficult and necessarily involves some compromise between what would be perfect and what is practicable. Consideration must also be given to such factors as the state of development of building and design techniques, and matters of administrative efficiency. Building requirements should also provide sufficient safeguards to insure that buildings

have a reasonably long life. On the other hand, restraint must be exercised lest standards result in building costs disproportionate to the advantage gained. No advantage ensues if the price of assuring absolute safety from fire in a single-family house is so high that the cost of the structure cannot be economically justified. Public interest is a qualifying consideration when setting mandatory building requirements. Persons should not be discouraged from using higher standards than those prescribed if they so wish.

Provisions Beyond the Scope of a Building Code. Several provisions commonly found in many building codes are generally considered beyond the proper scope and purpose of such controls. For example, a building code is not designed to protect an owner against a builder. Their relationship is a matter of contract. If the owner specifies a higher standard for his building than would be required to meet the law, he must take steps himself to insure that this standard is achieved by the builder. Again, concerns about the location of the structure relative to other buildings or other kinds of developments are usually a matter for local planning ordinances designed specifically to deal with land use and land development problems. For example, building codes may require rooms in a new structure to have a certain amount of window area to permit adequate lighting and ventilation, but only local zoning ordinances properly should establish lot area or setback requirements on a new building to protect light, air, and space for adjacent existing buildings. Thirdly, local building codes may impose some requirements that are primarily aesthetic. Such provisions that refer to elevation or design, or require different facing materials to be used, are basically controls over the appearance of buildings and their effect on the amenity of the neighborhood. Local codes containing provisions of this nature are often restrictive in that many tend to increase the cost of construction.

This is not to question the need for some control over the appearance of buildings--indeed, much of today's residential construction seems to be more technically sound than aesthetically satisfactory. Good aesthetic standards should be encouraged but preservation of amenity is not a suitable function for building code regulations. The appeals machinery provided in local architectural ordinances is well adapted to the application of subjective standards. To permit codes to work equitably and satisfactorily, requirements should consist only of such structural and mechanical standards as may be demanded in the interest of public health and safety. The building code should not prescribe for buildings in general any mandatory standards that exceed those which could not be justified under the State police power.

Administration of Building Departments

A comprehensive and highly useful survey of municipal building inspection practices was undertaken in 1963 by the International City Managers' Association. Questionnaires were mailed to 1,762 cities and towns over 10,000 population, and information from 1,013 municipalities responding was summarized in the 1964 edition of the Municipal Yearbook and in a special report published by the Association.³

Traditionally, local building departments have been concerned with new construction. Their functions have included (1) issuance of building permits, (2) plan inspection and approval, (3) zoning code enforcement, and (4) inspection of the work. A department may or may not have responsibility for enforcement of plumbing, heating, electrical, and housing codes. There is, how-

ever, a trend to bring these other code inspection requirements within the administrative structure of a single building department. The ICMA survey revealed that more than 40 percent of all cities over 100,000 population answering the questionnaire indicated that six types of regulation (building, plumbing, heating, electrical, and housing codes, and zoning ordinances) are administered under one department. Almost 40 percent of the cities between 50,000 and 100,000 population combined code inspection services and, among the smaller cities, from 10,000 to 50,000 population, only 34 percent indicated that all six types of regulation are administered by a single department.

In large cities, inspectional services are often centralized within one department. In Detroit, for example, the department of building and safety engineering is composed of bureaus of safety engineering, building, electrical inspection, plumbing, and smoke abatement, plus sections for administrative services, code enforcement, structural engineering, licenses and permits, and a laboratory service. In Philadelphia, the department of licenses and inspections consists of four divisions--field operations, housing, building, and administrative services and license issuance. The building division is further divided into a mechanical services section, a zoning section, and a construction section.

Often, in smaller cities, such as Santa Rosa, California, the building official serves also as zoning coordinator. The Santa Rosa building department is divided into a building section, a plumbing section, and an electrical section.

Administrative consolidation of all code inspection activities under a single department should improve coordination of required municipal inspections. Among the advantages are improved public convenience since the citizen contacts only one department and deals with fewer inspectors on the job. Furthermore, much duplication of clerical work is eliminated, and a more economical field inspection is possible since one inspector may visit a construction project and do the same work which theretofore might have required several different municipal departments.

The number of inspectors working in building inspection departments and the various inspection fields varies, of course, according to the size of the city and the kind of building going on. The ICMA survey revealed that the median number of inspectors for cities over 100,000 population is 29; for cities of 50,000 to 100,000, 8; and for cities of 10,000 to 50,000, 3. The survey further breaks down local practices into four regions of the United States and indicates that the number of inspectors within each region is fairly constant, except that in cities over 100,000 population in the Northeast the figure drops to 21 inspectors.

A recent Housing and Home Finance Agency demonstration grant study indicates that a full-time building inspector will likely be needed on new construction when the rate of residential construction reaches approximately 100 single-family dwelling units per year.⁴ Residential construction may be used as an index for all classifications as it usually represents about 60 to 70 percent of the total value of new construction in a small community. If the inspector is also charged with responsibility for enforcing the housing code and the zoning and subdivision regulations, the study suggests a full-time person will be needed when new construction starts reach about 65 single-family dwelling units per year.

Combining duties so that one person inspects two or more inspectional fields is gaining favor in local building departments. Some municipalities simply combine two or more inspection duties, such as building and plumbing inspection, or have a more inclusive arrangement where one inspector inspects in almost all fields. In the ICMA survey, 827 localities reported their inspectors responsible for all types of construction, with only 36 cities limiting them to residential housing. In the larger cities over 100,000 population, slightly more than 50 percent combined inspectional duties. In those cities, from 50,000 to 100,000 population, 87 percent combined such duties while in the smaller cities of 10,000 to 50,000 population, 84 percent combined two or more inspection duties.

Regardless of the size of the city, public administration authorities have encouraged consolidation of inspection functions to avoid, as much as possible, internal overlapping and duplication. Local authorities have been urged to:

(a) Divide the inspection function within the department into as few specializations as possible. In most cities, it will be necessary to recognize at least three inspection categories: (1) general building inspections, including carpentry, masonry, plastering, etc.; (2) electrical inspections; and (3) plumbing inspections.

(b) Establish as part of the general building inspection division a residential and small buildings unit. This unit will bring together the largest volume of plumbing, electrical, and general building inspections, but the inspections involved are the most routine from the standpoint of technical difficulties.

(c) Train and assign individual inspectors to perform all the required inspections in the residential and small buildings unit. The greatest controversy on any consolidation of building inspections will occur here. Opinions of craft unions and tradition in the field will tend to oppose this arrangement, especially in larger cities. The fundamental which should not be overlooked is that this inspector is not intended to be competent in all phases of these various craft fields. He is to be competent in only the small phase of each field where the work involved is of a repetitive and not unusual nature. He should be an inspector and not a mechanic. The chief difficulty is in obtaining qualified men and training them.

(d) Assign the inspectors in the various divisions to work in districts or areas to the extent possible. In making this assignment and the decision as to number of districts needed, consideration should be given to the tempo of construction activities, number of average inspections required in the districts, type of transportation needed, and average number of daily inspections possible.

(e) Establish adequate supervision in each inspection division to assure proper staff control and to provide prompt

assistance on difficult problems encountered. In a relatively small division, such as the plumbing inspection division, one supervisory position should be sufficient to the comparatively small number of inspectors assigned. Special technical problems encountered in the residential and small buildings inspections unit should be referred to the specialized inspection division technically concerned, such as the division of electrical inspections.⁵

The number of cities reporting in the ICMA survey, employing full-time engineers or architects for plan examination, is distressingly small. Of the 1,013 cities reporting, only 215 employ full-time engineers for plan examination; 28 others employ full-time architects. Of the cities over 100,000 population, 59 employ full-time engineers.

The survey indicates that higher salaries in all inspection fields were paid by cities over 100,000 population. Generally higher median salaries prevail in the West in all population groups, and lower in the South. The Northeast and the North Central regions run fairly close to the national figure reported. Among chief inspectors, the highest median salary is paid to chief building inspectors. The median for other chief inspectors is fairly constant--about \$500 less than the chief building inspector.

The most popular basis for establishing permit fees is through estimates of the cost of construction. The survey revealed that 490 cities used this method. A flat fee appears to be the least popular basis with only 38 cities in the 10,000 to 50,000 population bracket establishing fees by this method. The second most popular method, reported by 176 cities, used the square foot of floor area as the fee base. Sixty-six cities base fees on the cubic feet of building volume and 198 cities on a combination of the methods cited above. Only 12 cities reported that no fee was charged for permits.

The survey reported that 223 cities received more than 100 percent of the building departments' operating budgets from permit fees. An additional 121 cities reported that 100 percent of the operating budget is derived from these fees. More than half of the operating budget is derived from permit fees in 69 percent of the cities reporting (699). However, more than two-thirds of those cities reporting stated that they subsidize the activities of the building department from some other source of revenue.

In cities where inspections are performed by different departments or bureaus to enforce the several codes (housing, fire, zoning, building, etc.), coordination is a problem. Many cities must structure a system of coordination among the fire department, the health department, the housing department, and the building department where these departments administer parts or all of the fire, building, and housing codes. Some cities establish a special division or committee whose primary responsibility is to coordinate plan review, inspection, and permit issuance activities. In Rochester, New York, such coordination is accomplished through a compliance division, and in Portsmouth, Virginia, a coordinating committee composed of various department heads meets periodically.

The ICMA survey revealed that in cities of 50,000 to 100,000 population, inspection coordination is generally handled on an informal basis. The most common method amounts to a cross-referral system between departments--sometimes oral, sometimes written. As in the larger jurisdictions, cities in this

population group appear to be moving toward a more formal arrangement where the building department serves as a clearinghouse. For example, in Livonia, Michigan, all reports and requests are cleared through the building division of the bureau of inspection for enforcement. Other cities in this population group have adopted a plan-checking system where all plans are checked by each department or division involved before the permit is issued. Joint or task-force inspections are also used by many of these cities to effect a degree of coordination.

Administrative Appeals from Actions of Building Officials

Most local building codes provide some type of machinery for appeal from decisions of the building official--most commonly, a board composed of experts in the field of construction appointed by the municipality's chief executive or legislative body. For example, the Basic Building Code promulgated by the Building Officials Conference of America, specifies the qualifications of members of the board of appeals as follows:

. . .each member shall be a licensed professional engineer or architect, or a builder or superintendent of building construction; each of at least ten (10) years' experience, for five (5) years of which he shall have been in responsible charge of work; and at no time shall there be more than two (2) members of the board selected from the same profession or business; and at least one (1) of the professional engineers shall be a licensed structural or civil engineer of architectural engineering experience.⁶

Terms of board members usually overlap.

Well drafted codes specify procedures to be followed by the board in reviewing cases or inquiries and provide for court review from a decision of the building official or from the decision of the appeals board.⁷ The local board of appeals may also be delegated authority to review proposed changes to the code and make recommendations to the legislative body for their disposition.⁸ The board may also be granted authority to approve rules and regulations that might be issued by the building official.

A few cities have established an arbitration system to pass judgment upon actions of the building official. It consists of a temporary group of three people--one chosen by the building official, another by the aggrieved party, and the third by the first two. This procedure is used exclusively by the Baltimore Building Department.⁹

Appeals generally may be classified into three categories:

(1) That the building official has incorrectly interpreted the provisions of the code;

(2) That the building official was in error in not holding that an equally good or better form of construction could be used; and

(3) That there are practical difficulties involved in carrying out structural or mechanical requirements of the code and the building

official should vary or modify such requirements, assuming that the spirit and intent of the law are observed and public welfare and safety are assured.

As building codes are being drafted more in terms of technical performance standards, it may be expected that the technical findings of the appeals board will be as important as its findings concerning matters of law. To provide complete and adequate legal remedies, the State enabling legislation, or perhaps the building code itself, should allow for interested persons other than the owner or contractor of a particular building to challenge the code in the courts. In the administration of the code, action by the building official or the appeals board may arbitrarily discriminate against certain materials or methods of construction. Manufacturers and architects should not be precluded from recourse to judicial review as they, of course, have a vital interest in codes.

The administrative appeals procedure of municipalities adopting the New York State Building Construction Code is noteworthy in that the owner, builder, architect, or producer may appeal from the decisions of the local inspector directly to the State Building Construction Board of Review. While the local building official is the judge of whether a given material or technique satisfies State Building Construction Codes, any aggrieved person may appeal to the State Board of Review. In order to assure a reasonable degree of uniformity of interpretation of the State code provisions, appeal is directly to the Board with no provision for local review. The State Review Board's decision is final unless either party--the aggrieved person or the municipality--takes the case to court.

County Building Code Administration

Typically, county adoption, administration, and enforcement of building regulations applies the same general types of regulations already described for municipalities to unincorporated areas. Much of the general discussion regarding municipal building codes and their administration applies to county programs. However, the extent to which counties are authorized to exercise this function, the extent to which they have actually adopted codes, and their geographical jurisdiction over code enforcement vary considerably among the 50 States. For example, in California only four rural counties have not established building code regulations and an enforcement program. In several States, such as Texas and New York, counties do not have building code jurisdiction. In most States, counties can adopt building regulations and establish a building code enforcement program. However, this is usually done only in urban and metropolitan areas.

Where programs are established, counties frequently undertake significant programs, including the provision of cooperative and contract services for smaller local governments. This is particularly true in metropolitan areas where counties provide a number of municipal-type services. In fact, urban counties can become a very significant element in building code enforcement, either by participating in voluntary cooperative areawide efforts, by entering into inter-local agreements for providing inspection and enforcement services, or through the direct assumption of urban powers under various reorganization approaches creating "urban" counties.

There is no recent survey of county building code activity in the United States similar to the International City Managers' Association survey of municipal

practices. In order to provide illustrative examples of county activity, county officials in several counties in different States were asked to describe their building regulation program and indicate the extent to which it was similar to those of other counties within the State.

In King County, Washington (Seattle), the county code (based on the Uniform Building Code) applies only in the unincorporated area. Most municipalities in the county have adopted some version of the same code. In addition to the building construction code, there is a county plumbing code and a county fire code. The county building construction code is administered by the Building Department, a division of the County Road Engineers Office, which handles zoning and building codes. The staff consists of a supervisor, an assistant supervisor, who is also the zoning code enforcement officer, three plan examiners, and six building inspectors, two of whom concentrate on commercial buildings, churches, schools, and other similar structures, and the others on residential buildings. The staff participates in the week-long workshops of the International Conference of Building Officials to provide in-service training opportunities. The plumbing code is administered by the County Health Department and the fire code by the County Fire Marshal working with local fire chiefs and fire districts. Recently, a Building Code Advisory Committee composed of representatives from industry has been appointed to study and make recommendations regarding building inspection. So far, it has been primarily concerned with considering amendments to the 1964 edition of the Uniform Building Code prior to their adoption by the county. Since King County is one of the largest and oldest counties in the State, its program, while similar to others in the State, is no doubt more advanced. Some smaller rural counties have no county codes. In the unincorporated areas of those counties, only the State mechanical codes would be applicable.

In Prince Georges County, Maryland, the county building code (based on the Basic Building Code) applies to both incorporated and unincorporated areas, with the town of Laurel the only exception. The code is administered by the Department of Inspections and Permits with a code enforcement staff consisting of a contract administrator, a chief building inspector, two deputy chief inspectors, a plan examiner, nineteen building inspectors, a building inspector technician, and three engineers. An in-service training program provides an opportunity for instruction in the use of the code and in the legal basis of building regulations, safety requirements, design and material requirements, plan examination, and field inspection procedures. The County Plumbing Code is administered by the County Health Department outside the jurisdiction of the (neighboring) Washington (D. C.) Suburban Sanitary Commission, which is responsible for inspection within its area.

In Fairfax County, Virginia, the code is based on the Basic Building Code and administered through the Office of Director of Inspections Division of the Department of Public Works. The staff for general building code inspection consists of the director of inspections, a chief building inspector, three structural engineers, five senior building inspectors, a supervisory field inspector, and nine field inspectors. Code provisions apply to unincorporated areas and are also applicable to the towns of Clifton and Herndon through an agreement with the county to issue permits and make related inspections. In-service programs are provided. In addition to the building inspectors, an electrical inspector, plumbing inspector, and mechanical inspector, are under the jurisdiction of the County Director of Inspections. This general pattern of organization and enforcement is similar to that in other counties in the State, although, of course, Fairfax County, largest in Virginia, has a more highly developed program than

most counties.

The Multnomah County, Oregon, building code applies only in the unincorporated area. The County has adopted the 1964 edition of the Uniform Building Code. The Code is administered by the Building Department, a division of the Planning Department, and enforced by ten field inspectors, five plan examiners, and a supervisor directly responsible to the planning director. Although none of the staff are registered engineers or architects, the Department contracts on a part-time basis with a local engineer for detailed plan checking. Two or three members of the staff attend the annual training program for inspectors sponsored by the International Conference of Building Officials. The County plumbing code is administered by a division of the County Health Department which is also responsible for sanitation inspection. The State electrical and fire regulations are administered and enforced within the County by State inspectors. Building department organization of two other counties in the Portland metropolitan area is similar to Multnomah County. Other counties throughout the State usually establish separate building departments or locate the building inspection function within the office of the county engineer.

Code enforcement programs of Dade County, Florida, and the Metropolitan Government of Nashville and Davidson County, Tennessee, provide interesting examples from reorganized urban counties. The Metropolitan Nashville and Davidson County Code is based on the Southern Standard Building Code. It is administered by the Department of Codes Administration and applies throughout the Nashville and Davidson County area, except for six small incorporated areas. The Department of Enforcement staff consists of a director, a plan examiner, two administrative positions, and nine building inspectors. The Metropolitan Nashville and Davidson County plumbing and electrical codes, also administered through the Codes Administration Department, apply to the total area, including the six incorporated areas. In Dade County (referred to in Chapter V under the discussion on areawide efforts toward code uniformity) the County Building and Zoning Department enforces the South Florida Building Code and issues permits in unincorporated areas. Enforcement of the code is the responsibility of municipalities in incorporated areas. A single countywide appeal board hears appeals from both incorporated and unincorporated places.

Counties frequently provide building inspection service for municipalities too small to maintain their own departments--Fairfax County, mentioned above, is illustrative. This is a common practice in California where virtually all of the municipalities of Los Angeles County have adopted the Uniform Building Code, but approximately one-fifth rely on the county for inspection services. On a smaller scale, 12 townships, mostly rural, and one incorporated village in Washtenaw County, Michigan, have devolved their building regulation authority to the County. The staff of the County Building Inspector's office approves building plans and makes all field inspections in these localities. Formal appeals against their rulings are heard by a county-level Board of Appeals.

Footnotes for Chapter II

1. U. S. Bureau of the Census, Construction Reports - Building Permits, Housing Authorized in Individual Permit-Issuing Places 1964, (Washington, D. C.: Government Printing Office, 1964).
2. For an excellent general guide to the law of building codes, see Charles S. Rhyne, Survey of the Law of Building Codes, published cooperatively by the American Institute of Architects and the National Association of Home Builders, (Washington, D. C.: 1960).
3. This discussion is drawn from material in International City Managers' Association, Municipal Building Inspection Practices, Management Information Report No. 241, (Chicago: February 1964).
4. See New York State Division of Housing, Bureau of Urban Renewal and Community Services, Housing Codes, the Key to Housing Conservation, Vol. III, Administration Guide, (New York), and Urban Renewal Administration, Code Administration for Small Communities, Technical Guide 19, (Washington, D. C.: Government Printing Office, 1965), pp. 8-9.
5. Management Information Service Report No. 95, The Administration of Regulatory Inspectional Activities, International City Managers' Association, (Chicago: December 1951), pp. 596-597.
6. Building Officials Conference of America, Inc., BOCA Basic Building Code, 3rd Edition, (Chicago: 1960), Section 128.22, p. 17.
7. For a full discussion of the procedures and remedies which an individual has in challenging decisions of the building official, the appeals, board, or the validity of a building ordinance, see Rhyne, op. cit., pp. 19-24.
8. Management Information Service Report No. 208, Revision and Administration of the Building Code, International City Managers' Association, (Chicago: May 1961), p. 6.
9. Rhyne, op. cit., p. 20.

Chapter III

STATE AND FEDERAL ACTIVITIES RELATED TO BUILDING CODE ADMINISTRATION

Traditionally, building code enactment, administration, and enforcement in the United States has been a local government exercise of the police power. However, a number of State and Federal programs and activities have had a direct bearing on building codes and the regulation of building construction, ranging from statewide minimum requirement building codes in a few States through Federal standards development programs. State governments and the Federal Government, of course, are directly concerned with building construction standards for government buildings and, in some instances, State governments require similar standards for both State and local government buildings constructed throughout the State.

STATE PROGRAMS

The primary direct State involvement in regulatory programs governing construction (other than government buildings) is in the area of the mechanical codes or regulations, and regulations dealing with special hazards or with buildings used for special purposes, rather than general building construction codes. Mechanical codes deal with equipment built into or installed in buildings. For example, approximately four-fifths of the States have either one or more of the following: statewide plumbing, electrical, boiler, and elevator codes or regulations.¹ In addition, some States have more specialized mechanical codes such as those dealing with pressure piping, escalators, heating, and ventilation. Some of the mechanical codes are part of a broader program including inspection of operation and maintenance of equipment, and occupational licensing. Another type of statewide code in general use applies to special categories of hazards or to buildings used for particular purposes. For example, virtually half of the States have a statewide fire code or regulations. Many have codes, regulations, or orders applicable to industrial safety, hospitals, nursing homes, schools, restaurants, and hotels. These more specialized codes frequently incorporate operating and maintenance requirements along with construction standards and may provide for periodic inspection and licensing of operators or owners. A few States, including New Mexico, Michigan, Delaware, Arizona, Louisiana, and California, have established building contractor licensing programs. In connection with these programs, construction standards to be observed by contractors have been developed, thereby introducing an element of statewide regulation of building practices.

A small proportion of the States have enacted or provided for the promulgation of general statewide building construction codes, although in no case is there a general, inclusive statewide building code that is mandatory throughout

the State for all construction. There are three major forms of comprehensive statewide building construction codes each of which is in use in five or six States: (a) mandatory codes (but in every case with exclusions in coverage); (b) codes applicable only to buildings constructed with public funds; (c) model codes available on an optional basis for adoption by municipalities.

The relationship of the mechanical, special hazard, and special use regulations and codes to the general building construction codes is varied and can become quite complicated with considerable overlapping of jurisdiction and responsibilities. Furthermore, responsibility for promulgating and administering building regulations of all types is distributed in varying patterns among State and local governments.

In those States which have adopted either model or mandatory general State codes, mechanical and other special regulations or codes may be incorporated into the overall building construction code or may be separate. Usually plumbing and electrical codes and the construction provisions of other mechanical codes are included either directly or by reference, but the practice regarding special building construction regulations varies widely. Construction requirements associated with special uses or hazard may be provided for in general building construction codes by a system of classification of buildings according to special uses and capacities and the extent of hazards. These classifications are used to indicate the applicability of special provisions for particular uses or hazards.

Typically, the statewide mechanical and special codes or regulations, as well as general State construction codes, are minimums below which local standards cannot fall but above which they are free to go. Usually the regulations are locally enforced as part of the overall local building regulation program where there is one. The State, of course, retains ultimate authority for enforcement and may exercise it directly either where there is no local program, where the local program is inadequate, or, in some cases, where State enforcement is undertaken because of the nature of the matter being regulated. The actual decision regarding enforcement may be incorporated in statutes or may depend upon specific situations and conditions, varying with the particular regulations and jurisdictions involved. In some State statutes, localities are required to enforce State requirements; in others, the extent to which local enforcement will be used is within the discretion of the State agency and may reflect staff and budget limitations as well as policy preferences and program necessities.

Administration of mechanical and special hazard or use regulations and codes by the States is usually dispersed among a number of State agencies, although in a few instances responsibility is centered in one agency. For example, in a few States the agency administering a general building construction code is also responsible for several special codes, and in a few other States a single agency is responsible for most of the mechanical codes. These relationships are summarized in Table 1 which shows agency responsibility for the administration of State building, mechanical, and fire codes.

