NATIONAL BUREAU OF STANDARDS REPORT

9585

RECOMMENDATIONS TO THE AGENCY FOR INTERNATIONAL DEVELOPMENT FOR THE IMPLEMENTATION OF A NATIONAL BUILDING CODE SYSTEM FOR COLOMBIA, S. A.

BY

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Codes and Standards Section
Building Research Division

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U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

THE NATIONAL BUREAU OF STANDARDS

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This report covers the developing situation in Colombia regarding building codes and related standards. It is intended as a recapitulation of existing working arrangements and contains suggestions for future activities of the principal supporters of the Colombian code activity; ICONTEC (Instituto Colombiano de Normas Tecnicas), CCC (Centro Colombiana de las Construccion), AID (Agency for International Development, and the code group appointed by the city of Medellin.

At the present time there are three major groups directly involved in this Colombian building code activity: ICONTEC, the city of Bogota, and the city of Medellin. In addition, the city of Cali is known to have initiated a code development program and it is believed that other cities in Colombia are becoming increasingly interested in the subject of better building regulations.

In ICONTEC this activity is proceeding in three code areas: Plumbing, electrical, and elevators. A general building construction code, covering not only the structural and design elements of a building but also the plumbing, electrical, heating-cooling-ventilation, and elevator safety requirements, is being prepared for the city of Bogota by the CCC. A similar code is to be prepared for the city of Medellin by an officially appointed group in that city.

The ICONTEC plumbing code subcommittee, C13.5 - Instalaciones Sanitarias, has been formed in accordance with the procedures of ICONTEC and has as its goal the development and maintenance of a Colombian national plumbing code. The chairman of this 15 member committee is Dr. Bernardo Gomez and the technical secretary is Dr. Santiago Escallon. The electrical code and the elevator code committees have also been recognized by ICONTEC and are working towards the development of ICONTEC standards that, like

the plumbing code, could become the official codes of Colombia. At the present time there is no established ICONTEC building code committee.

The CCC (Centro Colombiana de la Construccion), a private Comombian organization that is an affiliate of Bouwcentrum in Rotterdam, has received a contract from the city of Bogota for the development of an acceptable building code system, primarily intended for the use of the city of Bogota. The CCC group, headed by Dr. Gabriel Andrade, has approximately one year to develop and deliver the expected comprehensive code system. Dr. Andrade's staff assistant, Dr. Alvaro Silva, will coordinate this activity. The CCC, in undertaking the work of developing this code will make use of an advisory committee composed of representatives from the Society of Architects, the Society of Engineers, the city of Bogota, CAMACOL (Camara Colombiana de la Construccion) and will include a representative from ICONTEC as a liaison member.

The city of Medellin (second in size to Bogota) has passed an act requiring the development of a comprehensive building code for its own use. The city has an autonomous board in charge of all public service installations, such as sewers, water mains, electricity, telephones, etc. One of this group has been appointed to the code development committee, consisting of two engineers and two technicians from the government staff. In addition, two outside consultants, Dr. Juan Jose Posada, an architect, and Dr. Jaime Munoz Duque, an engineer, have also been appointed to the committee. This official group has a tentative target date of 6 months.

The preceding outline of the framework of this extensive building code activity indicates that Colombia is facing an extremely important decision that will have a significant impact on the future development

of its building industry. If this considerable array of talent and energy can be successfully coordinated so as to produce a modern national code system, unnecessary and undesirable restrictions on the growth of the building industry can be avoided. These restrictions are often associated with a multiplicity of individually developed municipal codes with the attendant inevitability of conflicting requirements and non-uniformity in the acceptance of nationally marketable innovations in building materials, methods or design solutions. Fortunately there are many capable individuals in Colombia who recognize the importance to Colombia of the evolvement of a single comprehensive national building code system. Dr. Javier Henao, the executive director of ICONTEC and Mr. GeorgeFitch of the USA Agency for International Development are two who have long been associated with the development of Colombian national standards. Dr. Andrade of CCC and Dr. Osuna of the Sociedad Colombiana de Arquitectos seem to have a practical understanding of Colombian needs and capabilities in the building code area and are as appreciative of the desirability of a coordinated national building code activity as Drs. Munoz Duque and Jose Posada of the city of Medellin. The enthusiasm for and the understanding of the usefulness of a Colombian code system by Dr. Escallon of INSFOPAL (Instituto Nacional de Fomento Municipal) and by Dr. Silva of CCC can be of great help in the formative period ahead. Mr. Francis Masson and Mr. Edward Hoben of the Agency for International Development are aware of the important relationship of national standards to their programs, particularly as they relate to the advancement of the industrialization of the whole building process in Colombia.

During my last two week visit to Bogota (June 9 to June 24, 1967) several meetings were held at different times and involving different combinations of all of the preceding individuals. Regular morning discussions were held with Dr. Henao of ICONTEC and with the members of the plumbing code committee. Regular afternoon sessions were held with the members of the CCC staff. Many evening study sessions were held with a code committee of the Bogota chapter of the Sociedad Columbiana de Arquitectos. In addition, two explanatory lectures regarding building codes and standards were given; one to a general meeting of the Society of Engineers and one to a similar meeting of the architects. Out of these many discussions, tentative general agreements were reached on the following considerations:

(A) A national building code.