The relationship of mechanical codes and special hazard or use regulations to other broad general State programs such as industrial safety, sanitation, hospital care, public health, education or welfare, may determine the assignment of responsibility for administration and enforcement, reflecting the objective of providing functionally coordinated administration for a whole regulatory program. Another factor contributing to dispersal of responsibility arises

TABLE 1--STATE BUILDING CONSTRUCTION, MECHANICAL, AND FIRE CODES
Showing Agency Responsibility for Administration of Codes

State	Building Construction State Buildings		Mechanical				Fire
	General	Only	Plumbing	Electrical	Boiler	Elevator	
Alabama	--	X	--	--	--	--	--
Alaska	--	1	--	2	2	--	--
Arizona	--	--	--	--	--	--	--
Arkansas	--	--	4	--	--	--	--
California	3, M	--	3	3	--	--	8
Colorado	--	--	4	--	--	--	--
Connecticut	1, O	--	--	--	--	2	8
Delaware	--	--	4	8	9	--	--
Florida	--	--	4	3	--	--	--
Georgia	--	--	--	--	--	--	--
Hawaii	--	--	4	--	2	2	X
Idaho	--	1	5	7	X	--	--
Illinois	--	--	--	--	10	--	--
Indiana	X, M	--	X	X	9	2	8
Iowa	--	--	4	--	2	--	8
Kansas	--	--	--	--	2	--	8
Kentucky	--	--	4	--	10	--	10
Louisiana	--	--	5	--	2	--	8
Maine	--	--	4	6	2	2	--
Maryland	--	1	4	--	2	2	8
Massachusetts	--	--	5	10	10	10	10
Michigan	--	--	5	7	2	2	8
Minnesota	X, O	X	--	7	--	--	--
Mississippi	-- no reply	--	--	--	--	--	--
Missouri	--	--	--	--	--	--	--
Montana	--	--	5	--	--	--	--
Nebraska	--	--	--	8	2	2	--
Nevada	--	X	4	3	--	3	8
New Hampshire	--	1	--	--	--	--	--
New Jersey	X, O	--	--	--	2	--	--
New Mexico	--	--	5	7	--	--	8
New York	X, O	--	--	--	2	2	2
North Carolina	6, M	--	6	6	2	2	--
North Dakota	--	--	5	7	9	--	6
Ohio	3, M	--	4	3	3	3	--
Oklahoma	--	--	4	--	2	--	8
Oregon	--	--	4	2	2	2	8
Pennsylvania	--	--	--	2	2	2	2
Rhode Island	--	--	--	--	--	--	--
South Carolina	--	--	--	--	--	--	--
South Dakota	-- no reply	--	--	--	--	--	--
Tennessee	--	--	--	6	2	2	6
Texas	--	--	--	--	2	--	--
Utah	--	--	4	--	--	--	--
Vermont	--	--	4	--	--	--	10
Virginia	--	--	--	--	--	--	8
Washington	--	--	--	2	2	2	--
West Virginia	--	--	--	2	2	--	--
Wisconsin	3, M	--	4	3	3	3	--
Wyoming	--	--	--	8	--	--	8

CODE: M - Mandatory minimum State code

O - Optional model State code

X - Alabama, State Building Commission

Hawaii, Department of Regulatory Agencies

Idaho, Industrial Accident Board

Indiana, Administrative Building Council

Minnesota, Department of Administration

Nevada, State Planning Board

New Jersey, Dept. of Conservation and Economic Development

New York, Building Codes Bureau

State Agency Responsibility:

1 - Public Works (or Public Improvements)

2 - Labor (or Labor and Industry)

3 - Industrial Relations

4 - Health (or Health and Welfare)

5 - Plumbing Board

6 - Insurance (or Insurance and Banking)

7 - Electrical Board (of Examiners)

8 - Fire Marshal, (or Fire Prevention)

9 - Board of Boiler Rules

10 - Public Safety

-- - No statewide code

SOURCE: Questionnaire Survey, 1965

because plumbing, wiring, heating, ventilation, and to a lesser extent, elevators, boilers, etc., are specific and identifiable building construction problems calling for action. Special modern national codes or construction and installation regulations were developed, along with maintenance requirements and related inspection, and a licensing program for the trades involved. When States acted they often established a separate agency to administer all phases of a program.

State Building Codes

Mandatory Statewide Minimum Building Codes. Five States--California, Indiana, North Carolina, Ohio, and Wisconsin--have adopted legislation providing for the promulgation of mandatory statewide building codes applicable to all construction in the State with certain exceptions.² In Indiana, North Carolina, Ohio, and Wisconsin, the codes do not apply to one- and two-family dwellings (in Ohio, three-family dwellings are also excluded) or to rural or farm buildings. In California, the general statewide building construction code applies to dwelling places (hotels, motels, apartments, and houses) but not to public buildings or places of employment (State safety and other regulations cover the latter categories of buildings).

Statewide codes have as their general purpose the preservation of public health and safety--as do those enacted under enabling legislation by municipalities. They define the types of construction and mechanical equipment subject to regulation, include provision for administration and enforcement, and lay down general guidelines but leave details of developing the specific building code to administrative rules or regulations. The mandatory State codes are minimum regulations applicable to all construction (with the exceptions noted) throughout the State as a minimum standard and, except in North Carolina, do not supersede local codes that are equal or stricter in their requirements and do not conflict with the State code. In North Carolina, local governments can adopt local building regulations upon approval by the State Building Code Council. The Council has adopted the policy of approving only minor local revisions to particular provisions of the statewide code--not complete local codes.

The extent to which general statewide building construction codes incorporate provisions governing mechanical equipment and other special areas of regulation varies considerably. In Ohio and Wisconsin, the general building code includes provisions regulating most standard mechanical equipment and is administered by a single State agency, although the plumbing code is administered by the Board of Health. In California, the State Building Standards Commission is charged with codifying the separate administrative rules and regulations governing building construction promulgated by all State agencies having any authority in this area. The codification appears as the State Building Standards Code, which is Title 24 of the State Administrative Code. Responsibility for administering elements of the code is assigned to several agencies, however. The Division of Housing is responsible for the general building construction code applicable to dwellings, the Department of Health for hospitals, the Fire Marshal for fire regulations, and the Division of Industrial Safety for industrial safety. In Indiana and North Carolina, while plumbing, electrical, and heating regulations are included in the administrative responsibility of the agency administering the general building construction code, several mechanical codes are assigned to separate agencies. In Indiana, for example, boiler regulation is the responsibility of a separate board and elevators are regulated by the Labor Commission. In North Carolina, regulation of boilers and elevators come under the

jurisdiction of the Department of Labor and liquified petroleum gas regulation under the Department of Agriculture.

Enforcement responsibility for statewide codes is shared by the State agency and local governments. The precise division of responsibility varies from State to State. The Indiana Administrative Building Council enforces the Indiana State Building Code throughout the State, but in all municipalities that have building departments, actual on-site enforcement is done by local inspectors. In North Carolina, the code is generally enforced by local inspectors with the assistance of the State agency, the Department of Insurance. In Ohio, where there are local building departments which have been certified by the Board of Building Standards, enforcement is the responsibility of local authorities. In all other areas an appropriate inspection division of the State Department of Industrial Relations carries out the enforcement. Similarly, in California, local governments with a building department or other appropriate agency are required to enforce the State code. If there is no local agency or if the code is not adequately enforced locally, the State is the enforcement agency. At present, the Division of Housing is responsible for direct enforcement in only four sparsely populated counties where there is no local program. In Wisconsin, only the larger cities employ building inspectors, so the primary responsibility for enforcement lies with State inspectors.

A State board or commission acts as an appeal agency in several States. In Ohio, for example, the State Board of Building Standards hears appeals from actions of municipal authorities in enforcing provisions of the State building code. In Indiana, the Administrative and Advisory Committees serve as an appeal board for considering variances and recommended code changes. In California, the State Housing Appeals Board hears appeals from applications of the State code. The North Carolina Building Code Council hears appeals from decisions of enforcement officers and can overrule them. The Council, on appeal, can authorize the use of materials and construction methods other than those required by the code if they are found to be equal. The Code is then amended to conform to the Council's findings.

Mandatory Building Codes Applicable to Buildings Constructed with Public Funds. In at least six States a general building code has been adopted, mandatory only for State-owned or State-financed projects. In Maryland, the Department of Public Improvements, the State agency supervising public construction, has adopted a building code applicable to construction under its jurisdiction. Similarly, in Nevada, the State Planning Board with public construction supervisory responsibilities, has adopted building codes for public construction. New legislation in Minnesota assigns the Department of Administration responsibility to develop a State building code applicable to State-owned buildings, and provides that the code be available to localities for adoption by reference. In New Hampshire, the Department of Public Works and Highways has endorsed the National Building Code promulgated by the American Insurance Association for use as the standard for public buildings, and in Idaho the Department of Public Works has similarly endorsed the Uniform Building Code of the International Conference of Building Officials.

Optional Statewide Model Building Codes. In Connecticut, New Jersey, and New York, State agencies have been assigned responsibility for developing model building construction codes for optional adoption by local governments. The Minnesota State building code for public buildings will be available to local governments for adoption by reference. In North Carolina and Wisconsin, State

agencies responsible for the mandatory minimum statewide building code have developed optional model building codes for one- and two-family dwellings, not subject to regulation under provisions of the mandatory code. Although an optional model State building code for use by municipalities was developed in South Carolina, it has not been kept up-to-date and is no longer used.

The Public Works Department of Connecticut promulgated a model statewide building construction code based on the Basic Building Code of the Building Officials Conference of America, Inc. It was reported in 1960 that 42 percent of the municipalities had a building code and that 66 percent of them had adopted the model Connecticut Basic Building Code.³

The New Jersey code, also based on the BOCA Basic Building Code, consists of six parts: general provisions and definitions; structural, fire, and general safety requirements; elevators, escalators, and conveyor equipment; air conditioning, mechanical ventilation and refrigeration; plumbing; and electrical equipment and wiring. Although adoption of the code is optional with local governments, the Bureau of Engineering and Safety of the Department of Labor and Industry has adopted the first two parts of the code as its regulation governing construction of "manufacturing establishments" over which it has statutory jurisdiction.

By far the most extensive program of State development of model building codes is that of New York.⁴ In 1949, a special service agency was established with facilities for code drafting and technical research, and was assigned the task of developing and issuing model State building codes and manuals.

The State Building Code Council and the Building Codes Bureau, its staff agency in the Division of Housing and Community Renewal, have developed a three-part State building construction code with one part applicable to one- and two-family dwellings, one to multiple dwellings, and one to general building construction. In addition, they have developed a plumbing standards construction code which applies to all buildings regulated by the three codes. To assist in enforcement, they have also developed a code manual for the guidance of local officials, architects, engineers, builders, owners and others to help them interpret, apply, and enforce the code. It contains standards which are acceptable methods of compliance with the code, but they are only advisory and are not the only methods of compliance.⁵

Local governments may adopt the State building codes by simple resolution. Existing local building codes may be continued as alternative requirements unless rescinded by the local legislative body. State codes are usually adopted because of the inadequacy of existing local codes. Once adopted, however, they cannot be changed from the approved version except by special petition to the State Building Code Council for approval of standards higher than those in the State code. The Council may approve such higher standards upon showing of good cause by the community. By mid-1965, 49 out of 62 cities, 230 out of 550 villages, and 176 out of 932 towns, had adopted the State building construction code.

Building officials in communities using the State code have available to them the technical staff of the code bureau for advisory answers to problems arising in connection with administration. The code bureau also conducts a program of certifying products for manufacturers and distributors to establish their acceptability for use under the code. A State Building Construction Board of Review with power to interpret the State code and make rulings under its provisions helps to foster consistency in interpretation.

State Mechanical Codes and Other Special Codes and Regulations

Although few States have adopted general mandatory State building codes, at least 42 have some kind of mechanical codes as indicated in Table 1, page 24, above. Twenty-two States have fire codes incorporating structural construction requirements for fire protection. Finally, most of the States have at least some regulations governing special-use buildings, such as factories, hospitals, day centers, nursing homes, hotels, and restaurants, which include building construction requirements.

Mechanical Codes. The most common statewide mechanical codes are the plumbing code in 27 States, electrical code in 22, boiler code in 28, and elevator code in 18. In addition, a few States have instituted more specialized mechanical codes such as those dealing with heating, ventilation, air conditioning, liquid petroleum gas, and natural gas. They frequently deal with more than just the building construction aspect of the area regulated. They may, for example, incorporate maintenance and operating standards and provide for periodic inspection. In some cases, they also establish a licensing program for trades responsible for construction or installation, or for operators.

Typically, responsibility for promulgating, administering, and enforcing mechanical codes is dispersed among a number of State agencies. As Table 1 indicates, in many instances a separate agency is responsible for each of the major mechanical codes. In several cases, boiler and elevator codes are a common responsibility of the same State agency, usually the department of labor, industry, or industrial safety. Sometimes the Fire Marshal or other agency responsible for fire prevention and protection is also assigned the electrical code, and, in one or two cases, the boiler and elevator codes. In three States only is responsibility for all mechanical codes lodged in one agency. In three others, responsibility for several codes is lodged in a single agency, with only the plumbing code separately administered.

There have been efforts to promote coordination among State agencies responsible for building regulations in several States. In North Carolina, for example, there is an Inter-Departmental Building Regulation Committee composed of representatives of seven State agencies that have approval authority over building construction. The Committee is directed to establish procedures for the interchange of plans among agencies to avoid the necessity of multiple applications. In California, the State Building Standards Commission codifies the regulations issued by the various State agencies having authority in this area, sees that discrepancies among them are removed, and issues them as the State Building Standards Code.

The application and enforcement of State mechanical codes is distributed among State and local governments in varying patterns. The precise distribution of authority differs both among the States and among the types of equipment regulated, the types of buildings or structures involved, and the types and size of local government. Replies to the statewide building regulation practices questionnaire sent to State officials reflect this complexity and defy simple summarization. However, a general picture of the varying patterns can be drawn from the returns.

State mechanical codes are generally applicable to both incorporated and unincorporated areas although certain classes or sizes of cities, counties, or other local governments may be exempted from coverage of some of the codes. The codes generally apply to public buildings, places of public assembly, and employ-

ment, and to apartments, although buildings with less than a designated capacity or for less than a designated number of employees may not be covered.

The State plumbing, electrical, and fire codes are frequently not applicable to private dwellings although, of course, local codes are generally adopted to provide this coverage. The boiler and elevator codes have only limited relevance to private dwellings, which are usually exempted. Finally, farm dwellings and buildings are most frequently not included in the coverage of the codes.

Responsibility for enforcement presents a particularly complex pattern. The codes are generally minimum standards and local governments may enact provisions with equal or more strict standards. If this is the case, local provisions usually are superseded only if they directly conflict with or fall below State minimums. State and local regulations may thus be applicable to the same building with the local establishing more inclusive or more stringent requirements. The actual enforcement may be done by both State and local inspectors, by a local inspector acting as a representative of the State, or by a local inspector enforcing local standards which incorporate provisions at least as strict as the State's, thereby obviating the need for separate State inspection.

In some cases where State provisions have superseded local or where there are no local regulations, local building inspectors responsible for the general local building inspection program are assigned the responsibility for enforcement of State mechanical codes and State inspectors enforce only in those areas where there are no local programs.

Fire Codes. Generally State fire codes incorporate both building construction fire protection provisions and provisions related to a general fire prevention program. Fire protection construction provisions cover requirements for the use of fire resistant material; size, number, and accessibility of doors; sprinkler systems and other fire-fighting equipment; fire escapes and other fire protection measures. In some instances fire codes have been expanded to include provisions not directly related to fire prevention or protection. In Pennsylvania, for example, the building regulations for protection from fire and panic include provisions dealing with load-bearing characteristics, thickness of walls, etc., and thus have features of general building construction codes, although their basic emphasis is fire protection and prevention.

The codes also incorporate provisions dealing with fire prevention safety practices such as special handling of inflammable chemicals, fabrics, and other materials; availability of portable fire-fighting equipment; accessibility of fire hydrants; and maintenance of clear fire exit passages. Where there are general building construction codes, construction and structural requirements for fire protection are almost always incorporated in the comprehensive code.

Special-Use Codes. There are a host of State regulatory programs dealing with special-use buildings and structures such as hospitals, nursing homes, hotels, assembly halls, schools, day care centers, theatres, factories, etc. Many requirements are essentially of the occupancy and use type having to do with the arrangement of special equipment, with sanitary and safety practices, with functional planning of physical facilities related to use, and with other standard and accepted practices. However, some requirements include structural and construction provisions. In some cases they may have fundamental importance for building construction, as for example those that deal with load-bearing characteristics of floors for theatres or for industrial plants using heavy equipment.

In other instances they may be detailed structural requirements of a more limited scope closely associated with the special use as movie projection rooms, hospital operating rooms and wards, and school classrooms.

The special-use programs may deal with buildings and structures generally within the purview of building codes and mechanical codes, as for example hospitals, places of public employment or assembly, or public care institutions. On the other hand, they may deal with structures generally outside the scope of the other codes, as in the case of mobile homes or dairy sheds on farms.

General State building construction codes and model codes may incorporate the building construction requirements of the special-use codes which directly affect structural features through a system of classification according to use accompanied by a spelling out of provisions applicable to construction for special uses as an alternative to specific special use provisions may be incorporated by reference to models or to other enactments or regulations rather than including complete language.

State Enabling Legislation for Adoption of Codes by Reference

General enabling legislation in more than half the States provides for adoption of recognized national building codes by reference.⁶ Such authority would typically extend to the appropriate code or codes developed by the four code groups--the Building Officials Conference of America, the Southern Building Code Congress, the International Conference of Building Officials, and the American Insurance Association (formerly the National Board of Fire Underwriters)--as well as to specialized codes such as the American Standard National Plumbing Code sponsored by the American Public Health Association and the American Society of Mechanical Engineers, and the National Electrical Code of the American Insurance Association. In some cases specific statutory recognition is given to a particular code, notably in instances where States refer to the appropriate regional code applicable to their State.

Some of the State enabling statutes require that subsequent changes and revisions approved by the code promulgating group be adopted by local governments in the same manner as initial adoption by reference of the code. Others delegate this responsibility to appropriate administrative officials or even, in rare instances, provide for the automatic addition of changes as they are formally approved by the promulgating group.

Enabling legislation of this type makes it possible for localities to adopt accepted building standards which are generally available in printed form without the necessity of verbatim enactment and publication. It serves to foster acceptance of uniform models by local governments. The Advisory Commission on Intergovernmental Relations in an earlier report recommended that States enact legislation authorizing adoption of uniform building codes by reference and developed model State legislation for this purpose.⁷

Intergovernmental Problems in Building Construction Regulation as Viewed by State Officials

Among respondents to the questionnaire on statewide building practices who replied to a question concerning ways in which Federal, State, and local governments could encourage uniformity and modernization, there was general agreement

that more technical assistance was needed and that more uniformity of building requirements was desirable. Concerning methods for achieving uniformity and the question of who should provide technical assistance, there was a considerable range of opinion. There was general agreement that the Federal Government has an important role to play, drawing upon resources available to it, to provide technical services such as the development of standards and testing criteria or to develop a full model code; to assist in exchange of information and experience; to provide advice and assistance; and to apply standards to Federal construction that could serve as a model for States. The State role was viewed as falling in a somewhat similar relationship to local governments, with the State providing a model code or enacting a mandatory minimum State code and providing technical, education, and training facilities. Respondents generally felt that local governments should take full advantage of model codes and standards and draw upon available knowledge and technical assistance to aid them in adapting codes to local needs, keeping codes current and up-to-date, and attaining as much uniformity as possible.

Among replies from two-thirds of the States commenting on the Federal role, only six felt that there was no role for the Federal Government and that it should "not interfere," leaving all problems to "be handled on the State level." Views regarding the development of national models were about equally divided between two approaches: establishing "basic minimum standards for adoption or as guides to States in accordance with nationally accepted practices" and preparing "a model code for the States, recognizing the various requirements in relation to the different geographic conditions in the country." Respondents frequently mentioned that standards and codes should be based on nationally accepted standards, including specific reference to the work of the existing model code groups. Several also mentioned that the Federal Government should cooperate with existing code groups in developing models. It was suggested that the Federal Government could adopt a uniform code for Federal construction that could serve as a model for States. Need was seen for the Federal Government to "set up a service to continually maintain the model code requirements as new and improved materials became available." Additional views and suggestions, each mentioned by one or two respondents, included: requirements relating to federally insured loans provide the best control; the Federal Government should require conformity with generally recognized national standards; the Federal Government should provide information, advice, and assistance and develop training programs for inspectors; the Federal Government should provide financial aid to smaller communities for the development of model codes.

The role of the State government in attaining modernization and uniformity was seen primarily as one of providing either a mandatory State minimum code or a model code. Replies from 28 States indicated a preference for the mandatory approach by a slight margin, with their view most strongly stated by one respondent who wrote: "Overall State control is the best way." Specific suggestions regarding State activity in this area included reference to the State either developing a mandatory or model code or adopting one of the nationally recognized models for use in the State. The need for special assistance by the State to local governments in enforcing the model or mandatory codes was emphasized by several respondents, and the necessity for keeping the models up-to-date, if enacted on an optional basis by localities, was referred to. The technique of enabling local governments to adopt models by reference was also suggested. State responsibility to apply accepted standards to public construction and to provide technical services, information, and other assistance to local governments was recognized by several respondents.

The general assumption was made that enforcement powers would remain with local governments. This view was reflected by the comment: "Enforcement powers should be vested in State governments and, in turn, in their municipalities." The need for the availability of models for use by local governments was emphasized, as was the need for local governments to adopt models uniformly and keep them up-to-date. Emphasis was placed on the need for local governments to draw upon available sources of technical assistance and guidance, with this view most positively stated by one respondent: "Local governments do not have the competence nor the capacity to meet the growing changes in building code development. Other agencies should assist them." The need for training programs both for inspectors and officials and for contractors and builders was referred to by several respondents.

FEDERAL PROGRAMS

Although building codes are adopted and enforced by local and State governments, Federal Government programs and activities are significant in the building construction field and thus have an effect on the system of building regulations. Federal interest has been primarily of four types--

-direct construction activity;
-direct operating and regulatory impact of Federal programs involving insuring mortgages or granting funds for construction or for planning construction. The Federal Housing Administration, for example, has developed a set of Minimum Property Standards that must be met in connection with any construction financed by federally insured mortgages. The Department of Housing and Urban Development requires that before localities receive grants and loans for urban renewal programs, they adopt up-to-date building codes;
-engagement, either directly or through grants, in research that provides the basis for specifications, standards, and testing techniques;
-standards programs including development of standards and testing procedures that may be used in framing and administering building codes.

These activities are carried out by many bureaus, agencies, and departments. For purposes of analysis, Federal programs and activities can be divided into four areas of activity considered below.

Research Under Federal Auspices

Federal support of technical building research is primarily oriented to developing knowledge to better enable agencies to carry out their program responsibilities. Many of these programs, such as those operated by the Department of Housing and Urban Development, are devoted exclusively to dwellings. Others are more generally related to building technology, such as the programs for the measurement of properties and establishment of test methods undertaken by the National Bureau of Standards. Finally, many Federal agency research programs in other fields with only a fringe connection with building science have developed

information useful to the building industry. Certain programs undertaken or sponsored by the National Aeronautics and Space Administration, for example, have been useful in advancing building technology.

Research grants made by the Department of Housing and Urban Development to public and private agencies are primarily concerned with new or improved ways of developing housing for low-income families. The Department makes demonstration grants to independent third parties for actual field experiments. Such grants may involve research in the construction of new housing, or may deal with design, land planning, land acquisition and use, financing, or rehabilitation of existing structures.

Research sponsored by the Federal Housing Administration, a constituent agency of the Department, is primarily technological and concerned with construction, physical and mechanical structure and functioning, and related equipment in the various aspects of building technology. FHA technical studies utilize outside experts to analyze ideas that may lead to possible changes in its Minimum Property Standards. Much of this work is performed under contract with the Building Research Advisory Board of the National Academy of Sciences which convenes panels of experts to make the studies. In a few instances building research is performed internally by FHA staff personnel.

Some Department studies just completed or currently underway are: development of techniques to reduce the cost of high-rise units through pre-stressed lift story construction; control of airborne and structure-borne noise in multi-family dwellings; fire protection in residential construction; study of lower construction and development cost through use of residential squares for low-income families.

The Department of Defense has established no building research facilities of its own but operates a huge housing program both in this country and abroad. Nearly 270,000 housing units are maintained by the Department. The Department is experimenting with techniques that may bring new productivity to the building industry including a relocatable house; combined sub-space and finished-flooring in full house-width panels; and plumbing systems using plastic pipe and fittings and various venting arrangements.

The National Bureau of Standards is the primary research and service agency of the Federal Government for building technology. Its major goal is to provide a framework to facilitate reliable and accurate communication of technological data among the Nation's scientists and engineers and to encourage the exchange of technological products and services within the U. S. economy. These goals are achieved primarily through continuing attention to the problems of physical measurement and data on the properties of materials.

Technology developed by the Bureau has been incorporated in the National Plumbing Code and the National Electrical Code. Fire safety provisions of building codes incorporate basic work performed by the Bureau. The Bureau carries out work for other government agencies with approximately half of its nearly \$2 million building research budget financed by these agencies.

The Forest Products Laboratory of the U. S. Department of Agriculture has produced many technological advances in the use of wood products. Its work is basically an effort to keep wood competitive in the building materials market. Two recent studies directly related to the use of wood in building codes concerned

the structural utilization of wood-based materials, especially as related to building codes, and the environmental conditions affecting performances of wood and its use in urban situations.

Two other divisions of the Department of Agriculture are performing research that is applicable to general housing construction. The Agricultural Research Service, in developing a series of plans for farm houses, has undertaken limited technological studies with wood floors on-grade and experimental panels.

A number of other Federal agencies are involved in research relevant to building. A survey carried out by the Federal Construction Council of the Building Research Advisory Board lists 764 engineering investigations and studies pertinent to building construction conducted by Federal construction agencies since 1962.⁸ Of the 35 agencies known to be directly or indirectly concerned with construction, 18 supplied information on studies and investigations. They were:

- Atomic Energy Commission;
- Agriculture Research Service, Department of Agriculture;
- Bureau of Reclamation, Department of the Interior;
- Bureau of Yards and Docks, Department of the Navy;
- Cooperative State Research Service, Department of Agriculture;
- Economic Research Service, Department of Agriculture;
- Federal Housing Administration, Department of Housing and Urban Development;
- Forest Products Laboratory, Department of Agriculture;
- Forest Service, Department of Agriculture;
- National Aeronautics and Space Administration;
- National Bureau of Standards, Department of Commerce;
- National Institutes of Health, Public Health Service, Department of Health, Education, and Welfare;
- Office of Climatology, U. S. Weather Bureau, Department of Commerce;
- Office of the Chief of Engineers, Department of the Army;
- Office of Education, Department of Health, Education, and Welfare;
- Pentagon, Department of Defense;
- Post Office Department;
- Urban Renewal Administration, Department of Housing and Urban Development.

Although not a Federal agency, the Building Research Advisory Board of the National Academy of Sciences was established under a Federal charter in 1949 to study and advise on building science and technology and works closely with Federal agencies through a standing committee. The Board stimulates and correlates building research activities, and may study, on request, any scientific or technological subject in its field. It advises on questions submitted by any department or agency of the Federal Government, or by private industry when in the public interest. The Board does no actual laboratory or field research itself but compiles the findings of engineers, scientists, universities, and research facilities throughout the country.

The Federal Construction Council--a standing committee of the Building Research Advisory Board--was established to encourage continuing voluntary cooperation among Federal construction agencies in advancing the science and technology of Federal building construction. The council comprises 19 members--ten from the Building Research Advisory Board membership and one each from nine supporting

Federal agencies with continuing responsibilities for building construction.

The Council is staffed by BRAB personnel and its activities are supported under contract between the National Academy of Sciences - National Research Council and the National Bureau of Standards. Federal construction agencies contributing to the financial support of the Council do so by transferring funds to the National Bureau of Standards.

The Council is responsible for assembling and correlating available knowledge and experience from each of the Federal construction agencies designed to eliminate or reduce duplication of investigative effort on common problems. It also provides a forum for scientific and technical personnel, both within and outside the government, to discuss selected building problems. The Council may undertake studies in controversial areas or where value judgments are required to resolve technical problems for consideration by Federal construction agencies.

Information pertinent to the subject under investigation is gathered and compiled by BRAB staff for distribution to the concerned agencies, or it is prepared for study by a task group consisting of Federal agency technical personnel with special knowledge and competence in the particular subject. Reports of the Council are approved by BRAB, and transmitted through National Academy of Sciences - National Research Council channels.

The Council attempts to maintain close cooperation not only with those Federal agencies contributing directly to its support, but as well with more than fifty agencies interested in its activities. It invites these agencies to participate by appointing members to task force study groups and by contributing information and data they may have available for furthering a study. In addition, the Council invites any agency to submit proposed subjects or problems for consideration for future study or investigation. Selection of projects is based on benefits accruing to the largest number of agencies. If interest is not sufficient to warrant study by the Council, a request can be made directly to the Building Research Advisory Board either by the interested agency or by the Council itself on behalf of the agency.

Steps have been taken to involve appropriate State officials and thereby broaden public agency participation in Council activities. In response to a recent request to governors, 43 out of 50 States have designated State officials to serve as points of contact or liaison with the Council.

Standards Programs

Fundamental to the development of building codes are the availability of standards and the proper technical language for the evolving performance criteria in building. In the United States hundreds of organizations develop standards. Each has its own purpose in developing particular standards to serve its needs, although there often may be coordination between them. For example, one-half of the top 16 standards writing organizations have joint standards with other organizations (not including the American Standards Association).⁹

Standards programs in the United States are a complex network of efforts by private and public organizations. Activities may be divided into those programs sponsored by government, by trade and technical societies, and by companies. The most extensive standardization effort under a single organizational structure

is that sponsored by the Federal Government.¹⁰ While no Federal agency has exclusive responsibility for developing building construction standards, virtually all of the standards programs of Federal agencies include the development of at least a few standards of direct relevance to building codes. Federal activity consists of a variety of separate programs within different departments, agencies, and military commands--some highly coordinated and others not.

Nearly every department or agency in the Federal Government sponsors some standardization programs. Their objectives are, first, to establish criteria by which statutory requirements can be carried out, and, second, to establish "a minimum feasible variety of products and services necessary to meet government requirements."¹¹ The principal Federal Government programs in engineering and product standardization are conducted by the Department of Defense, the Department of Commerce, and the General Services Administration.

The standardization program of the Department of Defense is directed toward developing specifications and standards for equipment, supplies, and related engineering practices. It is the most extensive program in the Nation--government or private--with 35,000 specifications and standards to support procurement and development of equipment and supplies.

The Department of Commerce sponsors standards development programs as a service to industry to stabilize the level of quality in products to be offered to consumers. A total of 365 "Commercial Standards" and "Simplified Practice Recommendations" have been developed under this program. These are drafted by industry representatives and circulated by the Department of Commerce throughout the entire Federal Government and across the spectrum of affected industry. Thus, when approved by the Department of Commerce, the documents are usually accepted by the affected industry.

The General Services Administration is responsible for developing standards' specifications for equipment, supplies, and related engineering practices procured and used in common by more than one agency of the Federal Government. As the administrative housekeeping agency to the entire Federal establishment, the GSA with help from all agencies of the government develops criteria known as "Federal Specifications and Standards." Often Federal Specifications are utilized by private industry and by State and local governments to establish the accepted level of quality for commodities by the commercial community and consuming public. More than 4,000 specifications and 200 standards have been developed to guide procurement officers of the Federal Government.

The National Bureau of Standards has four standards programs--basic standards, standard reference materials, standard reference data, and engineering and commodity standards.¹² Of primary interest to the Advisory Commission on Intergovernmental Relations, the fourth activity concerns the development of criteria for evaluating technological products and services and providing test methods and information about properties of materials to facilitate the development of standards. Although the Bureau usually does not prepare standards, Congress, in enacting special safety legislation involving products shipped in interstate commerce, assigned it responsibility for developing mandatory standards in four areas. The standards dealt with refrigerator door openers, flammable fabrics, automotive brake fluids, and automotive seat belts--in all cases, a specific type or class of products moving in interstate commerce.

A recent study concluded that duplication in certain areas of government

standards and industrial standards is caused, in part, by statutory responsibilities of Federal agencies that require development of government standards and specifications that may conflict with other government standards and with industrial standards.¹³ Other factors contributing to duplication of effort identified by the study group includes: lack of communication among standards developing groups; multiplicity of interest and objectives of technical societies, trade associations, and industry groups required to develop standards and specifications to meet individual group needs; overlapping operations between groups and government and industry in developing standards for the same classes of products or materials; and inadequate use of existing coordinating facilities of the American Standards Association.

Federal-Aid Program Requirements Affecting Building Construction and Codes

Several major Federal programs affect both the private sector, notably building construction, and the public sector, particularly building code adoption, administration, and enforcement. The Minimum Property Standards of the Federal Housing Administration and the design standards of the Farmers Home Administration are used as program requirements in insuring the mortgage financing of new or existing housing and home improvements. The Department of Housing and Urban Development provides grants to municipalities to assist in the development and adoption of building codes and grants for enforcement of such codes.

The Federal Housing Administration, in addition to its two basic programs of mortgage insurance for homes and apartment buildings, administers a variety of special purpose programs aimed at assisting: cooperative and condominium housing; housing for families of low or moderate income, and for families displaced by governmental action in urban renewal areas; housing for the military; housing for the elderly; nursing homes; and experimental housing. The Minimum Property Standards of the FHA (discussed in more detail in Chapter IV) set forth acceptable practice in residential building technology essential for mortgage-insurance determinations. However, they are not a substitute for a local building code as the FHA requires compliance with all local codes for properties under insured mortgages.

The Farmers Home Administration of the Department of Agriculture administers the Rural Housing Loan Program providing direct loans from the Federal Government to individuals. The loans may be used to construct, improve, or repair rural homes and related facilities or to provide water for farmstead and household use. In addition, construction funds are available for home modernization. These loans are made only if other financing is not available to the prospective borrower. The Farmers Home Administration makes its own review of building plans and inspects construction as it progresses, in addition to any inspections made by local officials enforcing local codes and ordinances. In any event, compliance with local laws is required.

Section 701 of the Housing Act of 1954, as amended, provides Federal financial assistance to municipalities and counties for studies necessary to adopt or update existing local building codes. It is the policy of Department of Housing and Urban Development administrators to urge that basic standards and requirements of the local government's building, plumbing, and electrical codes be comparable to standards and requirements either contained in the most recent editions of nationally recognized model codes or developed and promulgated by nationally recognized standards-setting organizations.

The Housing and Urban Development Act of 1965 makes grants for local code enforcement available in two forms: either direct grants to cover part of the cost of concentrated code enforcement in a designated area or areas within a municipality or county, or by making eligible, as a part of the urban renewal project cost, the cost of code enforcement activities carried out by the local government in the project area. A municipality or county, prior to submitting an application for financial assistance, must have adopted a comprehensive system of building and land development ordinances and codes, including a building code. Local adoption of codes, based on national models, is required for "workable program" certification as a prerequisite to receiving financial assistance for urban renewal project costs. It may be presumed, therefore, that all of the approximately 1,300 localities with active approved workable programs, and an additional 400 to 500 on the inactive list, have adopted and are enforcing modern building codes.

Federal Building Construction Requirements

In the design and construction of new Federal buildings, the General Services Administration follows as minimum requirements standards contained in nationally recognized model building codes. It also follows the National Plumbing Code as a minimum requirement but its requirements in respect to materials generally exceed Code requirements as well as those of the average city plumbing code. Local plumbing codes, however, are directly applicable to plumbing outside the lot line of the public building. GSA follows the National Electrical Code as a minimum construction requirement and, again, exceeds its requirements and similar requirements of most municipal electrical codes. As a matter of public policy, GSA attempts to relate its construction projects closely to local code requirements. It relies heavily on local architects and engineers familiar with local practices.

The Public Housing Administration of the Department of Housing and Urban Development has established construction specifications for public housing dwelling units built under its program. PHA construction requirements appear to be primarily of the "specification" type rather than the "performance" type. Although there has been criticism of the rigidity of the Agency's specification type requirements, some progress is now being made toward including more flexible performance type criteria in PHA construction requirements.

Construction of federally owned housing (exclusive of military barracks) for Federal personnel and for employees of government contractors is based upon a single set of standards and criteria developed several years ago by the Housing and Home Finance Agency upon the request of the Bureau of the Budget. The design standards represent an attempt to outline certain minimum and maximum basic principles below which permanent housing should not be constructed, and above which Federal funds need not be invested to provide adequate housing. These standards are intended for all family housing except in those cases where local conditions outside the continental United States make their use impracticable.¹⁴ The standards were developed in cooperation with various Federal agencies responsible for family housing construction and FHA's Minimum Property Standards. They are used by the Bureau of the Budget in considering agency estimates for funds for family housing.

Footnotes for Chapter III

1. References to State building construction regulatory programs are based on replies to Questionnaire Survey Conducted Jointly by the Advisory Commission on Intergovernmental Relations and The Council of State Governments. Replies were received from forty-eight States. Additional sources used are indicated at appropriate points.
2. Brief descriptions of State building code activity appear in: Report of the Temporary State Building Code Commission, Submitted to the Legislature of the State of Minnesota, December 15, 1958; State Building Construction and Demolition Codes, Report Submitted by the Massachusetts Legislative Research Council, Senate No. 461, January 11, 1960; and "Statewide Building Codes," Memorandum, File No. 3-185, Illinois Legislative Council, April 30, 1958. Material from these reports has been used to supplement the questionnaire replies in this and the next two sections.
3. Massachusetts Legislative Research Council, op. cit., p. 35.
4. Summary information about the Codes is available in "How the State Building Construction Code Can Help Your Municipality," New York Division of Housing and Community Renewal, rev. ed., June 1962.
5. Code Manual for the State Building Construction Code, New York Building Codes Bureau, February 2, 1959.
6. See references to this legislation in Building Codes, A List of Selected References, rev. ed., National Association of Home Builders, (Washington, D. C.: July 1960).
7. Metropolitan Social and Economic Disparities: Implications for Intergovernmental Relations in Central Cities and Suburbs, pp. 97-99; and 1966 State Legislative Program, pp. 286-290.
8. Building Research Advisory Board, National Academy of Sciences - National Research Council, Engineering Studies and Investigations Relevant to Building and Heavy Construction by Federal Agencies, Federal Construction Council, Survey of Practice, Report No. 6, (Washington, D. C.: Building Research Advisory Board, National Academy of Sciences - National Research Council, 1965).
9. U. S. Department of Commerce, Report of the Panel on Engineering and Commodity Standards of the Commerce Technical Advisory Board to the Assistant Secretary for Science and Technology, Section B, (Washington, D. C.: February 2, 1965), p. 56. Much of the material in the discussion of Federal Government standard programs is drawn from this report.
10. Ibid., p. 57.
11. Ibid., p. 57.
12. Allan V. Astin, (remarks), Proceedings of the Construction Industry Conference on the LaQue Report, (Washington, D. C.: U. S. Chamber of Commerce, June 29, 1965).

13. U. S. Department of Commerce, op. cit., p. 77.
14. Housing and Home Finance Agency, Design Standards for Construction of Permanent Family Housing for Federal Personnel, issued by the Bureau of the Budget under Budget Circular A-18, (Washington, D. C.: U. S. Government Printing Office).

Chapter IV

PROBLEMS OF BUILDING CODE MODERNIZATION

It is a well known rule that the health of a given industry depends on its ability to accept change. Understanding the importance of this viewpoint in the building and construction industry is essential to the vigor of economic growth and needs to be recognized:

It should be evident that no segment of our economy has greater need than has the construction industry for new and better catering to the market for new facilities. This means that not only must the producers of materials be prepared to offer better values in which the buyer shares the advantages of lower costs through lower prices, but also that those engaged in construction must be as forward looking as those who supply the materials, to make the building of a new residence or new plant an attainable goal, and inviting enough in terms of price and capabilities to convert a possibility into a satisfied demand.¹

Building codes achieve a discipline over the building and construction industry through their specification of particular products, quantities, weights, construction practices, and similar matters. Improperly drafted codes that have not kept up with recent technological advances may interfere with the otherwise normal market acceptance of new materials. Codes that serve to favor local suppliers and local habits by incorporating certain restrictive provisions are, again, an intrusion into the normal processes of a free market equilibrium. Thus, the general public and the building industry have a very real, legitimate concern with the viability of the existing system of building controls.

An understanding of certain characteristics of the building industry, the procedures established within the public and private sectors for new product acceptance, and problems of establishing desirable standards for building construction is essential to the modernization of building codes.

Significance of the Building and Construction Industry in the Country's Economy

The role of the construction and building materials industries in the American economy is a significant one. For the year 1964, the Gross National Product (the market value of the Nation's output of income-producing goods and services) amounted to \$622.6 billion; expenditures on new construction were estimated at \$66 billion. These figures included expenditures for construction services and materials under contracts executed for private business and consumer

investors as well as contracts executed for governmental agencies. The figure for private construction was \$45.95 billion; for public construction \$20.05 billion. Thus, new construction accounted for more than 10 percent of the GNP with nearly 70 percent of new construction being undertaken for private customers. Expenditures for private and public construction are given in Table 2.

Building contractors are, of course, a major outlet for products of the manufacturing and servicing industries who depend upon the construction industry for their output. Several categories of materials' manufacturers contributed more than 40 percent of their output to furnishing supplies for the construction industry. These include:

- a. Heating, plumbing, and structural metal products--73 percent;
- b. Stone and clay products--61 percent;
- c. Paints and allied products--58 percent;
- d. Stone and clay mining and quarrying--47 percent;
- e. Lumber and wood products, except containers--43 percent;
- f. Electric lighting and wiring equipment--40 percent.²

A recent study of contract construction costs revealed that building materials accounted for an average of approximately \$480 per \$1,000 of construction value on a single-family dwelling and for 53 percent of the total construction value for nonresidential structures.³

Homebuilding Industry--Organization, Management, and Labor

Much has been written about inefficiencies in small building operations, the problem of fragmentation, and the highly local character of the housing industry.⁴ Of the 1.28 million units constructed in 1960, no single builder or home manufacturer accounted for more than 5,000 units. Most erected fewer than 20. It has been estimated that there are nearly 125,000 building contractors, most of whom operate within a single metropolitan area, and many of whom build within a single suburb. The number of small-scale homebuilders, however, is declining, while middle-sized builders (25 to 100 dwelling units per year) are increasing. Large-scale builders still represent only a small percentage of the total number of housing construction entrepreneurs.

Because of its local character, the nature of construction employment and management is markedly different from that of industry generally.⁵ The work force, for example, is seldom located on one project for more than two or three years. Contractors are continuously hiring or liquidating their work force as they shift from job to job. Opportunities for work vary a great deal seasonally and geographically for both the contractor and laborer. The individual worker is highly mobile--he may alternate from being a journeyman, a foreman, or even a contractor at times. His work may shift from houses to commercial or industrial buildings. The construction industry includes a high proportion of skilled workers--reflecting the character of on-site operations of the industry. Typically there are usually twice as many skilled workers engaged on a construction job as there are manual laborers and helpers.

Table 2

NEW CONSTRUCTION PUT IN PLACE IN 1964 IN THE UNITED STATES
BY TYPE OF CONSTRUCTION

<u>Type of Construction</u>	<u>\$ million</u>
TOTAL NEW CONSTRUCTION.....	66,008
PRIVATE CONSTRUCTION.....	45,954
Residential buildings (nonfarm).....	26,560
New housing units.....	20,588
Additions and alterations.....	n.a.
Nonhousekeeping.....	1,534
Nonresidential buildings.....	13,027
Industrial.....	3,333
Office buildings and warehouses.....	3,240
Stores, restaurants, and garages.....	2,395
Other nonresidential buildings.....	4,059
Religious.....	1,011
Educational.....	711
Hospital and institutional.....	1,455
Social and recreational.....	515
Miscellaneous.....	367
Farm construction.....	1,240
Public utilities.....	4,789
Telephone and telegraph.....	1,258
Other public utilities.....	3,531
All other private.....	338
PUBLIC CONSTRUCTION.....	20,054
Residential buildings.....	781
Nonresidential buildings.....	6,175
Industrial.....	405
Educational.....	3,329
Hospital and institutional.....	521
Administrative and service.....	874
Other nonresidential buildings.....	1,046
Military facilities.....	n.a.
Highways.....	6,971
Sewer and water systems.....	2,298
Public service enterprises.....	473
Conservation and development.....	1,623
All other public.....	432

n.a. - Not yet available, but estimate is included in total.

SOURCE: U. S. Department of Commerce: Construction Reports,
C 30-38, March 1965, Table 1.

Construction firms may range from large enterprises doing an areawide business to self-employed workers using their own tools and restricting their work to one locality. Contractors are usually classified as general or specialty, according to whether they accept a contract for a full project or take a subcontract or a separate prime contract for a part of the operation. In the housing field subcontracting is prevalent. Sometimes a contractor may do all the work himself.⁶ Ordinarily a specialty contractor tends to hire only one craft, although the same crafts may be hired by a number of separate contractors on a single project. There is, then, keen competition between general contractors and specialty contractors, and among the various types of specialty contractors.

The work force and the contractor system do have some implications on building technology as well as consequences for labor-management relations.⁷ For example:

- (a) Need for a mobile and flexible work force and the variation in place of work combine to focus attention of labor and management on procedures for recruitment and hiring, rather than on matters requiring adjustment to technological advancement.
- (b) Keen competition among skilled workers and between highly specialized contractors over job opportunities, each of limited duration, helps give birth to jurisdictional disputes which can result in work stoppage.
- (c) Need for constant assembling and reassembling of work crews for projects places a premium on organizing ability in contractor management because each job and location is to a degree unique.
- (d) Standards of labor productivity and pace offer a special problem to construction since they cannot be established once-and-for-all and then be maintained, as in industries with a relatively stable work force, but must in a sense be faced anew on each project.
- (e) Ease with which new firms can enter the industry and the consequent very large number of small firms result in keen competition among contractors and builders, a high turnover among firms, and considerable administrative difficulties for both unions and contractor associations in policing agreements.

These distinctive features of the employment picture have evolved over time and are not the result of union or contractor organizations arbitrarily imposing irrational conditions on each other. Rather, they reflect the nature of construction operations, the characteristics of the work force, and the competitive character of on-site construction.

Building labor is highly unionized in many parts of the country. In many instances, it is claimed that restrictive practices have caused an increase in the cost of housebuilding.⁸ Prohibition of new equipment and tools that shorten construction time in the plumbing, painting, and masonry trades; placement of limitations on output; or regulation of the number of workers in a trade are common charges leveled against building trades. Evidence of restrictive practices are found in many areas, but the extent of such practices nationally has never been determined.

In summary, higher costs of construction may be due more to the general economic organization of the housing and building industry, rather than to resistance to the use of new materials and construction systems. The number and size of contractors, the scale of operations, the distribution of operations between builders and subcontractors and between off-site and on-site work are important factors of the cost of building. The form of collective bargaining relationships between labor and contractors, the persistent problem of the legitimacy and extent of piece work, lending, and other bonus arrangements, and the training and allocation of a skilled construction labor force are other important problems that have a significant impact upon construction costs. Jurisdictional disputes and restrictive practices by workers and unions also affect costs. There is, unfortunately, little systematic comprehensive information concerning the extent of these problems. While observers concede they undoubtedly have an important impact on productivity and labor costs in homebuilding and heavy commercial and industrial construction, there appears to be no precise method by which to assess the relative weight of each factor.

Authorities in the construction field predict that the building industry generally will become more and more an assembly operation and that the proportion of fabrication performed at the site will continue to decline. Residences will continue to be constructed under a variety of economic organizations--carrying on the tradition that has developed over the years. Changes in construction methods and operating efficiencies will more likely come from materials' suppliers rather than from builders. But this is not to say that efficiency in homebuilding cannot be improved along paths already staked out. Improved performance, lower unit profits with higher volume, better purchasing, fewer restrictions in the future could also lower average housing construction costs.

New Product Acceptance and Approvals

Regulation of building materials and methods by various agencies, both public and private, is a very important aspect to that part of the building industry engaged in the development, manufacture, or marketing of building materials.⁹ Developing a new product for building and establishing its acceptability is a complex, difficult process. The industry's unique materials' distribution pattern, the craft nature of the construction operation, and other factors are all interrelated and almost all depend upon the acceptability of building materials and methods under the existing product approval structure.

The manufacturer of a new product on the building market does not concern himself merely with a full analysis of merchandising his product to consumers. He must also initiate a campaign to "sell" his product to public and private agencies in the code and regulatory areas.

"Product approval" is essential if the manufacturer hopes to market his product throughout the United States. In other words, approval of the building material by one municipal code enforcement agency would allow its use in that city only, and nothing more. On the other hand, if one of the model building officials' groups approves the product, automatic adoption might occur in a great many communities, both large and small. Similarly, because the New York State building code has been adopted by over 450 municipalities, the importance to the manufacturer of product approval by the State agency is easily seen, if he intends to market his material within New York State.

A manufacturer must first decide which of the approval authorities he should approach initially. If the product will be limited to industrial use, the manufacturer will probably seek approvals from the Factory Insurance Association and the Associated Factories Mutual Fire Insurance Companies. If the product is intended to be sold nationally, but only for residential use, the starting point for approval will likely be with the Federal Housing Administration.

Once the code or insurance authority is contacted, the manufacturer will discuss which testing laboratories and tests are acceptable, or useful, to that authority. He must decide what kind of test is called for and which of the laboratories recognized by code and insurance authorities are qualified for this work. Test data may take as much as two years to complete.

Model Code Groups. Procedures for approval of new building materials and building components by the various safety and proprietary code groups are complex. The building officials model code groups--the Building Officials Conference of America, the International Conference of Building Officials, and the Southern Building Code Congress--have adopted somewhat similar procedures for new product acceptance. Analysis and supporting data provided by the manufacturer are first reviewed informally by the executive director. BOCA's Structural Bureau usually retains an engineering consultant to study the preliminary request and if it does not prove the manufacturer's claim, further information will be requested. The ICBO staff reviews the manufacturer's submission and forwards the material to its Research Committee for review in advance of a public hearing before the Committee. Similarly, preliminary review by the SBCC technical staff is provided before the submission material is given to the Congress's Structural Bureau for analysis and the preparation of an approval brief.

Once the manufacturer has cleared these preliminary steps with the code groups, much more intensive study is given by the code organization's review committee to determine whether the product is in complete conformity with provisions of the model code and to suggest any necessary limitations or restrictions that should accompany an approval. A new product requiring a change in the provisions of the model code leaves the applicant with no alternative but to wait for general membership approval of an amendment permitting use of his product. If an amendment is not required, the code reviewing committee may call for additional testing by an independent laboratory. The cost of such test work must be borne by the applicant.

Upon approval of the building material or component, a report is prepared and sent to all active members of the code organization. Although the organization's approval is a recommendation only and does not assure acceptance by member communities, a manufacturer of an approved product can anticipate close to 100 percent acceptance among member jurisdictions of the model code group.

Each code group has established fee schedules for material approvals. The cost to the applicant will likely be at least \$500 for each product approval. Furthermore, the organizations provide an annual listing of approved components to member organizations, which in the case of one organization, would cost the manufacturer \$140 per product listed.

State and Local Code Jurisdictions. Manufacturers must also obtain building product approvals from the large number of State and local governments that do not automatically accept product approvals of the model code groups of the

several national testing organizations. For example, "code certificates of acceptability" on building products are issued by the Building Codes Bureau of the State of New York confirming that the product or assembly complies with the New York State building code. A fee of \$100 is charged for each application.¹⁰ Copies of the approvals are distributed to the building departments of municipalities in the State that have adopted the code.

The Ohio State Building Code does not establish a procedure for its Board of Building Standards on new product approval. However, the provisions of the code dealing with materials approvals require that materials shall be tested or analyzed under approved standards if: the requisite properties of the product cannot otherwise be established; any such property cannot be determined mathematically; there is evidence that the product is inferior to Ohio Building Code minima; it may be damaged in such a way that safety might be jeopardized; although approved, there is evidence that it now no longer meets the requirements; there is evidence that any part of it is unsafe, or that it is not sufficiently durable for safety. Within these general guidelines the State building inspector is assigned responsibility to judge conformance of a new product with the code's requirements.

All new building materials and components must be approved by the Los Angeles City Board of Building and Safety Commissioners. The procedure for approval is somewhat similar to that established by the proprietary code organizations. Supporting data on the product must be submitted for evaluation. The initial fee is \$150 and if the product is acceptable under the code, a general approval is granted for a period of three years. Approval can be renewed for succeeding three-year periods upon payment of a renewal fee of \$60.

Los Angeles County, on the other hand, has adopted the 1961 edition of the Uniform Building Code promulgated by the International Conference of Building Officials. The County provides two procedures that may be followed in seeking approvals of building materials and components. After obtaining a recommendation of approval by the ICBO Research Committee, the manufacturer of a product simply requests confirmation of the acceptance to the County. County officials prefer this procedure to one under which the manufacturer seeks product approval directly from the County authority. In such latter cases, the County Building and Safety Division requires that all particulars of the component, its use, and installation be provided by the manufacturer. In either case, no fee is charged for County approvals.

In Chicago, an application for approval must be supported by test results from an independent laboratory. The current Chicago Municipal Building Code adopted in 1956 authorized establishment of a Committee on Standards and Tests, organized apart from the regular machinery for issuance of permits, to review new products. The Committee proved to be ineffective, however, and since 1959 approvals have had to be obtained by arranging for the product to be incorporated in a building for which a permit is to be requested. If the Department of Buildings refuses use of the materials, such refusal can be the basis for a court action, whereby a mandatory injunction is sought ordering the city building commissioner to approve the petition. An alternative course is open to the manufacturer--he may appeal to the City Council's Committee on Building and Zoning.

Acceptance of products and methods in Cleveland is granted by the Board of Building Standards which evaluates new products upon performance. The procedure for requesting approval is probably typical of large cities, i.e., the

applicant must prepare and submit to the Board an application containing the following information: (1) provisions of the code under which application is being made; (2) description of the product; (3) test data showing product performance; and (4) other approvals. The Board sends a notice of the application to interested city government agencies requesting "any reasons why approval should not be made." These agencies might include the Fire Prevention Bureau, the Division of Building (structural engineering, plumbing, heating, electrical, air-conditioning, refrigeration, ventilation, and elevators), the Division of Health, the Division of Housing, the Division of Air Pollution Control or any related government agencies. Board staff then determines the area of the Cleveland Building Code pertinent to the request, what standards are applicable, adequacy of the data submitted, and whether the information shows the product meets the requirements of the Code. Essentially, the Board's Secretary represents the technical staff for screening data. The data are then presented to the Board of Building Standards with a report from the Secretary covering his review and recommendations. The Chairman of the Board assigns the application to one of the members best informed on the product or method for further review. A copy of the Secretary's submittal is sent to the applicant with the request that he be present at the public hearing of the Board. If the request is approved, the product or method is placed on the approvals' list.

The Federal Housing Administration. The Federal Housing Administration has enormous influence upon general standards of acceptability of products used in residential construction and upon building codes and their interpretation for such construction. A good many housing starts in any community are FHA insured. Structural requirements of the Veterans Administration rely upon FHA standards. A manufacturer, therefore, usually endeavors to establish acceptability for his product with FHA if he intends to market his material for the construction of single- and multi-family homes.

Acceptability of building materials and products is based upon FHA's Minimum Property Standards which set forth acceptable practice in residential building technology, including aspects of design, essential for mortgage-insurance determinations. The Minimum Property Standards, therefore, are not a substitute for a building code, which is primarily concerned with minimum public health and safety factors of construction, but go beyond these minimums.

New products for FHA acceptance are placed in either the "standard" or "non-standard" class of building materials and products. The former include those components for which a recognized standard exists or which through common usage have proved suitable in construction. Such items may be approved by FHA field offices. Non-standard items, however, must be approved by the FHA's Architectural Standards Division to determine whether the material or product has been developed and evaluated under recognized performance standards.

To keep abreast of rapidly changing technology in the building industry, the FHA has developed a rather elaborate approval procedure. For non-standard items the manufacturer will first seek a Materials Release--an interim acceptance to permit use of a product that has not yet been explicitly authorized by the Minimum Property Standards. The Materials Release states the trade name of the product and names the manufacturer. Technical data supporting a request from a manufacturer for a Materials Release is minimal in contrast to that required by many building code authorities.

The FHA's Architectural Standards Division bases its review on whether:

(a) there is a recognized standard, or standards, on which the component can qualify for acceptance; (b) the product will be readily identifiable in the field by the superintendent and the inspector; and (c) the product is "fool proof" in the sense that its adequacy cannot be nullified by poor workmanship on the job that might escape notice under routine supervision and inspection.

As the material gains wider acceptance and its application is better understood, minimum performance characteristics may be established. If several producers or manufacturers of the material collectively promulgate a standard of performance, based on suitable technical procedures, the FHA will often recognize this by publishing it in a Use of Materials Bulletin. On the other hand, if no satisfactory performance standards have been established by an industry organization, FHA's Architectural Standards Division may develop an interim test procedure upon which a performance minimum can be based. The Use of Materials Bulletin represents the next to the last step toward inclusion of the product in FHA's Minimum Property Standards.

Certain types of products do not lend themselves to inspection on the building site. The FHA's Engineering Bulletin promulgates the acceptability of products that are essentially assembled or fabricated in the plant. The manufacturer, therefore, certifies that his product is in conformance with a prevailing Engineering Bulletin with FHA inspectors checking on such certification from time to time by inspections at the plant.

The Fire Insurance Industry. The fire insurance industry plays an important part in the acceptance of new building materials. Materials presenting any fire hazard, and new products for which fire insurance loss records are not yet very extensive, are often penalized by higher rates set for buildings in which they are used. The additional cost of fire insurance, therefore, may restrict the use of such materials.

The fire insurance rate setting structure throughout the country rests upon organizations established in each State. Some have nonofficial status, others are supervised by State government. The State rating bureaus establish rates on types of buildings based on a number of factors. For houses, each rating bureau typically takes into account only a few variable factors--proximity of nearest fire hydrant and fire station, the town classification, and whether the structure is of masonry or woodframe construction.

The fire insurance industry depends upon the American Insurance Association (formerly the National Board of Fire Underwriters) for the classification and tabulation of fire losses occurring in the United States. The AIA Actuary Bureau collects and tabulates data on premiums and losses, for use by companies and State insurance departments.

Because the AIA represents approximately 200 of the larger capital-stock insurance companies in the country, the building materials manufacturer is particularly concerned with the organization's code promulgation and the development of standards. The AIA, in cooperation with other organizations, promulgates the National Building Code.

While the AIA has no jurisdiction over fire insurance rates, commissions, properties, or agents, its various standards, codes, and findings are enormously influential. The National Building Code has been in existence for over half a century and it is claimed that the code has been adopted by over 1,600 municipalities.

The Underwriters' Laboratories, sponsored by the American Insurance Association, is a major testing agency whose listings and services are widely used by capital-stock fire insurance companies, code-writing bodies, local inspection agencies, and State and Federal agencies. While its extensive activity in the electrical appliance field is probably better known to the public, it conducts broad activities in developing standards, classification, and specifications in the building materials field. The influence of UL is especially far reaching as its list of products meeting state safety minimums are recognized by reference in a great many local building codes. Therefore, many building materials manufacturers deem the UL listing an essential part of new product development.

Underwriters' Laboratories uses its own standards for product evaluation. As demand for new standards arises, UL engineers usually prepare drafts for review by industry subscribers of UL services, by governmental safety and inspection authorities, and by the insurance and fire protection organizations before publication of a new UL standard. Other recognized standard test procedures published by, for example, ASTM, or ASA, may be incorporated into UL standards. UL is currently submitting most of its 230 standards to ASA for approval as American Standards. Eighteen UL standards were recognized by ASA up through 1964 and ten more standards were recognized in 1965. A much larger number are under review at the present time, many of which are close to ASA recognition. This program will help achieve a degree of uniformity in the standards field.

The two major categories of building materials tests are for fire hazards and fire resistance of construction materials. Costs for them must be paid by the manufacturer. The more elaborate tests required for UL listings can be quite expensive.

An appeals procedure is available to the manufacturer when a product is not recommended by UL for listing. If the manufacturer differs from the UL decision as to methods, results, or interpretations, the National Bureau of Standards will adjudicate them if the dispute is sufficiently important. However, both parties must agree to abide by the Bureau's findings and to bear any costs involved.

Still another organization that building materials manufacturers must consider when introducing new materials is the Factory Insurance Association. The FIA specializes in loss-prevention inspection engineering services for industrial and manufacturing properties. It issues preferred risk insurance policies, in effect syndicating them among approximately 80 of the American Insurance Association's capital-stock companies. FIA approval of a product is granted only for a specific application to be used in an insured property. Its decision will be influenced to a considerable extent by information developed by Underwriters' Laboratories.

Finally, the Factory Mutual Engineering Division represents seven mutual property insurance companies that have established procedures for new product approvals. Factory Mutual is a preferred risk operation similar to the Factory Insurance Association. Insured properties include industrial, commercial, and office buildings as well as a large number of housing projects. FM's product approval service is second in importance to its prime function of insuring member companies against casualty risk. In addition, FM offers research and development testing useful to materials manufacturers seeking approval of new products and to proof of or changes in fire protection standards. If approved, the product may carry the "FM-approved" trademark and be listed in the "approved

equipment" manual of the organization.

Modernizing Code Provisions

Many individuals and groups concerned with building have long sought to develop performance requirements for the selection of, specification, and code provisions for, building materials, parts, and components. Success in accomplishing performance requirements has been limited by a shortage of basic building technology and adequate testing procedures and standards. More importantly, progress has been at a snail's pace for lack of a method and program involving a cooperative and unified effort of the entire building community. Each segment of the building industry has developed its own approach as it might be applied to its own special requirements. While these individual approaches are legitimate and necessary, it has been extremely difficult to marshal the collective thinking and effort of industry to undertake a rationalization of the performance concept for building as a whole. There must be an adequate definition and common understanding of the performance concept before any intelligent, effective discussion can take place toward building code modernization.

Shortcomings of Existing Research Efforts. Development of information is basic to establishing and providing sound codes and standards. In 1962, a special advisory committee of the Building Research Advisory Board observed that there are "essentially disparate approaches to building research in the United States--those of government, industry, academic institutions and nonprofit research and professional organizations."¹¹ The committee pointed out that each tends, in general, to approach research from its own parochial viewpoint.

Government research is largely either policy-oriented, aimed at providing the information required by the directors under which federal agencies operate, or program-oriented, in support of specific projects or building programs of the agencies. There is an air of "immediate action" to much of the building research undertaken by and for the operating agencies. The work, while valid and important, by its frequently ad hoc nature is unlikely to contribute the very kinds of information most necessary for the broad advancement of building science.

Building research in industry is concentrated primarily on product development and application. Competition has spurred a legitimate and successful growth of activity in this field, but here again the broader need is not being met.

Academic institutions engage in the pursuit of original ideas, the development of knowledge, and the training of personnel. They are not generally committed to a specific research orientation, but are limited by available funds and personnel, and by the responsibility for maintaining a balance with educational activities. Much of the academic research is directed into programs sponsored by industry and government and is thereby limited in scope.

Nonprofit research and professional organizations investigate building problems essentially on an ad hoc basis, i.e.,

when funds are available for the conduct of a specific project. Since few have a continuing program designed to stimulate research in this area, the effectiveness of contributions to building from this source is necessarily limited.¹²

The advisory committee felt that only a national institution could act as a stimulus and provide a clear focal point for a comprehensive attack on the problems of building. Building material, component, or equipment manufacturers, or building financiers, designers, constructors, or operators, are not likely, either singly or in combination, to be able to support a full range of required activities. Industry competition is not conducive to the establishment of a comprehensive program nor are existing Federal agencies equipped, or operated under a directive "to establish and maintain a complete, correlated program for the Nation as a whole."

The advisory committee recommended that a National Institute of Building Research be instituted and assigned the task of establishing and sustaining a continuing national program of building research. The Institute was proposed to be organized under the National Bureau of Standards, but with its own separate administration and appropriation. Building research activities of the Bureau would be incorporated into the Institute with the additional program elements to include research grants to provide long-term lending to academic institutions and nonprofit research organizations for original investigation and acquisition of equipment, supplies, and subordinate facilities; provide support projects in public and private agencies and organizations; perform internal research within the major areas of building science; provide fellowship grants to strengthen graduate training and research in the building field; and provide training grants to support specialized courses, conferences, to disseminate research results.¹³

Development of Performance Criteria in Building. Problems of developing performance requirements and methods of measurement in the building industry are complex. The present level of building technology has far to go toward determining what constitutes performance.

The difficulty of determining the merit of a specific innovation in the building industry is due largely to the fact that its actual performance will likely depend on a complex interaction among many different materials and items of equipment, assembled under a given set of conditions in a given manner, and subject to unique environment and usage.

Processes of deterioration are complex and vary greatly by geographical location. An innovation which may be suitable in some areas is often unsuitable in others. There must be adequate allowance in evaluation for catastrophic conditions which occur only at unpredictable intervals.

To be accepted technically, a proposed dwelling must perform satisfactorily over a long period of time; yet there is no generally accepted definition of the properties which the various elements of a house and the total structure must have to assure this result. It is difficult to define needed performance characteristics, and it is even more difficult and expensive to establish methods of measurement which would enable one to predict long-life performance. In addition, to

evaluate an innovation, one must be able to balance initial cost against future maintenance cost.

And, finally, a house must provide healthful and satisfying living environment--qualities which are most intangible and most difficult to evaluate in deciding whether an innovation should be accepted or rejected.¹⁴

Much scientific and experimental work must be done before any meaningful progress can be made in modernizing building codes. There must be a clear understanding "of what characteristics are essential measures of performance...what levels of performance are needed for the purposes to be served and how innovations will be tested for compliance with acceptance requirements which are established..." because:

- (a) Without a clear picture of what constitutes satisfactory performance and of how it will be determined, a great deal of research and technical work of an industry is wasted by misdirection.
- (b) Without means to insure that an innovation which is accepted will perform satisfactorily, there is very great pressure to "play safe" by staying with established practices and avoiding the new.
- (c) Without an experimentally-determined basis for evaluating innovations there is no sound approach to establishing codes or minimum standards which will permit the rapid adoption of worthy new technology as it is developed.¹⁵

Recently, the Building Research Advisory Board undertook the first steps to study the performance concept in its entirety. BRAB has appointed an advisory committee to study the feasibility of utilizing the performance concept in building. As its initial objective the committee hopes to achieve: (a) agreement as to whether the performance concept is valid in building; (b) agreement on definitions and terms and a clear statement of the meaning of performance concept; (c) development of an approach for applying the performance concept in building; (d) development of guidelines delineating the responsibilities of and actions needed from the various segments of the building industry; and (e) development of mechanisms for disseminating study results to motivate the necessary participation.

It is difficult to overemphasize the importance of the BRAB study. Building codes, it is often said, are holding back housing technology. But what are they holding back? No real progress in improving building technological development, let alone achieving meaningful modernization of building codes, is possible without first defining the performance concept in building.

If the results of this 18 months study indicate that the performance concept is completely practicable, the work of developing performance specifications and performance tests still will require years of effort to cover the existing state of the art plus the continuing job necessary to stay abreast of future ideas. Informed observers state that even if a start could be made today on the job of developing true performance standards to satisfy the needs of the building industry and assuming that financial and technical resources were available, the task would take several years to complete.

A beginning in the establishment of performance characteristics of certain

parts, components, and systems is now underway. Encouraging efforts have been made thus far in exploring the practicality of performance specifications and performance tests in the areas of curtain walls, roofing systems, and plumbing fixtures. Thus, it is reasonable to assume that standards of performance, at certain selected levels, can be established for various applications and codes written embodying these standards.

Building Codes--Performance vs. Specification Provisions. In any discussion of the problems of modernizing building codes, a frequently misunderstood issue is whether a code should be labeled "performance" or "specification." The two code types may be defined as follows:

A specification code, or a specification provision of a code, establishes minimum requirements in terms of particular materials, systems, designs, and construction methods permitted in a building to be erected for a given use, or in the building component affected.

A performance code, or a performance provision of a code, establishes minimum requirements in terms of performance needs to be fulfilled by a building to be erected for a given use, or by the building components affected, without limiting the materials, systems, designs, or construction methods that may be used. Performance standards and related evaluative techniques must be available by which to establish the bases for judging whether predetermined performance needs will be fulfilled.¹⁶

Realistically, both terms should be rejected. It is not uncommon for some persons to argue that anything contained in a building code of a specification nature is obsolete. However, all codes labeled as "performance-type" include many provisions of a specification nature. Such specification provisions are not only desirable but essential because of the lack of evaluative techniques of existing materials, systems, designs, and construction methods.

A performance code does not automatically arise from a particular arrangement of provisions in the building code or merely from reference to national standards--neither is of consequence for making a distinction between performance and specification codes.

...There are those who have the mistaken concept that the mere splitting of a code requirement into two parts automatically makes the requirement performance in type. Under this concept, the first part would use some phrase such as "safe," "accepted practice," "durable," etc., and would then make reference to a second part (manual, reference standard, etc.) in which the materials or methods that satisfy the general requirement are specified in detail. If the latter is couched in mandatory language, the whole requirement is specification in nature regardless of the two-part arrangement. If the language indicates that the specification is one acceptable method of meeting the general requirement, then theoretically the code moves toward the performance type (and, for a given situation, this may be as close as one can get because of the limitations of the present state of the art). In point

of fact, in most cases, the specification becomes the way of performing. Whether any other method will ever be accepted depends entirely upon the judgment of the local building official. It should be emphasized that this particular situation can be handled just as well in one part as in two.

A second mistaken concept is that reference to a national standard automatically makes for a performance code. This again is not necessarily so! The determining factors are whether the standard referred to is itself written in performance or specification language, and whether or not compliance with the standard is mandatory or optional. A statement such as "all hollow load bearing concrete masonry units shall comply with the provisions of American Standard A79.1-1960 (ASTM C 90-50)" is not a performance requirement because the provisions of A79.1-1960 are entirely specification in nature, and compliance with the standard is mandatory. What we have here is simply a shorthand specification requirement, the condensation being accomplished by reference to another text. The basic requirements are still specification in nature, and necessarily so in this case.¹⁷

A true performance provision specifies a performance requirement that can be verified "by scientific analysis, testing, or physical measurement."

"Floor constructions separating dwelling units from each other shall have a minimum Impact Noise Rating (INR) of ± 0 when tested in accordance with the provisions of American Standard Z24.19-1957 (ISO R140)"...It should be quite obvious that this type of language can only be used where the state of the art is such that specific performance requirements can be spelled out along with a reference to an acceptable method of testing for the satisfactory performance. Unfortunately, the number of code requirements where such performance and testing requirements can be spelled out are relatively few. Most code requirements must at this time be either of direct specification nature or of the type outlined earlier, which we might liken to the traditional "or equal" clause in specification writing.¹⁸

Charles E. Schaffner, chairman of the New York City building code revision committee, states that based on present knowledge, a modern code can only be drafted as "...one in which, first of all, every possible requirement is written in true performance style (as defined above); secondly, where as few requirements as possible are written in strict specification style; and third, where the remainder are written in the 'or equal' style which will permit approved variations on a judgment basis until such time as the particular case advances to the point where conversion to a truly performance requirement is possible."¹⁹

It is instructive to note that while many architects, engineers, contractors, and material suppliers have long argued for more "flexibility," these same groups objected strenuously to a procedure proposed by the code revision committee to give the building commissioner, or other designated individual or board, discretionary powers in the large number of cases falling within the "or equal" provisions. The committee argued that this approach is the only workable

means of achieving the flexibility necessary to encourage new design, new construction methods, and new materials within the present limitations of building technology. The only other alternative to this approach is to return to the rigid specification-type provisions.

The Use of Standards in Building Codes. While most modern building codes allow the designer leeway in selecting materials and methods, the quality of materials selected, and the manner of their use, many are governed by material standards and accepted engineering design formulae which are specification documents. Furthermore, proof of the performance of the materials and methods selected by the designer or architect for a building must be governed by certain test standards selected to establish the quality or performance of the material under certain conditions of use.

Several different kinds of standards are used in building codes to establish ground rules for construction.²⁰ Standards prepared and issued by associations representing the construction industry, engineering and professional societies, government agencies, and recognized national standards organizations are used in codes if all, or part, of the standard is related to safety and can be included as a mandatory requirement. Those parts of a standard classified as "acceptable requirements" may be included in a code, but mandatory compliance cannot be required.²¹

A standard may be divided into three classifications--engineering practice standards, material standards, and test standards. Engineering practice standards define methods of design, fabrication, or construction. They usually give accepted design procedure, engineering formulae, and calculation methods as well as approved standards of good practice. Frequently, the stated requirements of engineering practice standards are expressed as an optimum or ideal condition rather than minimum safe practices. Therefore, only the parts of such standards that set forth safety limits may be used as mandatory requirements within a building code. Those parts of a standard in excess of minimum safety needs may be regarded as acceptable practice since compliance is not required by the code.

Material standards are specifications establishing quality requirements, physical properties, and methods of sampling and testing to evaluate compliance of materials or manufactured products with the standard. Material standards may be regarded as mandatory requirements for the quality of materials or for the performance of a building product. Those parts of material standards exceeding basic safety requirements may not be included as mandatory code requirements but, as with engineering practice standards, may be regarded as an accepted practice.

Finally, test standards are established to determine methods of testing materials or assemblies of materials for quality or performance under conditions of use, either actual or simulated. Test standards in building codes are usually included as mandatory requirements for measuring such performance and are relied upon to determine (a) structural stability of individual building materials; (b) structural stability of assemblies of component materials; (c) the durability of building materials and components as well as their assembly; and (d) resistance to fire- or flame-spread under fire conditions.

Standards Organizations. While a large number of agencies prepare and issue standards, several nationally recognized standards organizations perform the major task of correlating the work of these agencies. The principal standards organizations that produce standards used in building codes are the American Society

for Testing and Materials, the National Fire Protection Association, the American Standards Association, the American Concrete Institute, the American Society of Mechanical Engineers, and the American Society of Heating, Refrigeration, and Electrical Engineers. The work of these organizations together is comprehensive although somewhat complex in the standards field. All are private, not-for-profit organizations. Federal specifications are also influential in the development of standards in local building codes.

The work of three of these organizations is probably most widely known. The American Society for Testing and Materials (ASTM) produces standard specifications and methods of tests for materials or assemblies. It operates through a system of technical committees, organized under the rules of the Society, each establishing its own bylaws, governing its own operations, and conducting its affairs with the assistance and guidance, but not direction, of the Society staff. It receives financial support for its operations primarily from membership dues and sale of publications. Proposed standards may be approved as "tentative" and used for several years to gain experience before final adoption.

The membership of the National Fire Protection Association (NFPA) includes more than 200 national and regional societies and associations and about 20,000 individuals, corporations, and organizations. NFPA also operates through a system of committees but differs from the ASTM principally in that it controls the membership of the committees and their operations. NFPA committees produce fire protection, fire prevention, and safety standards, or may review standards developed by ASTM or other committees and recommend their adoption. It is the sponsor of the National Electrical Code.

The American Standards Association (ASA), supported by contributions from business and industry, does not formulate standards but serves as a coordinating agency for approving recognized standards produced by other organizations. It may also encourage development of standards under committee procedures in areas of activity not already covered by established organizations. The ASA may adopt an existing standard produced by some other agency (thereby designating it as an American Standard) and assigning to it an ASA identification number. Under the "sectional committee" method, ASA first determines if there is a need for a standard on a proposed subject, and, secondly, whether an existing organization could undertake to develop it. If need is found, but no existing organization is able to assume responsibility for preparing a standard, ASA will request sponsorship of a "sectional committee" by agencies or organizations interested in the field of activity for which the standard has been proposed. The sponsors still must determine by conference whether a standard is needed. If it is agreed that work towards a standard is necessary, a sectional committee is organized by the sponsoring agencies and organizations. The committee becomes autonomous, similar to ASTM committee procedure, and functions much like any other organization producing a standard.

A consensus, or acceptance of the proposed standard must be reached before it may be approved as an "American Standard." Votes of the committee are weighed on the basis of the general public interest as against personal or private interest--a delicate and difficult task. Committee approval is forwarded to the ASA Standards Council for final review and approval.

Participation of model code groups in the activities of these standards organizations consists of representation on the various committees considering standards related to building construction. Model code organizations are not,

of course, bound by committee agreement on a standard until it is included within the requirements of the model code.

Economic Impact of Performance Standards and Codes. While performance-type building codes have been promoted in the belief that improved quality, lower cost buildings, and the favorable overall impact of encouraging innovation in building materials and components could be accomplished, documentation of results has not been available until recently. In conjunction with a study being carried on by the Building Research Advisory Board to clarify the performance concept in building, the National Bureau of Standards contracted with the National Academy of Sciences to identify performance codes and, if they were found to exist, to analyze and document their impact. The project, carried out by a special committee of the Building Research Advisory Board, analyzed in depth the new building codes adopted by St. Louis, Missouri, and Elizabeth, New Jersey, both frequently reported as being performance codes.²² Also selected for review were the current code writing efforts of the city of New York, the efforts of sewage septic tank producers to develop product evaluation procedures, and a general review of many other codes in addition to the two selected for detailed attention.

The committee concluded that the St. Louis and Elizabeth codes contained provisions which were performance in nature, but they also consisted of specification provisions.²³ Neither code was found to be entirely of one or the other. Adoption of a new code in both cities appeared to contribute to certain construction economies, but these were more readily attributable to changes in specific code requirements than to the fact that the new code was more nearly of the performance-type than the code it replaced.

In spite of these somewhat inconclusive findings, the study committee concluded:

No performance code (as defined by the committee) currently exists. The present state of knowledge is insufficient to permit the writing of a full and complete performance code, even if such were desired and its coverage for the purpose of protecting public health and safety were stipulated.

If performance codes are to be developed, in whole, or in part in the future, performance needs for the protection of public health and safety to be met by buildings must be accurately determined, and related evaluative techniques for the assessment of proposed means of satisfying those needs must be developed.... There must be a major effort to improve the reporting, collection, and analysis of statistical data....²⁴

The committee summarized the potential benefits that would accrue from utilization of the performance approach:

1. The inadequacy of today's technology notwithstanding, utilization of the performance approach wherever practicable in the development of codes will:
 - (a) Lead to a progressively more rational building industry and building process and all the attendant benefits of a diminishing pragmatism.

- (b) Make possible a more effective identification and delineation of those areas of building science and technology most in need of further rationalization through the development of needed knowledge and analytical tests.
 - (c) Stimulate the research necessary to fill the needs.
2. When it is possible to write and complete performance codes, such codes will of themselves provide a major component in the framework for:
- (a) The systematic development of new or improved building materials and components and, for their utilization in buildings and building complexes.
 - (b) A significant reduction of unnecessarily restrictive building practices.
 - (c) Although not necessarily lower-cost construction, a climate for the attainment of economic efficiency.²⁵

Even if there were substantial uniformity in the adoption of performance-type codes, they can permit, but not insure, economic, social, and aesthetic progress in construction. Factors other than codes may play a more important part in encouraging or discouraging progress. Despite opportunities which performance codes can offer, certain factors will tend to slow progress. For example:²⁶

- (a) Construction costs may actually be a relatively small proportion of the total investment. Land acquisition and development costs may exceed the cost of the building, or the equipment going into a factory may cost several times as much as the structure. If the cost of a house or other building is written off over a 20- or 25-year period, the impact per unit cost of production of even a substantial saving in the construction cost of the building may be negligible. Building owners, therefore, may likely be more interested in conventional materials and construction systems than in running the risk of a new design or using new materials allowable under performance codes.
- (b) New construction techniques permitted under performance codes may not be used to full advantage because of the unfamiliarity of architects and engineers with possible savings and by contractors who may not know how to use new methods efficiently. Until the new material or new design systems are used for a period of time, actual costs-in-place may be appreciably higher than conventional systems.
- (c) Building owners tend to be conservative when considering buying something as long lasting as a house or other structure. Today, there are many examples of construction costs being cut without the benefit of true performance codes. Design improvements, efficient building materials, sizes, reduction of investment rates by cutting construction time, better material distribution practices, use of power in erecting buildings, and the use of prefabricated assemblies are

examples of a more efficient building industry. With the introduction of performance codes, it would be difficult to tell in many cases just how much of any increase in efficiency was due to trends that were in effect before adoption of the code and how much was the result of the introduction of the performance code itself. Part of the problem is that we do not know how to measure benefits to the construction industry and to society which performance codes would give.

In summary, the characteristics of demand for construction material or for construction itself; the risk of being an innovator in such a major decision as construction; the hesitancy of building material manufacturers and dealers, mechanics, and architects to work on untried new materials and designs; and the heavy hand of tradition in architectural styles tend to make builders somewhat insensitive to opportunities offered by performance codes. Adoption of performance codes by municipalities throughout the country will not automatically result in cutting construction costs or increasing construction volume. At first, progress will likely be sluggish.

Footnotes for Chapter IV

1. Building Research Advisory Board, Economic and Other Implications of Performance Building Codes, (draft) 1965.
2. U. S. Bureau of the Census, Census of Manufacturers, 1958, (Washington, D.C.: Government Printing Office, 1959).
3. Construction Review, August 1964, p. 5., Table 2.
4. Glen H. Beyer, Housing and Society, (New York: The Macmillan Co., 1965), pp. 212-216; see also, Miles L. Colean, American Housing: Problems and Prospects, (New York: The Twentieth Century Fund, 1947), and Leo Grebber, Production of New Housing, (New York: Social Science Research Council, 1950).
5. Beyer, op. cit., p. 219.
6. See "NAHB Building Survey," Journal of Homebuilding, March 1960. The 1959 survey reported that 31 percent of the homebuilders subcontracted 75 to 100 percent of the dollar value of their work. Another 27 percent subcontracted 50 to 74 percent; 23 percent subcontracted 25 to 49 percent; 14 percent subcontracted 10 to 24 percent; 3 percent subcontracted 1 to 9 percent; and 2 percent used no subcontractors.
7. Burnham Kelly and Associates, Design and Production of Houses, (New York: McGraw-Hill Book Co., Inc., 1959), p. 262.
8. Beyer, op. cit., p. 203.
9. William Demerest, Building Codes: Product Approval, (New Haven, Connecticut: Ludlow Bookman, 1964). This publication provides an excellent description of product approval procedures employed by public agencies and private companies.
10. The director of the Bureau estimates that the actual cost of a single product review probably averages nearer \$1,000.
11. Building Research Advisory Board, Special Advisory Committee, A Program for Building Research in the United States, A Report for the National Bureau of Standards, (Washington, D. C.: National Academy of Sciences - National Research Council, Publication 994, May 1962), p. 3.
12. Ibid., pp. 3-4.
13. Ibid., pp. 9-10.
14. Panel on Civilian Technology, Office of Science and Technolgy, Better Housing for the Future, (Washington, D. C.: 1963), p. 8.
15. Ibid., pp. 8-9.
16. Building Research Advisory Board, Economic and Other Implications of Performance Building Codes, National Bureau of Standards, (Washington, D. C.) (draft report).

17. Charles E. Schaffner, "The New Building Code for New York City--Performance or Specification?," The Magazine of Standards, October 1964.
18. Ibid. Other illustrations of performance requirements appearing in the proposed New York City Building Code are: (1) The major construction elements (i.e., exterior walls; bearing walls; fire divisions; stair and passageway enclosures; shaft enclosures; floor and roof constructions; protection of columns; beams, girders, and trusses) will be identified as to their required fire-resistance ratings. The required ratings will vary, depending on the nature of the occupancy and the size of the building, but the standard of acceptance will be evaluation under the test procedures of American Standards Methods of Fire Tests of Building Construction and Materials, A2.1-1956 (ASTM E 119-61). (2) A required air-borne sound transmission loss rating will be established for wells, partitions, and floors separating dwelling units from each other or from public halls, corridors, or stairs. The standard of acceptance will be evaluation under the test procedures of Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Floors and Walls, ASTM E 90-61T. (3) A required impact sound transmission loss rating will be established for floor constructions separating dwelling units from each other, or from public halls or corridors. The standard of acceptance will be evaluation under the test procedures of American Standard Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Floors and Walls, Z24.19-1957 (ISO R140).
19. Ibid.
20. This discussion on the use of standards in building codes draws heavily on John J. Uicker, "The Use of Standards in Building Codes," Local Building Regulations (Chicago: Building Officials Conference of America, Inc., 1961), unpagged.
21. The Basic Building Code of BOCA lists 117 accredited standards-writing agencies as dependable sources for the generation of acceptable practice standards.
22. The special advisory committee members were: Robinson Newcomb, Chairman, Agency for International Development, BRAB Executive Committee member; Paul E. Baseler, Building Officials Conference of America; Frank W. Crimp, Clinch, Crimp, Brown, and Fisher, Architects; J. William Hubler, American Iron and Steel Institute; Raymond E. Johnson, Associated General Contractors of America; Harry C. Plummer, Structural Clay Products, Inc.; James R. Simpson, Federal Housing Administration; John P. Eberhard, National Bureau of Standards; Robert F. Gutzeit, The Society of the Plastics Industry, Inc.; and Howard M. Williams, Office of the Chief of Engineers, Department of the Army.
23. Building Research Advisory Board, op. cit.
24. Ibid.
25. Ibid.
26. Ibid.

Chapter V

PROBLEMS OF BUILDING CODE UNIFORMITY

Efforts to overcome the diversity of local building code requirements have been undertaken by virtually every segment--public and private--of the building industry. The Federal Government tried in the 1920's to develop a single national building code and later the proprietary model building code groups attempted to standardize their separate model national codes.

Today, fresh efforts are being made to promote building code uniformity. Three of the four proprietary code groups (the American Insurance Association, the Building Officials Conference of America, and the International Conference of Building Officials) are attempting to merge the requirements of their respective model codes for construction of one- and two-family houses. Public officials in several metropolitan areas throughout the country are now preparing a single code applicable in all local jurisdictions or expanding the role of the county in providing for code application and inspection services in incorporated municipalities. State programs promulgating model building codes also are being undertaken to achieve a higher degree of uniformity in local adopting jurisdictions.

As homebuilders' organizations, public officials at all levels of government, some trade associations, and national study groups have addressed themselves to code diversity problems, strong evidence emerges of a growing determination to bring about improvement. Of course, difference of opinion exists about the steps necessary to achieve a solution--ranging all the way from absolute local option in establishing building requirements to development of a mandatory national code.

The following discussion describes the extent of local code diversity and efforts by public and private groups, metropolitan and national, to achieve uniformity of building codes. While the primary emphasis is on efforts to standardize code requirements among code jurisdictions, problems of uniform interpretation of requirements are also discussed.

Local Code Diversity

Two recent surveys of local building codes provide the best nationwide picture now available of the extent of code diversity. Unfortunately, neither survey includes jurisdictions under 10,000 population, where uniformity of code requirements and their interpretation is probably most lacking.

In 1963, the National Association of Home Builders (NAHB) published

findings of a survey of approximately 1,200 communities.¹ The report describes the extent to which building code requirements in these communities permit various types of building materials and construction techniques, and plumbing and electrical code requirements for one- and two-family dwellings. Table 3 illustrates a few materials and systems that have won widespread acceptance but which are still barred in many local codes. The percentage of communities prohibiting use range from 62 percent in the use of 2" by 4" studs on 24" centers for non-bearing interior partitions to 15 percent prohibiting roof trusses on 24" centers.

Table 3

MATERIAL AND CONSTRUCTION TECHNIQUES
PROHIBITED BY LOCAL CODES

Percent of Localities Prohibiting	Material and Construction Method
62	2 x 4 studs on 24" centers for nonbearing partitions
60	Gypsum drywall interior finish on 24" stud spacing
48	Concrete posts and grade beams as foundation walls
36	3/8" gypsum drywall interior finish on 16" stud spacing
27	Elimination of corner bracing when using plywood or fiber-board sheathing on 16" stud spacing
26	Wood roofing material (such as red cedar shingles or shakes)
22	Concrete floor slab-on-grade construction
20	Factory-built chimney and flue lining
15	Roof trusses on 24" centers

SOURCE: National Association of Home Builders, Building Code Requirement Survey, 2nd Edition, (Washington, D. C.: 1963).

The survey also revealed that a high percentage (88 percent) of communities follow the National Electrical Code, but 57 percent of the jurisdictions adopting the code have made local variations or changes. Only 11 percent of the communities surveyed had adopted the National Plumbing Code, presumably without modification. Another 38 percent followed the code but have incorporated their own changes.

Data from the International City Managers' Association (ICMA) survey,² published in 1964, provide information on the types of model building codes

adopted by local jurisdictions, locally drafted codes, adoptions of State or county codes, and locally drafted codes patterned after one of the model codes or after a State or county code. The survey data, summarized in Table 4, reveals that nearly 60 percent of the responding cities adopted one of the four model building codes, with the highest number of adoptions of the Uniform Building Code.

Both surveys suggest that model building codes are frequently modified. The NAHB survey reported that 71 percent of the communities base their codes on one of the four models but only about one-fourth abide strictly by provisions of the code. The ICMA survey indicates that 60 percent of the communities had adopted one of the four model codes, but does not provide specific information on modifications. However, seven percent of the respondents stated that their locally drafted codes were based on one of the models.

A 1965 survey of building code regulations in the Detroit metropolitan area makes it clear that even though many communities adopt the same model code, frequent modifications or amendments are made.³ In the six-county metropolitan region, 82 municipalities have adopted a comprehensive building code. The model code sponsored by the Building Officials Conference of America has been adopted by 57 municipalities--indicating a relatively high degree of uniformity in building codes adoptions in the Detroit metropolitan area.

To determine the extent of local modifications, a sample was selected for further study consisting of 42 of the larger communities with BOCA adoptions (the remaining 15 code enforcing jurisdictions were in areas with little building activity). Changes in administrative provisions were not considered as modifications. It was found that 24 of the 42 communities had made changes in the technical provisions of the BOCA code, while 18 had maintained the model code provisions without change. The degree of change varied--some places changed only one or two specific provisions, others made numerous changes in many different chapters. Only 12 of the 18 communities not changing the model code have a clear policy of immediately adopting the annual supplements issued by BOCA to keep its model up-to-date. Thus, there is considerably less uniformity of building codes in the Detroit area than first appears to be, even though the wide use of the BOCA code helps provide common elements in building regulation.

There is still another factor contributing to building code diversity. To achieve uniformity in building regulations, it is necessary not only that the code provisions be uniform, but also that uniform interpretation of such provisions be given by officials who administer them. The inspector's ability to correctly interpret and apply his code will be a product, first, of his intelligence and his ability to use general inspectional and enforcement techniques; second, of his familiarity with building materials, techniques, and terminology; and, third, of his knowledge of the code itself. In the judgment of most building officials and homebuilders interviewed in the Detroit metropolitan area study, variations in code interpretation by building officials do even more to prevent uniform regulation than diversity of code and ordinance provisions. Those interviewed agreed that better selection of inspectors and better in-service training programs would achieve a higher degree of administrative performance.

Areawide Efforts Toward Code Uniformity

Many observers have urged coordination of building controls within metropolitan areas. They point out that excesses of localism among metropolitan

Table 4

TYPES OF CODES ADOPTED BY CITIES OVER 10,000 POPULATION

Population Group and Region	No. of Cities Reporting	Type of Code									
		N	U	S	B	L	G	LG	LO	Comb.	None
Over 100,000	101	8	22	13	5	27	1	9	15	1	--
NE Region	18	1	---	---	3	9	--	3	2	--	--
N. Cen. Region	26	2	3	---	1	11	--	4	5	--	--
South Region	34	5	4	12	1	5	1	2	3	1	--
West Region	23	---	15	1	---	2	--	--	5	--	--
50,000 to 100,000	141	15	41	12	15	28	7	6	14	3	--
NE Region	31	1	---	---	5	15	2	2	6	--	--
N. Cen. Region	40	4	10	1	7	8	1	4	4	1	--
South Region	40	10	2	11	3	5	4	--	4	1	--
West Region	30	---	29	---	---	---	--	--	--	1	--
10,000 to 50,000	771	134	204	86	80	127	35	11	41	18	35
NE Region	146	26	2	---	26	43	21	3	11	3	11
N. Cen. Region	238	40	32	---	49	68	3	3	21	7	15
South Region	206	61	5	86	5	14	11	4	7	4	9
West Region	181	7	165	---	---	2	--	1	2	4	--
TOTAL, all cities	1,013	157	267	111	100	182	43	26	70	22	35

Type of Code: N - National Building Code
 U - Uniform Building Code
 S - Southern Standard Building Code
 B - Basic Building Code
 L - Locally drafted code
 G - State or county code

LG - Locally drafted code patterned after State
 or county code
 LO - Locally drafted code patterned after one
 of model codes
 Comb. - Combination of two or more model codes

SOURCE: International City Managers' Association, Municipal Building, Inspection Practices, Management Information Service Report No. 241, (Chicago: February 1964), p. 14.

area communities often cause severe economic hardship to the builder who cannot easily build to consistent specifications; that the variety of minimum building standards reduces the likelihood of the private housing industry's meeting the housing needs of low-income groups; that local governments, acting separately, unnecessarily raise the cost of housing. In a previous report the Advisory Commission recommended "...the adoption of uniform housing (and) building...codes within metropolitan areas..." to decrease diversity, increase the coverage, and allow more expert application of reasonable requirements.⁴

In several metropolitan areas across the Nation steps have been taken to reduce code diversity. Homebuilders in some areas have initiated campaigns for building code unification. In other areas, regional planning agencies, code officials, and metropolitan councils of elected officials have undertaken such programs. In a few areas, municipalities have contracted with the county for building code inspection services, thus providing a measure of uniformity.

Efforts by Homebuilders to Achieve Areawide Code Uniformity. In the Cleveland area, a homebuilders' committee reviewed the four model codes, local codes, FHA Minimum Property Standards, and finally turned to a regional model code prepared by the Cleveland Regional Planning Commission. It had been adopted by 25 communities at the time the homebuilders started their campaign in 1959. At the present time a few more communities have been added, but there still is much to be done. The chairman of the homebuilders' code committee felt "...progress might have been much faster had he been able to stimulate public enthusiasm for his drive. He...received little aid from manufacturers--even in communities where their products were threatened by an adverse ruling. Some manufacturers and unions...actually opposed the regional code."⁵ In the three-county Akron metropolitan area homebuilders persuaded the 22 major communities within the market area to prepare and adopt a uniform building code.⁶

Atlanta Metropolitan Area. In other metropolitan areas throughout the country, public officials have initiated uniform code programs. The Atlanta Regional Metropolitan Planning Commission recently received Federal 701 funds to begin a building code study within the area. The region includes 45 incorporated cities and five counties, most of which have individual codes. The project will:

- (1) Review existing housing and building regulations within the region and local administrative and organization practices.
- (2) Outline steps leading towards standardization of regional codes related to housing, building, plumbing, electric, gas, fire prevention, and other such regulations as may be appropriate.
- (3) Evaluate regional code adoptions by local governments.
- (4) Suggest appropriate State enabling legislation relating to uniform housing and building codes and their administration.

Upon completion of the study a continuing body--either an intergovernmental standing committee serving metropolitan Atlanta or a joint committee of public and private agencies--will be established to provide continuing assistance on local code administration, staff training, and legislative liaison.

It is interesting to note that in recent months the direction of the Atlanta uniform code project has been altered. Local plumbing codes in the metropolitan area were generally considered far more obsolete than locally enacted

building codes. Support for modernizing local plumbing codes came immediately from plumbers, architects, engineers, and contractors not only from within the metropolitan area, but throughout the State. The metropolitan planning commission, therefore, altered its original objective of promulgating a uniform metropolitanwide plumbing code and is now supporting the adoption of a uniform statewide code. Hearings on a bill to establish a State Plumbing Council will be held during the current legislative session.

Denver Metropolitan Area. In 1963, a small group of building officials representing Denver and a few of the surrounding municipalities organized the Denver Suburban Building Code Changes Committee to coordinate and discuss elimination of conflicting provisions in local building code regulation.

The original organization, which included six cities and three counties, soon expanded to 12 cities and four counties and came to be known as the Metro Building Code Committee. The bylaws of the Committee provide for voting membership consisting of a building official appointed by the chief executive of each participating government, and members from outside of government including two licensed architects, two professional engineers, two general contractors, one homebuilder, one representative of the Denver Building Trades Council, and one member representing the fire services. Other members, elected by the Committee, include the research engineer of the Denver Building Department, a city attorney, a representative of the National Lumber Manufacturers Association, a representative of the American Iron and Steel Institute, and a representative of the Structural Clay Products Institute.

The major work of the Committee in preparing new chapters or revisions of the code is performed by subcommittees appointed for two-year periods. Revision subcommittees are given specific assignments to consider and prepare future modifications in a particular chapter of the code that may become necessary or that may be assigned by the chairman of the Committee. Each subcommittee consists of a chairman, who is a member of the Committee, an architect, an engineer, a contractor, a building official, a labor representative, and two industry members. The industry members represent manufacturers and subcontractors concerned with the specialized field of study assigned to the subcommittee. Individual members of the subcommittee are carefully selected for their special interest or knowledge in the field of study and are instructed to consider the code or proposed revision from their particular point of view and the effect of the code or revision upon the public interest.

Denver adopted the new building code in January 1965. Two other metropolitan area cities, Englewood and Edgewater, are in the process of adopting it but adoption of the code by other member communities may take several years. Some local legislative bodies still must be convinced of the value of adopting the areawide code without change. The code group is working closely with the Inter-County Regional Planning Commission in promulgating the uniform code within the metropolitan area.

Miami Metropolitan Area. Still another example of areawide building code uniformity is in South Florida. The South Florida Building Code was prepared and adopted by Dade County (Miami metropolitan area) in 1957. Soon neighboring Collier and Broward Counties adopted building codes conforming with the Dade County code. There are, however, no interagency agreements among the three counties concerning revision and administration of the code, apparently because no provision is made for such arrangements in the home rule charter of Dade County.

Within Dade County, the code applies to all of the 27 incorporated places. The Dade County Building and Zoning Department enforces the code and issues permits in unincorporated areas while code enforcement within an incorporated area is the responsibility of the municipality. A single countywide appeals board has jurisdiction within incorporated places as well as the unincorporated area. The Board of Rules and Appeals is also responsible for the integrity of the code and may request the Dade County Commissioners to take appropriate action against municipalities that are lax in administering the code within their boundaries.

Recently the Board recommended that the County Commissioners tighten administration and enforcement by establishing a permanent municipal inspection team of three members to evaluate local inspection practices. The team would report its findings to the County Commissioners. If after appropriate notice cities do not correct their "violations," the Board suggests that the County consider taking over local permit-issuance and inspection duties. If the cause of an inadequate local program is due to lack of funds, the County would strengthen the local inspection staff and building inspection practices with County funds. If the city is unwilling to cooperate with the County or is unable to provide its share of costs to maintain a satisfactory inspection program, the Board would urge the County to assume code enforcement within city boundaries. The team has been appointed thus fulfilling the first recommendation of the Board to ensure uniform countywide inspection practices.

The Dade County Building Department is large enough to support a products-control group to test and approve materials. Its evaluations are highly regarded by other communities throughout the State which lean heavily on the Department for approval of, or information on, new products or materials.

In addition to its responsibility for supervising enforcement practices, the nine-member Board of Rules and Appeals keeps the code up-to-date. Members include an architect, two general contractors, two structural engineers, a mechanical engineer, and a master plumber. All must have at least ten years experience in their profession or trade and must reside within an area of jurisdiction adopting the code. Amendments must be approved by the County Commissioners whereupon changes are codified and issuance is sent to incorporated jurisdictions in supplement form.

Councils of Elected Officials. Councils of elected officials in two metropolitan areas are providing the framework for local governments to work cooperatively toward uniform building codes. The Association of Bay Area Governments, representing city and county governments in the San Francisco Bay area and the Council of Governments, a voluntary organization of the major governments in the National Capital area, have established standing committees concerned with code uniformity and modernization.

ABAG has created a Uniform Standards Committee consisting of six members of the Association--three elected city officials, and three elected county officials. The Committee also has a Technical Advisory Group consisting of local building officials from throughout the Bay Area. Momentum for closer uniformity in the adoption and interpretation of codes came as a result of a conference held in 1964 attended by approximately 200 city, county, and State government officials and building industry representatives. Described by the National Association of Home Builders as "one of the most promising developments in the country, one which may become a model for other metropolitan areas throughout the nation," the conference was developed as a part of ABAG's overall program to encourage uniformity

in the adopting and enforcement of building regulations. The Association's president described its specific objective as being "to develop new and more effective ways of working together in order to take full advantage of new developments in technology and research and to achieve the economies of greater uniformity."⁷

Following a survey undertaken by the Association revealing that only 60 percent of the local jurisdictions were using the latest (1964) edition of the Uniform Building Code (virtually all of the municipalities in the San Francisco-Oakland metropolitan area are using the Uniform Building Code of the International Conference of Building Officials), a vigorous program was undertaken to persuade localities to update their codes. In addition, with its continuing work of promoting code uniformity, ABAG's technical advisory group is now working towards establishing and improving existing training programs and courses available to building officials and preparing a standard for sound transmission control in multi-family structures.

The Council of Governments serving the metropolitan area of the District of Columbia includes representatives from six cities and six counties from surrounding Maryland and Virginia, and the District of Columbia. Recommendations of COG are advisory to member governments. The Council has established a Committee on Codes to encourage code uniformity and adoption of provisions permitting use of acceptable new products and construction methods in existing codes. The COG Code Committee has a membership of 45 persons. Its chairman is an executive of a local department store, while other members are architects, lawyers, businessmen, building inspectors, fire marshals, representatives of construction companies, building associations, and building materials associations, and technicians from the Federal Housing Administration and the Urban Renewal Administration. The program for 1966 includes:

- (a) Development of model plumbing code.
- (b) Preparation of a model safety glass specification.
- (c) Investigation of standards for soundproofing multi-family dwellings.
- (d) Updating the Basic Building Code (Building Officials Conference of America) used by most of the local jurisdictions.
- (e) Sponsorship of an annual training session for building inspectors.

Recommendations of the Technical Code Committee must be approved by the COG Executive Board whereupon they are sent to participating governments for voluntary implementation.

Countywide Inspection Services--Interlocal Agreements. Still another approach to achieve uniformity within a metropolitan area may be found in the practices of Los Angeles County, California, and St. Louis County, Missouri. While all municipalities in Los Angeles County (except the city of Los Angeles) have adopted the Uniform Building Code, the county provides inspection services for 30 cities--approximately one-fifth of the incorporated municipalities within the county. This interlocal arrangement provides, of course, a high degree of uniformity in inspection services. Similarly, about 30 municipalities in St. Louis County contract with the County for local building inspection services.

In summary, current efforts to achieve building code uniformity within metropolitan areas should be helpful in reducing diversity. All the techniques employed--campaigns by homebuilders' organizations for code uniformity, initiative and leadership by areawide planning commissions for code reform, organization of a metropolitan code committee to prepare and promulgate a single code, county authority for code administration in incorporated as well as in unincorporated areas, and interlocal agreements--suggest a variety of approaches that may be utilized. However, such programs are not common and most are of such recent vintage that it is too early to appraise their effectiveness. There is also another shortcoming--even though one code is better than a number of different local codes and helps most builders operating in the area, a metropolitan or regional code is still little more than a broadened local code--different from every other code within the State. Disparities in inspection practices among localities are an obstacle to overcome even though all localities may be operating under a single regional code. The experience of the Dade County Building Department suggests that uniformity in the application of codes is more than merely adopting a single code covering the metropolitan area--it also means that uniformity in inspection practices must be practiced.

Efforts to Achieve National Uniformity and Modernization

Need for building code uniformity nationally was recognized over 50 years ago when the insurance industry prepared a set of standards for construction designed to reduce fire loss. From 1905 to 1927 only one "building code" was offered for nationwide adoption. Then known as the "National Building Code," it was issued by the National Board of Fire Underwriters. Although changed and modified over the years, the code still reflects the major interest of the sponsoring agency--the reduction of property loss from fire.

Soon after World War I, Herbert Hoover, then Secretary of Commerce, appointed a Building Code Committee to draft requirements and recommendations that could be used by local governments in preparing building codes. The Committee, working with the National Bureau of Standards, functioned until 1933 when funds for its work in building code activities were curtailed. The program was turned over to the American Standards Association which established the Building Code Correlating Committee with NBS to continue work in building standards and codes. Unfortunately, the work of ASA was also handicapped by lack of funds.

The Uniform Building Code was first published in 1927 and sponsored by a group of Pacific Coast local building officials. In 1946, the first edition of the Southern Standard Building Code was published, sponsored by local building officials in the South. Five years later the Building Officials Conference of America, formed in 1915, published the first edition of the Basic Building Code. The 1950 draft was heavily financed by industry through BOCA's Building Officials Foundation.

The three building codes promulgated by organizations of local building officials and the code sponsored by the insurance companies have brought about a degree of regional code uniformity. So far as technical knowledge will permit, all are intended to be performance-type codes. While it is estimated that nearly 3,500 communities subscribe to, or use, one of the four model codes as a basis for their local regulations, such adoption does not insure national or even regional or metropolitan uniformity. Localities may at their option introduce variations beyond those necessary changes justified to adapt to local administrative practices. The four model codes are similar in basic provisions, but do vary in detail.

The model code groups on several different occasions have provided for communication and coordination among themselves. Just prior to publication of the first edition of the Basic Building Code in 1950, BOCA and the West Coast group jointly organized the American Society of Building Officials (ASBO) to serve as a coordinating council between the two organizations. Some observers felt that the Housing Act of 1949 triggered this effort as Title III of the Act charged the Housing Agency to "undertake technical research and studies to develop and promote acceptance and application of improved and standardized building codes and regulations and methods for more uniform administration thereof, and standardized dimensions and methods for the assembly of homebuilding materials and equipment."⁸ The two organizations agreed to "alternate the presidency among participating groups--(the southern group might join them), promote welfare and prestige of building officials, present a united front to industry, encourage uniformity in building codes, provide a publishing facility to serve both, or all three groups."⁹

In 1949, the Joint Committee on Unification of Building Codes, now called the Joint Committee on Building Codes, was funded to review and coordinate matters of technical interest to the model code groups. In 1953, the United States Chamber of Commerce provided a \$10,000 two-year grant to the Joint Committee and in that year written drafts of code sections on definitions, types of construction, design loads, use and occupancy classifications, and requirements for steel construction were prepared.¹⁰ At the present time, the Southern Building Code Congress is not participating in the meetings of the Joint Committee, but work is continuing on uniformity in standards and code provisions for the National Building Code, the Uniform Building Code, and the Basic Building Code. Representatives of U. S. Department of Housing and Urban Development, National Bureau of Standards, National Fire Protection Association, Underwriters' Laboratories, Inc., American Standards Association, and the Building Code Committee of the National Research Council of Canada participate as observers in the affairs of the Committee. The program of the Joint Committee has received the endorsement of the Chamber of Commerce of the United States. A policy statement adopted by members of the Chamber, and reaffirmed in May 1965, urges that "...support be given to...the efforts of the Joint Committee on Building Codes which is engaged in resolving variations in major or basic requirements of nationally recognized codes and of the organization promulgating such codes."

By 1958 ASBO had expired and meetings of the Joint Committee were few and far between. At this time another joint organization to boost the welfare of the building official was suggested--the National Coordinating Council of Building Officials Organizations. While remaining outside of the Joint Committee, the Southern Building Code Congress joined the National Coordinating Council in 1962. The Coordinating Council has concerned itself with policy matters and prepared a "Seven Point Program" endorsed by all of the building officials organizations and the American Insurance Association in 1964. The building officials organizations believe that the Council's program is a position paper for building code improvement:

- (a) All segments of the building industry concerned with building codes actively and progressively promote in local communities with which they have contact, the adoption of either the Basic Building Code, National Building Code, Southern Building Code, or Uniform Building Code; recommending that this adoption be without prejudice or local amendment except as may be necessary to adapt the code to the administrative organization, and that all communities in a metropolitan

area adopt a similar code.

- (b) All segments of the building industry actively and progressively support the establishment of enabling legislation where none previously exists, to authorize local governments to adopt building codes by reference without bias of authorship.
- (c) All segments of the building industry actively and progressively participate in the activities of AIA, BOCA, ICBO, and SBCC and standards development, promoting rational regulations of all products based on fact without prejudice.
- (d) That the building industry coordinate and provide a means to accomplish the following goals:
 - 1. Correlate research development in the industry and provide for dissemination of this information.
 - 2. Establish recommended standards in clearly defined terms based on the research of information set forth in item (a).
 - 3. Promote the establishment of new standards including good practices procedures where none presently exist.
- (e) The aid of education institutions and other organizations should be solicited to provide for the educational or professional upgrading of personnel engaged in administration of building codes.
- (f) Clear-cut areas of responsibility of State and local agencies for the promulgation and administration of regulations governing buildings be established in order to eliminate overlap, duplication, and conflict between State agencies, and between State and local agencies.
- (g) A public relations program be established to inform the public of the advantages of modern, minimum performance building codes as stated herein. Further, that the term "Building Industry" refers to all persons, manufacturers, associations, enforcing agencies or other organizations interested in building regulations, and that the term "Standards" applies to recommended material specifications or test procedures which do not include conditions of acceptance.¹¹

While all national proprietary code groups have finally joined hands to endorse a single program for code improvement, recommendations for uniformity of model code provisions, or unification of the codes themselves, are conspicuously absent. Nor does the program appear to suggest the policy of the code groups with respect to this matter.

The most promising development in the unification of the model codes sponsored by building officials organizations is currently underway. At the urging of the National Association of Home Builders, the Building Officials Conference of America, the International Conference of Building Officials, and the American Insurance Association have agreed to prepare and jointly publish a single residential code for one- and two-family dwellings. The Southern Building Code Congress has not yet joined this effort. The code groups anticipate that the job

will be finished and ratified by the memberships in 1967.

Another move by two of the organizations--BOCA and ICBO--to establish a Joint Standardization Committee, consisting of officers and the staff directors of each organization, also appears to be a step in the direction of uniformity. The Committee is to determine and recommend the "basis for standardization of activities of the two organizations to further eliminate duplication of effort and improve the services to members."¹² The Committee, established in 1965, hopes to establish standardization in the following areas:

- (a) In-service training programs for code enforcement officers.
- (b) Procedures and practices for acceptance of new materials.
- (c) Correlation of approved fire resistance ratings for assemblies of materials.
- (d) Correlation of the recognition and the use of standards.
- (e) Correlation of the housing codes of the two organizations.

These recent activities of BOCA and ICBO may lead to the merger of the two organizations. While both separately are probably too small and thinly financed to become a strong national rallying point for code uniformity, together they might soon grow large enough to do the job. Their combined budget, assuming no losses in income would occur, would total approximately \$600,000 a year.

The Construction and Community Development Department of the Chamber of Commerce of the United States in a 1963 report urged local adoption of nationally recognized model building codes to achieve uniformity of building regulations.¹³ To encourage building progress and community growth codes of local governments "...in close proximity should be sufficiently uniform that they do not encourage construction in one jurisdiction and discourage the same construction in another jurisdiction."¹⁴ Use of the same model code by the central city and surrounding suburbs would lower and stabilize construction costs. Expanding the role of the State and Federal Governments in building code regulation to promote uniformity is, generally, undesirable. State codes, according to the Chamber report, have failed to produce a desirable degree of uniformity and have resulted in considerable duplication and overlap in authority. Promulgation of a building code by the Federal Government "would compound the problems which arise because of the multiplicity of codes."¹⁵

Most States have been slow to promote genuine uniformity in building codes among their communities. An exception is the progress being made in New York State. The New York State Building Code, adopted by 455 of the nearly 1,500 cities, towns, and villages within the State through mid-1965, could serve as a model for other States. It is available for adoption by any community, but administration and enforcement are local responsibilities. Municipalities may not amend the code unless State approval is granted. The code is considered a modern performance-type code. Perhaps most important is the central testing and approval body, staffed and supplied with State funds, to keep the code up-to-date and to approve new building materials and systems. State approvals are distributed to municipalities that have adopted the code. On request, the State Code Bureau will assist local officials in reviewing particularly complex building plans or give counsel on code interpretations.

Other States have adopted statewide building and mechanical codes but many are incomplete or suffer from a lack of funds to be properly serviced and enforced.

The National Bureau of Standards, the Federal Housing Administration, and the Department of Commerce have backed programs to promote better housing technology, several of which are discussed in Chapter III. However, many proposals to enlarge the Federal role have been hotly controversial. While the building industry generally agrees that the Federal Government ought to spend much more than it does for building industry statistics, it has also made its central concern clear--if the government gets into the field of building techniques and methods, thus into building standards or codes, Federal administrative decisions and legislative actions may lead to favoring one building product over another.

The proposed HHFA \$3.4 million research program for fiscal year 1951 was defeated for this reason. The same arguments of the building industry prevailed to defeat the Commerce Department's proposed \$1.6 million housing research program in 1963. However, many observers feel that Federal financial support is the only way to build an adequate base of knowledge for achieving code uniformity. A report written in 1962 by the Sub-Panel on Housing of the Panel on Civilian Technology for the President's Office of Science and Technology pointed out that "...at present, local choice is based on far too little real knowledge of minimum requirements and how to prepare codes and standards to assure their being met. If proper government action provides a sound technical basis for establishing criteria for judging new innovations, definitions of performance requirements, and establishment of measurement, a sound basis will be provided for making local codes more intelligent and more uniform."¹⁶

A recent effort to encourage code uniformity comes from recommendations of a 15-man panel of industry and government experts appointed by the Department of Commerce to review the broad requirements for industrial and commodity standards in the United States.¹⁷

The major finding of the study group, popularly known as the LaQue Panel--for its Chairman, Dr. Francis L. LaQue--was the need for a more effective organization using accepted procedures for voluntary coordination and promulgation of standards. These standards should meet the requirements for recognition as "USA Standards" both nationally and in international standardization activities and be promulgated by an "Institute." The Institute would be a federally chartered organization--possibly accomplished by reorganizing the American Standards Association--supported financially from private and public sources.

The Panel concentrated on eight major areas, one of which dealt with building codes and related standards. It recommended establishment of a uniform national building code that would become available for voluntary adoption anywhere in the Nation. Paradoxically, many readers have given the word "national," as used in the report, a meaning restricted to some government activity or authority, especially a code promulgated by the Federal Government.

The principal recommendation of the Panel with respect to building codes recognized that a more extended study would be required.¹⁸

Since the present Panel has been unable to undertake the more extensive study that the importance of this matter

warrants, it recommends the creation of a new national panel made up of experts in this field to extend the present investigation and to propose appropriate action needed toward the recommended establishment of a uniform national building code. The Department of Commerce should establish the proposed Panel on Building Codes in cooperation with the major organizations concerned.

The role defined for the National Bureau of Standards by the Panel in the development of a uniform national code has been a source of confusion. Some critics have stated that the intention of the Panel was to recommend that the Bureau develop the code.¹⁹ The proposal, according to Dr. LaQue, did no more than to suggest the special competence of the Bureau in this field.²⁰ The role of the Bureau that might be played was defined in the report as follows:

This could possibly be undertaken under the supervision and with the guidance of the National Bureau of Standards for subsequent promulgation by the Institute as a USA code.²¹

The development of any uniform national building code would require the advice and assistance of existing model code groups and representatives of consumers, users, builders, architects, labor, and other groups. The importance of effective implementation of a uniform national building code was recognized by the Panel in its emphasis on properly qualified enforcement officers where the code might be adopted. Any program for a uniform code must include an effective program for training enforcement officers.

The report summarized the benefits that would flow from a widely-adopted uniform building code.

- (a) Elimination of arbitrary restrictions which add unnecessarily to the cost of construction and the price to the buyer.
- (b) Stimulation of initiative and innovation on the part of material suppliers and builders by reducing the cost and delay involved in securing wide approval.
- (c) Improvement of the legal climate for codes by relieving inspection officers of conflicting responsibility for the promulgation as well as the enforcement of codes.
- (d) Assistance to code-promulgation bodies having limited access to technical guidance in resisting the prejudicial influence of self-serving voluntary advisors and in securing the benefits of technically sound conclusions embodied in a uniform code.
- (e) Reduction of the difficulty in combining and harmonizing most advantageously standards originating in different industry groups. These would be brought into proper relationship in a uniform code.
- (f) Reduction of the cost and the local technical requirements for maintaining and servicing a code that would be kept abreast of the demands of a modern building industry.
- (g) Facilitation of the regional training and qualification of local

inspectors needed for rational, as distinct from arbitrary, interpretation of a code.²²

More recently, a presidentially-appointed study commission recommended the Federal Government take the lead in modernizing local building codes. The National Commission on Technology, Automation, and Economic Progress concluded that "we cannot adequately re-house America by existing methods."²³ Among a number of proposals made to meet the challenges of technological change, the task force recommended Federal programs to stimulate research in housing through research grants and through its own building activities, and development of a national model building code.

The Federal Government can take the lead in modernizing local building codes and removing obstacles to new technologies. The research and development of new materials and methods of residential construction cannot be adapted to mass production so long as there are thousands of different local building codes in the United States. Even in a single metropolitan area, there may often be 50 or more local building codes. A substantial proportion of all construction, including housing, is either federally financed or insured. The Federal Government should, in consultation with the States and the construction industry and building trade unions, develop an acceptable model code. It should then give financial aid, insure building loans, or build its own facilities only in those localities which modernize their building codes in line with the model national code. In this way, government action could break down one of the most important obstructions to action.²⁴

Wide agreement prevails on the need for building codes to operate as uniformly as possible and to be flexible enough to take into account the development of new construction techniques and building materials. But there are no easy solutions: How can the principles of uniformity and flexibility--two not entirely compatible aims--be met? What might be the best way to go about providing a framework to achieve satisfactory uniform building code regulations? What governmental administrative machinery would best meet the desired ends? How can a national building code be made to work? .

Footnotes to Chapter V

1. National Association of Home Builders, Building Code Requirement Survey, 2nd Edition, (Washington, D. C.: 1963).
2. International City Managers' Association, The Municipal Yearbook 1964, (Chicago, 1964), pp. 333-358.
3. From a report by the Metropolitan Fund, Inc., One Woodward Avenue, Detroit, Michigan. Municipalities adopting other types of codes included: seven - city of Detroit; six - Uniform Building Code of the International Conference of Building Officials; two - city of Dearborn; one - National Building Code of the American Insurance Association; and nine - prepared own code.
4. The Advisory Commission on Intergovernmental Relations, Metropolitan Social and Economic Disparities: Implications for Intergovernmental Relations in Central Cities and Suburbs, (Washington, D. C.: Government Printing Office, 1965), p. 97.
5. "Will Homebuilding Be Cheaper on the Moon?," American Builder, May 1962.
6. "The Code Problem and What To Do About It," American Builder, March 1963.
7. "Building for Tomorrow, A Conference on the Coordination of Building Regulations," The Association of Bay Area Governments, May 15, 1964, (conference report and summary).
8. Housing Act of 1949, Public Law 81-171, U.S.C. 1450.
9. Harold Colling, "Who's to Blame for the Building Code Mess," Housing and Home, January 1964, p. 84.
10. Colling, op. cit.
11. "Seven Point Program," National Coordinating Council of Building Officials Organizations, (mimeographed) 1964. Available from the sponsoring organizations.
12. Special Bulletin, Building Officials Conference of America, Incorporated, July 23, 1965.
13. Chamber of Commerce of the United States, Building Codes, (Washington, D. C.: 1963), p. 7.
14. Ibid., pp. 3-4.
15. Ibid., p. 6.
16. Executive Office of the President, Office of Science and Technology, Better Housing for the Future, a report to the Panel on Civilian Technology from its Sub-Panel on Housing, (Washington, D. C.: April 1963).

17. See U. S. Department of Commerce, Report of the Panel on Engineering and Commodity Standards of the Commerce Technical Advisory Board to the Assistant Secretary for Science and Technology, Section A, (Washington, D. C.: February 2, 1965). Section B of the report is contained in a separate document and consists of reports submitted to the Panel by its task forces.
18. Ibid., p. 14.
19. See, for example, the generally critical comments prepared by Percy Bugbee, General Manager of the National Fire Protection Association, The LaQue Report--A Summary and an Assessment, May 17, 1965; also statements of representatives of the model code groups and building materials manufacturers trade associations contained in the Proceedings of the Construction Industry Conference on the LaQue Report, Construction and Community Development Department, U. S. Chamber of Commerce, (Washington, D. C.: June 29, 1965).
20. U. S. Chamber of Commerce, op. cit., p. 12.
21. U. S. Department of Commerce, op. cit., p. 13 (emphasis added).
22. Ibid., pp. 13-14.
23. National Commission on Technology, Automation, and Economic Progress, Technology and The American Economy, (Washington, D. C., January 1966, multi-lith), p. 151.
24. Ibid., p. 153.

Chapter VI

CONCLUSIONS AND RECOMMENDATIONS*

In this report the Commission has examined the effect of building code laws, policies, and practices upon the technology and economic of building and housing in the United States and the intergovernmental problems arising in the preparation and administration of such codes. Our purpose has been to identify the friction points and barriers in relationships among Federal, State, and local governments and elements of private industry most directly affected by building code regulation. At this point we identify our findings and we present recommendations for intergovernmental action designed to: (1) modernize building codes; (2) stimulate building research; (3) reduce housing costs due to excessive and diverse code requirements; (4) expedite the acceptance of new building products; and (5) enhance the quality of building code administration. Benefits stemming from such action would accrue to virtually every family and business in the Nation.

The problems are complex and require a number of solutions rather than a single approach. The objectives of modernization, uniformity, and effective administration of building codes are commendable; however, each is interrelated with the others. For example, though uniformity of building codes is a desirable objective, its full potentialities cannot be achieved unless vigorous efforts are also taken to develop information to modernize building codes and unless other steps are taken to assure effective administration. There is little to be gained in urging uniformity of obsolete codes or in suggesting measures to modernize codes, only to have poor administrative practices by code enforcing agencies wipe out potential benefits.

Therefore, recommendations of the Commission should be considered as a unity, involving complementary actions toward increasing research for housing and building, eliminating distortions created by existing legislative and administrative provisions, removing obstacles to free movement and free operation of the market forces, and providing more effective administration.

* Additional Views of Senator Ervin, Senator Mundt, Representative Crank, and State Senator DeStefano:

Senator Ervin: "I believe the Commission is mistaken to take action at this time on the draft report. I have grave doubts about any proposals which might lead to Federal control of local and state building codes. Even a single national model code might not serve the best interest of a nation with building problems as diverse as ours. For many years private model code groups have

Summary of Findings

The Commission finds that:

1. Obsolete code requirements, unnecessary diversity of such requirements among local jurisdictions, and inadequate administration and enforcement, taken together tend to place unjustified burdens on the technology and economics of building.
2. Too many building codes contain unnecessarily high standards, prevent the use of economical methods and materials in building, and include provisions extraneous to the basic purposes and objectives of building controls. Local governments in the exercise of their building regulatory powers often include provisions that go beyond establishment of minimum requirements for public health, safety, and welfare. The cost of adhering to excessive requirements bearing only superficial relation to health and safety, limits the economic range of housing that can be made available within a community.
3. The full benefits of a comprehensive building construction code cannot be realized unless the construction aspects of mechanical (i.e., plumbing, electrical, elevator), fire, and special-use (factories, hospitals, hotels, theaters, etc.) codes are integrated within the requirements of a single building construction code.
4. Approval procedures for building materials, components, and systems by a myriad of public and private groups has made the development and acceptance of new products a difficult process.
5. Many States have adopted mechanical codes that apply uniformly throughout the State, but to date only a handful of States have provided for adoption of statewide general building construction codes.
6. Intergovernmental problems of code uniformity are greatest in metropolitan areas. Current efforts in a number of metropolitan areas to achieve a common building code hold considerable promise in reducing diversity. But even if successful, these efforts have the inherent limitations of differing from the codes in other parts of the State and independence upon a variety of inspection practices among the localities adopting the code.

provided direction for the improvement and advancement of building regulations, their administration and their enforcement throughout the United States. Continuing progress is being made by these private model code groups toward achieving uniform provisions among the different model codes and developing cooperative programs to improve administration and enforcement of building codes. I feel the progress by these private groups is much more meaningful than a national model code or national legislation.

"It appears to me that additional time should be given to those interested in developing constructive comments and alternative recommendations to the report. At least, this matter should be delayed until the next meeting of the Commission."

7. Although the Federal Government is involved in building code uniformity and modernization through direct construction, specifications for housing, housing guarantees, support of research, testing activities, and administration of anti-trust laws, it has followed no consistent path or objective toward modernization and uniformity of codes.

8. Resistance by various interests to the Federal Government playing a major role in the field of building techniques and methods because of fear of Federal involvement in product approvals has been accompanied by fragmented and disparate approaches to building research in the United States.

9. Insufficient knowledge is available at the present time for the writing of full and complete "performance codes" (i.e., codes based upon performance such as load-bearing requirements, in contrast to specification of type and thickness of material). The availability of knowledge to establish performance criteria would go far toward encouraging development of new and improved building materials and reduction of restrictive building code practices.

The Commission concludes that a widely adopted uniform building code would go far toward eliminating arbitrary restrictions adding to the cost of construction; it would stimulate initiative and innovation in the development of new construction materials and techniques by making possible a prompt, wide market for such products; it would eliminate the conflict arising from responsibility for both issuance and enforcement of codes; and it would reduce the cost of research, testing, maintenance, and servicing of building codes.

Finally, the Commission concludes that even if the building industry continues to increase its efficiency and economy, the continuance of obsolete and diverse building codes will remain a formidable obstacle to the fullest exploitation of new technology. Remedial action is needed by local, State, and Federal governments, along the lines suggested below.

Recommendations

The Commission's recommendations are three-fold in nature and are designed to: (a) accelerate the modernization and updating of building codes, and take into account new developments in construction techniques and building materials;

Senator Mundt: "I believe the Commission was ill-advised in taking action on the draft report at this time. Although the Commission staff consulted with representatives of the building industry and availed itself of the views of State and local government officials, interested parties did not appear to have had sufficient time to make their views known and to study the final draft prepared before submission to the Commission. Because Housing and Urban Development officials characterize this subject as controversial, it is my view that the construction industries and other interested parties should have had additional time to present alternative proposals and that this matter should have been delayed until the next meeting of the Commission."

Representative Crank and State Senator DeStefano: "We also believe that the Commission should not take action at this time on the draft report. Certain

(b) encourage maximum uniformity in building codes; and (c) improve the quality of administration and personnel practices at the local level.

Nothing short of a major overhaul and restructuring of intergovernmental responsibilities for building codes will suffice to help meet anticipated housing and commercial construction needs of late twentieth century America.

The Federal role in building code modernization, uniformity, and administration has been essentially limited to scattered support of research and testing and establishment of general standards for federally aided housing. The State role has been limited largely to the adoption of mechanical and special-use codes and State enabling legislation for adoption of building codes by reference, with some exceptional examples of statewide mandatory minimum building codes, and model codes. With these exceptions, the regulation of building construction, possibly the largest segment of the Nation's economy, has been characterized by building code enactment, administration, and enforcement as a local government exercise of the police power.

New efforts at the Federal level are recommended to develop: (a) model national performance criteria and standards for building construction; (b) a comprehensive program of research leading to improved building technology; and (c) uniform standards among Federal departments and agencies responsible for programs of construction and housing loan insurance.

Under the broad police power available at the State and local levels the States have a significant responsibility to provide the framework and machinery within which the objectives of modernization and uniformity can be realized. Proposals are made for all States in areas in which only a few States to date have ventured, including: (a) adoption of statewide building codes; (b) expeditious appeals procedures for interpretation of local building code decisions, for prompt decisions on new products, and for recourse from arbitrary local action; and (c) a State program for licensing of building inspectors, training facilities to improve professional competence, and general supervision of local minimum standards of staffing and performance.

Within this restructured allocation of responsibilities--which the Commission believes is appropriate for an age of rapid communication, increased mobility, enhanced social expectations, and expanding technological breakthroughs--the great burden of building code administration and enforcement in the United States should continue as a responsibility of local government.

MODERNIZATION AND RESEARCH

Current activity in modernization of building codes is primarily concerned with increasing the flexibility and adaptability of code requirements to permit

segments of the building industry, the construction industry, and other interested parties affected by building codes, have requested additional time to study the draft report. It appears to us that additional time should be given to those interested in developing constructive comments and alternative recommendations to the report. Therefore, it is our view that this matter should be delayed until the next meeting of the Commission."

use of new building materials, components, and construction methods. However, major research is necessary to realize this goal, through the development of performance criteria and standards for building. As the performance concept becomes incorporated in building construction regulations, the full potential of expanded research in building technology can be made generally available.

Recommendation No. 1. National Program for Performance Standards Development

The Commission recommends that the Congress authorize and finance an immediate cooperative program, drawing upon recognized public and private efforts, designed to develop national performance criteria and standards and testing procedures for building construction.

The Commission urges that immediate attention be given to the difficult task of defining the performance concept in building. This project should receive the full support, both financial and technical, of government and the building industry. With the establishment of performance criteria, a major obstacle to modernizing building codes and standards would be removed. It is reasonable to assume that the line dividing reasonable from unreasonable requirements would be brought into sharper focus, that the criteria for judging innovations would be made on a sounder technical basis and that the opportunities for maximizing the production potential of the building industry would be substantial.

Many individuals and groups concerned with building are developing performance requirements, which can be used as code provisions, for the selection and specification of building materials, parts, and components. Progress has been slow for the lack of a method and program involving a cooperative and unified effort of the entire building community. Each segment of the building industry has developed its own approach to the problem as it might be applied to its own special requirements. While these individual approaches are legitimate and necessary, it has been extremely difficult to marshal the collective thinking and effort of industry to undertake a rationalization of the performance concept for building as a whole.

The present level of building technology has far to go in providing an adequate base from which to draw a complete picture of what constitutes "performance." The problems in developing performance requirements and methods of measurement are far more complex than the preparation of "specification type" provisions. The actual performance of a specific innovation may depend upon a complex interaction among many different materials and items of equipment. Also, an innovation suitable in one geographic area may be unsuitable in others because of climatic differences. Finally, it is difficult to define needed performance characteristics, and it is expensive to establish methods of measurements to enable a prediction of product performance over a long period of time.

Authorities in the field appear convinced that a number of benefits would accrue from utilization of the performance approach in the development of building codes. A more effective identification of those areas of building science and technology most in need of further research could be identified more easily and public and private research activity would be stimulated to fill those needs.

When it is possible to write true performance codes, such codes will of themselves allow for a more systematic development of new or improved building materials and components, reduce unnecessarily restrictive building practices, and provide a climate for greater attainment of economic efficiency in construction.

There must be a major research effort to permit the writing of a full and complete performance building codes. The program will require leadership and direction, and financial support. Appropriate Congressional action is needed to authorize, finance, and fix responsibility for leadership in developing and carrying out an advisory, comprehensive performance code program involving a cooperative and unified effort of the public and private sectors of our economy.

Recommendation No. 2. National Program for Building Construction Research

The Commission further recommends that a continuing national program of building research be established to: (a) identify and define areas within the building field requiring research; (b) fill gaps in existing knowledge through encouragement and support of research; (c) formulate a continuing program for the integration and continuity of knowledge and experience; and (d) provide for demonstration projects that would contribute significantly to building technology.

The Commission also recommends that the President direct Federal agencies having major policy or program responsibilities for construction, urban development and renewal, and associated activities, to cooperate in the developing of knowledge applicable to the solution of building problems.

A national program of building research is needed to accompany the recommended program for the development of the performance concept in building. Current building research in the United States, while displaying its own capacity for wide diversity, tends to reflect a narrow range of interests. Building research now being carried on by government, industry, academic institutions, and nonprofit research and professional organizations is essentially on an ad hoc basis. No single group or combination of them solely within the government, or within industry, academic institutions, and other elements of the private sector is likely to contribute the varied kinds of information most necessary for the broad advancement of building and housing technology. Government building and housing research is either oriented by the directives under which agencies operate or by the demands of specific projects. Research in industry is concentrated primarily on product development and application. Academic institutions, while not generally committed to a specific research orientation, are limited by available funds and personnel and much of their research is directed into programs sponsored by industry and government. Few nonprofit research and professional organizations have a continuing program to stimulate research and building problems.

The traditional approach in building research has been one of uncovering new knowledge about materials and their characteristics and the development of new and improved materials or uses thereof and then exploring ways of applying them to man's needs. A welcome shift in emphasis, however, is now beginning to occur.

An expanded cooperative research program should include: research grants to academic institutions and nonprofit organizations for use in paying salaries of investigators and acquiring equipment, supplies, and supporting facilities; research contracts to support projects in public and private agencies and organizations; "in-house" research by public agencies in the major areas of building science; fellowship grants to encourage competent individuals to undertake graduate training or to conduct research in the building field; and training grants to support specialized courses, conferences, and symposia designed to communicate research results to instructors, investigators, and practitioners in the building field.

A continuing national program of building research must have the confidence of both the private and public sectors. Financial contributions to the maximum extent from industry should be encouraged. Based on past experience, however, it is likely that much of the financial support for a cooperative program will have to come from Federal Government sources. Several agencies at the Federal level, such as the National Bureau of Standards, the Department of Housing and Urban Development, the Department of Defense, and others, have already made significant contributions to building research and development. The Building Research Advisory Board of the National Academy of Sciences, representing both public and private interests, has certain responsibilities for coordinating building research and development. Its Federal Construction Council encourages voluntary cooperation among Federal construction agencies in advancing building technology.

The Federal Government has a variety of opportunities to stimulate and demonstrate the creative use of new technology. It could provide an incentive for private industry research by offering initial markets for federally supported building construction which could serve as demonstrations of new possibilities. In the construction of new buildings and houses, for example, the Federal Government could adopt the approach used by the several California school districts which are part of a School Construction Systems Development program. By taking bids on 22 schools at a time, a large enough market was created to induce manufacturers to make new products and designs to meet the specifications of the schools, rather than create building designs based on existing equipment and processes.

A survey carried out by the Federal Construction Council of the Building Research Advisory Board lists 764 engineering investigations and studies pertinent to building construction conducted by Federal construction agencies since 1962. Thirty-five agencies are known to be directly or indirectly concerned with construction. In fiscal year 1964, almost 15 percent of the total value of all building and construction in the United States was accounted for by Federal procurement. In this respect, the Federal agencies could be a major innovator to set up new standards and promote technological innovation. Wherever possible, Federal purchasing practice should place primary emphasis on performance criteria rather than product specification criteria for items or services to be purchased. With emphasis on performance criteria, the Federal Government could encourage industry to innovate, it could foster cost reduction, and it could create new

markets with sufficient volume to encourage industry to free itself from local building code restrictions.

Because of the potential importance of the Federal role in stimulating building technology, the Commission suggests the President direct appropriate Federal agencies to cooperate in the development of knowledge applicable to the solution of building problems.

Recommendation No. 3. State Research and Information Efforts in Building Construction

The Commission urges that programs for research in building construction be established by appropriate State agencies and institutions of higher education and that appropriate technical information services be established for the dissemination of research findings to public officials and private businesses. Such research and information programs should be carried on within the context of a continuing national research effort recommended above.

The States and academic institutions should be encouraged to establish programs for research in building construction and to provide for appropriate technical information services for public officials and private business. Such programs should complement and be coordinated with the continuing national research effort.

The university has a special position and responsibility to encourage research in building construction. It is ideally suited to bring together government, industry, labor, and community groups to focus on problems of building technology.

Some States, including Kentucky, Mississippi, North Carolina, and Texas, have budgeted funds in support of university research centers to encourage efficient utilization of the State's economic resources. Such programs might also include research to advance building technology. Areas of research particularly appropriate for agencies of the States would likely be those of a more localized character arising from the geographic, climatic, and economic characteristics peculiar to the region. There is, furthermore, another advantage to encouraging research efforts at the local level. The concept of local and State governments as "laboratories of experimentation" would provide substantial gains in achieving a total national effort to broaden research in building.

UNIFORMITY

There are many thousands of local jurisdictions in the United States administering and enforcing building codes. It has been found that many of these codes vary greatly from place to place thereby resulting in burdens on the building industry that limit initiative and innovation in the development of new construction materials and techniques. Such diversity also results in excessive

requirements adding to the cost of construction, narrows the market for such products; and increases the cost of research, testing, maintenance, and servicing of the many building codes.

Traditionally, building code preparation, administration, and enforcement has been delegated to local governments by the States as an exercise of its police powers. State governments, however, are also involved in administering their own building and mechanical codes and several Federal Government agencies have established building standards for their operating programs, such as the Federal Housing Administration, the Department of Defense, the General Services Administration, and the Farmers Home Administration. In many instances, the requirements established at all three levels of government differ, adding to duplication and overlapping authority.

While the following recommendations are directed to Federal, State, and local government actions, the building industry itself has a major role in the development of testing procedures and standards that may be incorporated in government regulations and codes applying to building materials and construction methods. It is important to recognize that a high degree of cooperation must exist between public authorities and private industry in the development of uniform building regulations.

Concern for the wide diversity of building code requirements was expressed in President Johnson's 1965 "cities" message to the Congress. He emphasized the "...need to study the structure of building codes across the country, their impact on housing costs, how building codes can be simplified and made more uniform...." To carry out this assignment, among others, the President recommended the establishment of a Temporary National Commission on Codes, Zoning, Taxation and Development Standards.

This need for building code modernization and uniformity was recognized by the 89th Congress. In the 1965 Housing Act, Congress assigned to the Department of Housing and Urban Development the responsibility to study building codes and "...their impact on housing and building costs, how they can be simplified, improved, and enforced at the local level, and what methods might be adopted to promote more uniform building codes and the acceptance of technical innovations including new building practices and materials...."

Independently, the National Commission on Technology, Automation, and Economic Progress, established by Public Law 88-444 made a number of recommendations affecting building research and building code modernization, uniformity, and administration in its January 1966 report. That Commission recognized the great need for housing reform through development of new materials and methods of construction. However, it noted that new technologies at the present time are difficult to adapt to mass production so long as there are thousands of different local building codes in the United States. It urged the Federal Government to "take the lead in modernizing building codes and removing obstacles to new technologies." The National Commission urged that "the Federal Government, in consultation with the States and the construction industry and the building trade unions, develop an acceptable model code."

The Advisory Commission believes that the achievement of uniformity and enforcement of desirable standards for building construction, including mechanical and special use features, is a joint responsibility of all levels of government. While the Federal Government's regulatory role is essentially limited to

direct government construction and loan or grant programs, it can use its considerable resources to encourage uniformity in the adoption of building regulations at the State and local level. In the first of the following recommendations, we propose bringing together the many diverse groups, public and private, for development of a voluntary national model building code.

State governments in the exercise of their powers have the direct constitutional authority and obligation to protect public health and welfare, and to further social objectives desired by the State. A considerable but varying proportion of this authority resides with local government, either as a result of legislation or constitutional home rule provisions. All of the recommendations to the States are based on the assumption that local governments will continue to have a major role in the regulation of building construction within their borders. Such regulation could cover the whole range of necessary subject matter.

Action at the Federal Level to Achieve Uniformity

In order to facilitate achievement of the uniformity necessary to assure a national market for new building products, and to establish technically competent performance standards for building materials to meet health and safety requirements, a generally accepted national uniform model code is needed for use by the various levels of government in their administration of building regulations.

Recommendation No. 4. Development of a Model Code by a National Commission*

The Commission recommends that the President either appoint a drafting group representing all levels of government to develop a model code with the participation of the model code groups and other interested public and private groups or, in the event the Temporary National Commission on Codes, Zoning, Taxation and Development Standards is established in accordance with the President's 1965 message on cities to Congress, the Commission's charge be expanded to include

* Representative Crank dissents from this recommendation and states:

"I am opposed to this recommendation calling for the development of a model code by a national commission. It is my preference that the Commission recommend that the President instruct all departments and agencies with direct responsibility for building construction to develop and use common, simple standards to the greatest extent possible; and that the Commission recommend to the various States that legislation be enacted authorizing and directing an appropriate State agency to prepare and promulgate a comprehensive model building code. I would prefer to exhaust these possibilities before requesting that the Federal government attempt to establish a code which would apply to the entire United States."

a similar assignment. In its report to the President, the code-writing group should recommend appropriate permanent machinery for keeping the code revised and up-to-date and as well as a products approval program to certify new products as to their conformance with code provisions.

The benefits resulting from a widely-adopted uniform model building code may be summarized as follows:

- (a) Elimination of arbitrary restrictions which add unnecessarily to the cost of construction and the price to the buyer.
- (b) Stimulation of initiative and innovation on the part of material suppliers and builders by reducing the cost and delay involved in securing wide approval.
- (c) Improvement of the legal climate for codes by relieving enforcement agencies of conflicting responsibility for the promulgation as well as the enforcement of codes.
- (d) Assistance to code-promulgation bodies having limited access to technical guidance in resisting the prejudicial influence of self-serving voluntary advisors by making available the benefits of technically sound conclusions embodied in a uniform code.
- (e) Assist in combining and harmonizing standards originating in different industry groups. These would be brought into proper relationship in a uniform code.
- (f) Reduction in the cost and the local technical requirements for maintaining and servicing a code which would be kept abreast of the demands of a modern building industry by the promulgating agency.
- (g) Assist in the training and in establishing qualifications of local inspectors needed for rational, as distinct from arbitrary, interpretation of a code.

The need for a comprehensive national model code incorporating the latest available performance type approaches and reflecting the best possible technical knowledge and skills is pressing enough to warrant the establishment of a national building code commission representing all levels of government and appropriate elements of the building industry. The Commission believes a presidentially appointed group would be a most effective way of developing a model building code for use on a voluntary basis throughout the country. Such a body will have the capacity to bring together interested public and private groups, be free from domination or appearance of domination by the actions of government, be able to represent many different points of view, and enlist persons of high reputation and competence. The Commission could be staffed independently or with appropriate Federal personnel from agencies with experience in code development and building technology.

The Commission should draw upon the technical competence and skills of

State, local, and private groups. Personnel in several Federal agencies also constitute an important resource in aiding the code drafting group. For example, the National Bureau of Standards has had long experience in research and the development of test methods for evaluating the building materials and products and participates in the work of many national groups now engaged in establishing voluntary standards. The Department of Housing and Urban Development has also administered programs concerned with building codes through the provision of technical financial assistance for local building code preparation, administration and enforcement. Personnel in other Federal agencies, including the General Services Administration, the Department of Defense, the Department of Commerce, and the Department of Agriculture, would also provide valuable technical knowledge.

The full potential of a national model code can be realized only if the model is widely adopted throughout the Nation. Federal and State actions to achieve this objective are set forth in two recommendations which follow. As an early first step in this direction, all Federal construction agencies should consider using those standards of the model code appropriate to their program responsibilities. This step would directly affect a significant portion of the construction market in the country, and would, in addition, serve as a "yardstick" in influencing decisions regarding the regulation of all construction.

The importance of effective enforcement is recognized by the Commission in Recommendations No. 9 and 10. Properly qualified enforcement officers are essential and any comprehensive program for development of a uniform code must include programs for training of building officials.

The code-writing group should recommend appropriate permanent machinery for keeping the code revised and up-to-date. It should also consider and recommend a program for products approval to certify new building materials, systems, and components as to their conformance with code provisions. This approval program would provide new channels to speed building materials and components from the drawing boards into general use. Competent independent and institutional laboratories presently engaged in testing building materials and components should continue to perform tests established by standards-making bodies. Building innovations tested in an approved manner and indicating satisfactory levels of performance, would receive an endorsement thus ensuring automatic acceptance under the national model code. If the activities of existing organizations can be welded into an orderly mechanism, the Commission foresees the day when complete building systems will be proposed, evaluated, and approved for use throughout the country at a much greater speed and less cost than is possible today.

Recommendation No. 5. Uniform Standards for Federal Construction

The Commission recommends that the President instruct all departments and agencies with direct responsibility for building construction, such as the General Services Administration and the Department of Defense, or with responsibility for establishing standards governing construction under programs administered by them, such as the Federal Housing Administration and the Farmers Home

Administration, to develop and use a common set of standards to the greatest extent possible.

An immediate step toward encouraging uniformity in building standards could be taken by the Federal agencies with responsibility for building construction and for setting program requirements for construction through the development of common standards.

Standards and specifications developed by the Federal Government represent the definition of technical requirements for products and services by the largest consumer in the world. Aside from the statutory obligation of the government to procure material at optimum value, the sheer volume of government consumption and its mandate to buy competitively from many supply sources, has resulted in a complex array of definitions of technical requirements to assure quality.

The standardization program of the Department of Defense is directed toward the development of specifications in standards for equipment, supplies, and related engineering practices. More than 35,000 specifications and standards support procurement and development of equipment and supplies for the military forces. The Department of Commerce sponsors standards development programs as a service to industry in order to stabilize the level of quality in products to be offered to consumers. This program has developed 365 "Commercial Standards" and "Simplified Practice Recommendations." The General Services Administration is charged with the responsibility for development of standards specifications and standards for equipment, supplies, and related engineering practices used by more than one agency of the Federal Government. These criteria, known as "Federal Specifications and Standards," are often used by private industry and by State and local governments. More than 4,000 specifications and 200 standards have been developed under this program to guide procurement of the Federal Government.

A recent report of a special advisory panel of the U. S. Department of Commerce Technical Advisory Board concluded that duplication in certain areas of government standards and industrial standards is caused, in part, by Congress enacting statutory requirements for Federal agencies that eventually may result in development of standards and specifications conflicting with existing Federal and industrial standards. Other factors contributing to duplication of effort were identified: the lack of communication among standards developing groups; the multiplicity of interest and objectives of the technical societies, trade associations, and industry groups required to develop standards and specifications to meet individual group needs; overlapping operations between groups in government and industry in developing standards for the same classes of products or materials; and inadequate use of existing coordinating facilities of the American Standards Association.

Several major Federal-aid program requirements affect building construction and codes. The Minimum Property Standards of the Federal Housing Administration have an impact on building standards that go beyond their application to the mortgage insurance program. To assure as broad a market as possible for their products, materials manufacturers' product design must be based on FHA approval. The FHA, in addition to its basic programs of mortgage insurance, has a variety of special-purpose programs including: cooperative and condominium housing; housing for families of low or moderate income, and for families displaced

by governmental action in urban renewal areas; housing for the military; housing for the elderly; nursing homes; and experimental housing. The Farmers Home Administration provides direct loans to individuals through its Rural Housing Loan Program. This agency makes its own review of building plans and inspects construction as it progresses, in addition to any inspections made by local officials enforcing local codes and ordinances.

Construction requirements for Federal buildings are administered by the General Services Administration. The standards contained in nationally recognized model building codes are followed as minimum requirements in the design and construction of new Federal buildings. The GSA also follows the National Plumbing Code and the National Electrical Code, but its materials requirements generally exceed the requirements of both model codes. Another construction agency, the Public Housing Administration of the Department of Housing and Urban Development, has established its own construction specifications for public housing dwelling units. The PHA requirements are primarily of the "specification" rather than the "performance" type. In response to criticism of the rigidity of the agency's specification-type requirements, attempts are now being made to include more flexible performance-type criteria in PHA housing specifications.

The design standards of federally-owned housing (exclusive of military barracks) for Federal personnel and for employees of government contractors were developed in cooperation with various Federal agencies responsible for family housing construction and FHA's Minimum Property Standards. These standards were developed at the request of the Bureau of the Budget several years ago by the House and Home Finance Agency and illustrate an example of interagency cooperation in the development of a single set of construction standards and criteria.

Federal programs presently consist of a variety of separate activities within different departments, agencies, and military commands--some highly coordinated and others poorly coordinated. The Commission urges the President, therefore, to instruct departments and agencies with responsibility for building construction and for responsibilities in establishing standards governing construction to develop and use a common set of standards to the greatest extent possible.

Action by State Governments to Achieve Uniformity

State governments and their local units occupy a key position in efforts to modernize building codes and to achieve uniformity. Federal action toward these goals, while of great significance where direct Federal programs including grants and loan guarantees are involved, will still leave the great bulk of the building construction activity in the Nation outside its direct impact. It is at the State and local level that broad police power exist to regulate all phases of building construction. Furthermore, regardless of the decision as to the particular jurisdiction which should be responsible for developing and promulgating building construction standards and codes, the major ultimate responsibility for administration and enforcement of building regulations will remain with local jurisdictions. States, therefore, have a significant responsibility to provide the framework within which the objectives of modernization and uniformity can be realized.

Recommendation No. 6. Development of a State Model Building Code

The Commission recommends that the States enact legislation authorizing and directing a State agency to prepare and promulgate a comprehensive model building code with a products approval procedure for permissive adoption by local political subdivisions. The State enabling legislation should specify that local jurisdictions may not alter the model code except on specific approval of the State agency and should establish an appellate body to hear appeals from decisions of adopting local jurisdictions on the application of the code. To the extent possible State model codes should adhere to nationally recognized models. The Commission urges the adoption of such a State model code by local governments.

The Commission encourages State and local governments to make full use of funds available under Section 701 of the Housing Act of 1954 to undertake studies, services, and other activities necessary for adoption of the model code.

The Commission recommends that those government agencies at the State and local levels responsible for operating and construction programs incorporate the standards of the State model code as their rules and regulations for public construction.

To encourage uniformity in building codes, the Commission further recommends that States consider legislation establishing a uniform policy of conditioning loans and grants to local governments upon conformance of aided projects to the State model code.

Direct action by State government to further the adoption of modern and uniform codes throughout the State can be achieved through the development and maintenance of a model State building code. Such State codes should conform to the maximum extent possible to the national model code recommended earlier. A State code as recommended above does not disturb the traditional authority of municipalities and counties over the administration and enforcement of building regulations. It does, however, make available to localities the resources of State government in developing performance-type code provisions. The State can maintain its own research facilities and a staff of trained architects and engineers and other specialists. It can evaluate new building materials and devices

and adopt appropriate standards, model codes, and product approvals of national groups to assist in keeping the State model up-to-date with the latest developments of the building industry.

The objective of uniformity is furthered by requiring, as in New York State, that once the model State code is adopted locally, the communities maintain the code in a uniform fashion except as exceptions are authorized by the State administering agency.

One of the difficult policy and administrative problems in connection with the enforcement of building codes is the need to get expeditious decisions regarding specific new products and building techniques. Local enforcement agencies and inspectors may lack the equipment, the technical knowledge and ability, and the familiarity with new products and techniques to provide adequate evaluation. Furthermore, efforts may be made to protect certain established products and techniques at the cost of new approaches. Lodging authority for testing new products and new construction methods in the State model code agency with adequate technical staff to evaluate products or tests performed by others would minimize this problem. Certificates of approval could be issued centrally and act as guidance to localities adopting the State model code. This would maintain uniformity in the application of the State model building code standards and facilitate the introduction of new products and technologies.

A State level board of appeals provides an administrative avenue of relief for all those aggrieved by the decisions of local governments participating in the State model code program. This is essential to promote uniform interpretation of State provisions and minimize variances introduced as a result of local enforcement.

The Commission notes with concern that no States have applied for Federal 701 assistance for preparation of statewide building codes or regulations. It is suggested that necessary informational material be prepared by officials of the Department of Housing and Urban Development setting forth program guidelines for assistance to State activity in this field. Several examples, including Atlanta and the National Capital area, may be found where officials are seeking to unify and update local building codes with Federal financial assistance. Programs for metropolitan building code uniformity would be an appropriate endeavor for many other metropolitan councils of elected officials and areawide planning agencies throughout the country.

The full potential of a State model code in reducing the conflicting and unduly restrictive provisions of local building codes that discourage innovation and experimentation can be realized only if the model is uniformly adopted throughout the State. Federal construction agencies were urged to incorporate standards of the national model code--similarly, all State and local government construction agencies should adopt the standards of the State model code for their public construction programs. A further step that might be taken by the States to obtain uniformity is to require that all local projects aided with public grants or loans conform to the provisions of the State model code. Such action would have particular significance in connection with State aid for educational, institutional, hospital, and similar projects. It would also have application in those few States administering low- and middle-income housing programs.

Recommendation No. 7. Establishment of a State Construction Review Agency to Develop Statewide Standards Through an Appeals Procedure

In order to provide for the establishment of uniform State standards governing building construction through an evolutionary process as the need arises, the Commission recommends that States enact legislation creating a building construction review agency at the State level to consider appeals by affected parties from the decisions of local government. Through its decisions the review agency would establish uniform interpretation of standards.

Most local building codes provide some type of machinery for appeal from the decisions of the building officials. The powers and duties of the local appeal agency, usually composed of experts in the field of construction, are specified in the building code. A well drafted code would also provide for court review from a decision of the building officials or from the decision of the appeals board.

Administrative appeals from actions of building officials are generally based on one or more of the following grounds:

- (a) that the building official has incorrectly interpreted the provision of the building code;
- (b) that the building official was in error in not holding that an equally good or better form of construction could be used; and
- (c) that there are practical difficulties involved in carrying out structural or mechanical requirements of the code and the building officials should vary or modify such requirements, assuming that the spirit and intent of the law are observed and public welfare and safety are assured.

As building codes are being drafted more in terms of technical performance standards, it may be expected that the technical findings of the local appeals board will be as important as its findings concerning matters of law.

The purpose of the foregoing recommendation is to facilitate the introduction of new materials of construction and building systems by providing an alternative to the costly and time-consuming procedures of approval established in each individual community. In providing for the establishment of a construction review agency at the State level to hear appeals from local building code actions and to approve alternatives to the material and method of construction specified in the local code, building code uniformity could be achieved within the State.

The State may establish a building construction review agency and may at the same time carry out the program for a State model code as set forth earlier in this report. In this instance, the jurisdiction of the construction review agency would be limited to those localities not adopting the State model code.

Those States not wishing to enact legislation for the establishment of a State model code may, on the other hand, prefer the approach of working toward uniformity through establishment of a State construction review agency. This approach, however, would likely take longer to achieve statewide uniformity as initiative for the introduction of new materials and building systems would rest with builders and developers.

The State review board would be authorized to use as its "yardstick" nationally recognized standards or codes in determining whether relief should be granted. Appellants could include builders, materials' manufacturers, architects, owners, and other affected parties. Appellants would base appeals on the conformance of the proposed use of a material component, system, or construction method with standards nationally recognized and accepted by the State review agency.

As an alternative to a State construction review agency, legislation might be enacted requiring establishment of a review agency only in metropolitan areas of the State. Such a requirement would assist in establishing uniformity in those areas within a State where the bulk of the problem is concentrated while preserving the traditional structure of local building code adoption and enforcement for most areas of the State.

Recommendation No. 8. Enabling Legislation for Local Adoption by Reference of Model Codes

The Commission recommends that the States pass appropriate legislation:

(a) enabling local jurisdictions to adopt a recognized uniform building code by reference; (b) permitting local jurisdictions to adopt future changes made in such recognized model codes by administrative rather than legislative action.

The Commission reiterates its position set forth in the report Metropolitan Social and Economic Disparities: Implications for Intergovernmental Relations in Central Cities and Suburbs, adopted in 1965, that the States enact "...legislation authorizing the adoption of uniform...building...codes within metropolitan areas and action by local governments to utilize such authority." One of the most politically feasible immediate ways in which the use of modern building code standards and provisions can be encouraged is for States to enact enabling legislation allowing local governments to adopt recognized model uniform building codes by reference. Draft legislation, authorizing municipalities to incorporate by reference the provisions of nationally known technical codes and model codes prepared by Federal, State, county, metropolitan, or regional agencies for local governments within the boundaries of such county or agencies, is contained in the 1966 State Legislative Program of the Advisory Commission. Under the provisions of adoption-by-reference statutes, local governments are relieved of the expense of printing the lengthy ordinance language necessary to adopt a building code.

The Commission also recommends that States permit the incorporation of changes made by the model code promulgating body into the local code by administrative rather than legislative action. Experience shows that many municipalities are slow to incorporate model code changes into their codes and consequently

are enforcing outdated municipal building codes. Any unnecessary lag by municipal legislative bodies in incorporating changes may result in an unnecessary increase in building costs and even a decrease in health and safety protection.

Authorization of adoption by reference of codes prepared by county, metropolitan, and regional agencies is of particular significance. Uniform code committees, representing local governments within the metropolitan area, have been established in several places in the country. In Denver, the surrounding counties and incorporated municipalities formed the Metro Building Code Committee to prepare a comprehensive uniform building code for adoption by the local governments within the metropolitan area. The uniform code developed by the committee has been adopted by Denver and the other participating governments intend to adopt the Denver code by reference. In Atlanta, the Metropolitan Planning Commission is undertaking preparation of uniform housing, plumbing, and building codes for adoption throughout the five-county planning area. Uniform code committees have also been established in San Francisco and Detroit to develop uniform standards and in the Washington, D. C., metropolitan area, a committee of the Council of Governments, representing the local governments in Virginia and Maryland, is preparing a uniform plumbing code for adoption by reference. State enabling legislation, therefore, should authorize municipalities to adopt by reference codes prepared by such county or metropolitan committees where such codes are readily available to the general public.

The enabling acts of a few States expressly permit local governments to adopt model codes by reference including, prospectively, amendments as may be subsequently made. A few other States authorize approval by administrative action of amendments made by the model code promulgating group. However, in some States this would create a legal problem involving delegation of legislative power by the municipal law-making body. While the attempt to keep the building code current is commendable, caution must be exercised. A possible method of avoiding the legal objection to either of the approaches for incorporating amendments is to permit localities to state the general standards of health and safety in building construction in the local ordinance and give to an administrative agency the right to promulgate regulations consistent with those standards. The agency is then free to adopt as regulations the current edition of the model code, and any subsequent amendments. It could be required that administrative regulations incorporating a model code and amendments be laid before the local legislative body for a stated number of days subject to veto, before they become effective.

PROFESSIONALIZATION OF PERSONNEL AND IMPROVEMENT OF ADMINISTRATION

Administering and enforcing building regulations efficiently and equitably is primarily a matter of personnel and organization. Once there is recognition that building inspection requires technical competence, certain prerequisites for a successful enforcement program become clear. The following recommendations, directed to the States, are concerned with the need for professionalizing and up-grading local and State building inspection practices, including the licensing of building inspectors, conduct of training programs, and establishment of minimum staffing requirements.

Recommendation No. 9. State Licensing of Building Inspectors*

The Commission recommends that a State supervisory agency be empowered to establish professional qualifications for building inspectors and license candidates as to their fitness for employment on the basis of examinations given by it, or of examination satisfactory to it given by a State or local agency. The State agency should be able to revoke licenses for good and sufficient cause.

States may wish to provide a State salary supplement for local building code inspectors to compensate for the higher salary requirements that would result from the licensing program.

The qualifications possessed by many building officials are inadequate to properly advise on the administration of modern performance-type building codes. While it is possible that these officials can deal competently with the ordinary run of traditional buildings, the advances expected in building technology will demand a more expert knowledge of a wide variety of building practices and materials. As building codes are drafted to cope with these new trends in building, the capabilities of the officials must be adequate for administering codes incorporating performance standards.

It should be noted that professionalization means more than requiring qualifying examinations and certification. To challenge persons of ability, to recruit and hold such people, the work must be made professionally attractive by adequate salaries and provision of opportunities for advancement in compensation and responsibilities.

It can be expected that under a State licensing program, salaries of local building inspectors would have to be increased to attract candidates with necessary qualifications. States may wish to consider a program of State salary supplements to accompany the adoption of licensing. Recent examples of State salary supplement programs can be cited for tax assessors in Maryland and for sewage treatment plant operators who meet State technical qualifications in New York. Availability of State money could be related to minimum staffing requirements as suggested in the following recommendation and also related to available local financial resources, including income from building permit fees.

* State Senator DeStefano and Mayor Goldner dissent from this recommendation and state:

"We oppose this recommendation as an unnecessary and unwarranted extension of State government in local affairs. If local government officials are to be held responsible for the quality of public services, they should retain the right of determining the qualifications of their public employees who perform such services."

Recommendation No. 10. Training Programs for Building Inspectors

The Commission recommends the enactment of State legislation authorizing and supporting the training of building inspectors including provision for cooperative arrangements among State agencies, educational institutions and the appropriate building officials organizations in planning and conducting pre-entry courses of study, and providing or arranging for regular internship training programs.

The Commission recommends that grants to States and local governments available under Title VIII of the Housing Act of 1964 be utilized by State and local governments to develop training programs for building inspectors.

This recommendation has been derived in large part from the programs of the Building Officials Conference of America, the International Building Officials Conference, and the Southern Building Code Congress. The objectives of these three building officials' organizations to increase the competence of their individual members constitute a major part of their efforts. This activity should be encouraged and supported. It represents a most important present and potential contribution to the improvement and modernization of building construction regulation throughout the country.

Technical services to member municipalities by the code groups fill a vital need. They should continue to be expanded and strengthened, and utilized by all local governments. Organizations, such as the International City Managers' Association, the American Society of Planning Officials, the National Association of Housing and Redevelopment Officials, and others, also have strong technical information services widely used by professional administrators to support and strengthen their own resources. Professional associations of building officials have a similar role to perform that should be fully developed and supported by government at all levels.

Pre-entry and in-service training of building inspectors is an indispensable prerequisite for a code enforcement program. Competent, knowledgeable inspectors, with an established reputation for honesty and sound judgment are a priceless asset and should be considered the pre-condition for the ideal development of building code enforcement programs. Because so many inspectors, especially in building safety inspection, are "second-career" men who enter code enforcement after years of tutelage in the crafts and trades, some attention must be directed to assuring that public service values are instilled and maintained.

The true function of in-service training is to advance the professional capabilities of building inspectors who, through appointment, are career public employees. Extension courses, correspondence courses, and seminars conducted by universities have been undertaken in a few States, such as Connecticut, New York, New Jersey, Pennsylvania, and North Carolina. These courses are usually joint undertakings of a college or university and one of the national or State building

officials organizations. The training programs of the Building Officials Conference of America, the International Conference of Building Officials, and the Southern Building Code Congress have had an influential role in the advancement of professional training. These programs should be encouraged and expanded.

The Housing Act of 1964 authorizes matching grants to States to assist in establishing and expanding training programs for technical and professional people employed by a governmental or public body responsible for community development. Training programs for building officials would undoubtedly qualify under the provisions of the Act. Unfortunately, no appropriations have been made to date by the Congress pursuant to the authorization. The Commission hopes that adequate appropriations will be made for the initiation of this program.

Recommendation No. 11. Provision of Local Building Inspection Services*

The Commission recommends that the State legislature establish, or authorize the State supervisory agency to establish minimum staffing requirements for building inspection in all local government jurisdictions, authorize local governments to enter into interlocal agreements for building inspection services to meet such minimum requirements, and empower a State agency to provide both direct and reimbursable building inspection services to local governments.

In order to achieve the most efficient use of available trained and qualified manpower, on-site construction inspection services should be centralized to the extent feasible among the various State and local agencies administering any of the building construction and mechanical or special codes.

This recommendation is designed to advance the level of competence of local inspection practices. Minimum staffing requirements established by a State agency would undoubtedly be expected to lead to some difficulties for the smaller jurisdictions if they are required to employ full-time officials. There are, however, ways in which this difficulty may be overcome. Two or more small municipalities may jointly employ a single building inspector, enter into an agreement

* Mayor Goldner dissents from a portion of this recommendation and states:

"I oppose the provision of this recommendation authorizing 'the State supervisory agency to establish minimum staff requirements for building inspection in all local government jurisdictions...' on the same basis that I dissent from Recommendation No. 9. While I am in sympathy with the need to advance the level of competence of local inspection practices, I believe that the responsibility for establishing staffing requirements should rest with the code enforcing jurisdiction."

with the county for part-time employment of an inspector, employ a professional consultant, or join with several other jurisdictions for the purpose of building code administration. Under certain circumstances State governments may want to consider salary supplements, as mentioned in an earlier recommendation, to assist local governments in meeting their staffing requirements with qualified personnel.

In order to avoid overlapping and duplication of inspections with the attendant waste of manpower, inspectional duties can frequently be combined. The flexibility introduced by using as broadly qualified inspectors as possible with a minimum of specialization, allows the most efficient use of 'available inspectors' time and keeps staff needs at a minimum. It may then prove unnecessary to maintain separate on-site inspection services for all of the various mechanical and special-use codes.

CONCLUDING OBSERVATIONS

Repeatedly throughout this report the Commission has emphasized that the intergovernmental problems of building code preparation and administration are incredibly complex. The recommendations in this report are designed to deal with these problems in urging: modernizing and updating building codes through establishment of a national program for performance standards development and building research; reducing housing costs through greater uniformity of building codes and regulations; and improving the quality of personnel and administrative practices of enforcement agencies.

In the Commission's report on Metropolitan Social and Economic Disparities: Implications for Intergovernmental Relations in Central Cities and Suburbs, a number of actions were recommended to all levels of government that would tend to increase freedom of choice in housing for all income groups in metropolitan areas and would tend to make available more housing, particularly for persons who are economically and socially disadvantaged. Among these were measures to use zoning as a means to permit a wider range of housing prices, amendments to Federal and State housing statutes to diversify and disperse low-income housing, and encouragement of State-Federal cooperation in administering laws banning discrimination in housing. In a more recent report, Relocation: Unequal Treatment of People and Businesses Displaced by Governments, the Commission stated that the most difficult problem in relocating people is finding adequate housing for low-income groups and recommended that assurance of availability of housing be required prior to dislocation.

This report is pointed toward certain building regulatory practices of a governmental nature that tend to inhibit advancement of housing and building technology and thereby delay developments that could make housing more widely available at a broader range of prices. The existence of many thousands of different local codes imposes burdens on the building industry that limit initiative and innovation in the development of new construction materials and techniques and result in excessive requirements adding to the cost of construction. Nothing short of a major overhaul and restructuring of intergovernmental responsibilities for building codes will suffice to meet the housing and commercial construction needs of late twentieth century America. In addition, the building industry, its unions, its suppliers, the mortgage bankers, and consumers must share responsibilities in creating the best possible environment achievable in an age of advanced technology. Finally, new creative combinations of public and private initiative must be found to explore and develop more meaningful, rather than merely more productive technologies.

The Commission believes that a sound intergovernmental framework can assist in meeting the social and economic problems of housing within metropolitan areas through technological advancement and sound regulatory practices. The foregoing recommendations, involving complementary actions by local, State, and Federal governments, should stimulate the application of constantly advancing technology to housing problems. With responsible public leadership this can result in the creation of better housing and a better living environment for all its citizens.

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- Investment of Idle Cash Balances by State and Local Governments. Report A-3. January 1961. 61 p., printed.
- Investment of Idle Cash Balances by State and Local Governments--A Supplement to Report A-3. January 1965. 16 p., offset.
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- Local Nonproperty Taxes and the Coordinating Role of the State. Report A-9. September 1961. 68 p., offset.
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- Alternative Approaches to Governmental Reorganization in Metropolitan Areas. Report A-11. June 1962. 88 p., offset.
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- *The Role of the States in Strengthening the Property Tax. Report A-17. June 1963. (2 volumes), printed (\$1.25 each).
- Industrial Development Bond Financing. Report A-18. June 1963. 96 p., offset.
- The Role of Equalization in Federal Grants. Report A-19. January 1964. 258 p., offset.
- Grant-in-Aid Programs Enacted by the 2nd Session of the 88th Congress--A Supplement to Report A-19. March 1965. 22 p., offset.
- Impact of Federal Urban Development Programs on Local Government Organization and Planning. Report A-20. January 1964. 198 p., U. S. Senate, Committee on Government Operations, Committee Print. 88th Congress, 2d Session.
- Statutory and Administrative Controls Associated with Federal Grants for Public Assistance. Report A-21. May 1964. 108 p., printed.
- The Problem of Special Districts in American Government. Report A-22. May 1964. 112 p., printed.
- The Intergovernmental Aspects of Documentary Taxes. Report A-23. September 1964. 29 p., offset.
- State-Federal Overlapping in Cigarette Taxes. Report A-24. September 1964. 62 p., offset.
- Metropolitan Social and Economic Disparities: Implications for Intergovernmental Relations in Central Cities and Suburbs. Report A-25. January 1965. 253 p., offset.
- Relocation: Unequal Treatment of People and Businesses Displaced by Governments. Report A-26. January 1965. 141 p., offset.
- Federal-State Coordination of Personal Income Taxes. Report A-27. October 1965. 203 p., offset.
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- *Measures of State and Local Fiscal Capacity and Tax Effort. Report M-16. October 1962. 150 p., printed (\$1.00).
- *Performance of Urban Functions: Local and Areawide. Report M-21. September 1963. 281 p., offset (\$1.50).
- *Tax Overlapping in the United States, 1964. Report M-23. July 1964. 235 p., printed (\$1.50).
- State Technical Assistance to Local Debt Management. Report M-26. January 1965. 80 p., offset.
- 1966 State Legislative Program of the Advisory Commission on Intergovernmental Relations. Report M-27. October 1965. 483 p., offset.

1/ Single copies of reports may be obtained without charge from the Advisory Commission on Intergovernmental Relations, Washington, D. C. 20575. Multiple copies of items marked with asterisk (*) may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