The rather sudden and almost simultaneously occurring municipal interest in establishing building regulations, not only in Bogota and Medellin, but also in Cali, Barranquilla, Manizales, Bucaramunga, and other cities provides the setting and the need for a coordinated activity at the national level. Wisely those actively engaged and interested in the Bogota and Medellin code development projects have agreed that a single national building code for Colombia is of primary importance at this crucial time. They know full well that if this current municipal code development activity proceeds in an uncoordinated manner, the freedom of the public to enjoy quickly the benefits of technical progress in building materials and methods will be

sacrificed for the freedom of each municipality to have its own individual code, without materially improving the primary objective of these building regulations: the health and safety of the people in Colombia's growing urban centers.

(B) Performance type code.

Not only have these principals agreed on the urgent necessity of a national code, but they have also agreed that it should be developed around the performance concept. This means that only the health and safety requirements for all aspects of a building are to be phrased into the language and status of a law. The design, material, or method solutions to the legal requirements, in the form of standards, are to be introduced into the national code system through an appropriate acceptance program. In effect, this requires a two part document. One part, the health and safety requirements, is enacted into law, while the other part, the solutions to the requirements, remains in the category of acceptable national standards. While this format provides an equal or better protection for the public than old fashioned specification type codes, it avoids their inflexibility and their attendant stifling effects on innovations in the building process.

(C) A national code system.

It is generally agreed that in the search for a viable national

code for Colombia, a systematic approach will be required. It is believed that not only must a suitable code development program be established, but also a systematic way of keeping this two part document up to date. Out of the many discussions held, it was generally agreed that a continuing effort be directed towards the solution of the second objective in the belief that such effort will almost automatically provide a solution to the development effort. Thus the development work should not be considered as completed until the system for the successful maintenance (but not enforcement) of the code and related standards is also completed. In effect, the latter consideration should and will shape the former.

These three areas of general agreement represent an immensely important advance towards the full advantages of a comprehensive national building code system. They are also a solid basis for proceeding with a coordinated code system development program. It is with these background agreements that the following suggestions are offered:

(A) ICONTEC

In view of the apparent wide-spread municipal interest in building codes and in view of the considerable current Colombian code development activity, within and outside of ICONTEC, it is recommended that ICONTEC quickly establish an ad hoc committee to assist in the coordination effort required. A small but high-level group needs to be organized for the purpose of smoothing the way for the evolution of a Colombian code by fostering the willingness to cooperate now expressed by the code development groups in both Bogota and Medellin. This ad hoc committee should

endeavor to make it possible for these two important and able groups to fulfill their contract obligations but in such a manner as to produce a suitable national code system. Members of this temporary or interim committee need not be technicians but they should understand the value and importance of a single code and should be able to use their influence to obtain a commitment and support from the larger municipalities for the code development work now under way. The CCC group in Bogota and the group in Medellin need operating room and a good solid opportunity to cooperate in their parallel endeavor. The ICONTEC group should be able to insure this opportunity and, afterwards, to see that this cooperative approach is properly coordinated. In addition they should begin preparations for the establishment of the various ICONTEC committees that will be required to operate (but not enforce) this code system, with particular emphasis on obtaining financial support for the staff people required. The whole operating success of this (or any other) code system depends largely on the quantity and quality of the staff people that are made available to the many standards development committees required.

A useful tool that could be recommended by this ad hoc committee for guiding a coordinated code development effort are the performance codes developed by the State of New York. If all parties concerned were to use these codes as models or guidelines, coordination of their efforts should be easier.

It should be made clear to all concerned of the singular importance of developing a single national statement (code) of the health and safety performance <u>requirements</u>. Regional or municipal approved <u>solutions</u> of these requirements need not be made into national standards at this time. However, those solutions that are applicable on a national scale should be promptly

made into national standards. In this manner the greatest benefits of the flexibility of this two part code system can be obtained in the least amount of time.

This ad hoc coordinating committee is strongly recommended as a means of averting what could be a technological disaster for the growth of the industrialization of the building process in Colombia; the appearance of a multiplicity of conflicting, specification-type municipal building regulations.

(B) CCC and the code group of Medellin.

In my opinion, the principals in both of these groups fully understand the grave nature of their individual contracts. They would like to cooperate in the development of a uniform set of health and safety requirements. Even though both groups have agreed to work together on an informal basis, each should make strong recommendations to their respective municipalities, requesting that they be allowed to cooperate in a more formal manner. If the ad hoc ICONTEC committee is formed, such a positive recommendation from the technical people who are actually going to prepare the code system, could carry a strong influence in this matter.

The advisory committee proposed by CCC should not be confused with the proposed ad hoc ICONTEC committee. The ICONTEC committee should be concerned with finding the ways and means of permitting the capabilities inherent in the several existing code activities to work together towards a national code. The CCC advisory committee should be a technical advisory group concerned mainly with the physical development of the material in the code and related standards. The committee, representative of the architects, the engineers, the city of Bogota, and CAMACOL, with a liaison member familiar with the ICONTEC code activities should be very useful for

this purpose. Since representatives of the city of Medellin will be actively engaged in the code drafting work, in the same fashion as the CCC, the interests and viewpoints of the city of Medellin could be considered as being as well represented as those of Bogota, providing the two groups proceed with their stated intention of working together.

The New York State performance codes are strongly recommended as guidelines for both groups as a coordinating aid in this parallel development effort. It would seem advisable that both groups come to an early agreement on a common set of (a) definitions, and (b) use and occupancy classifications. If at all possible, it may be advantageous to divide and assign subsequent sections to each of the two code writing groups in order to shorten the drafting time required. This procedure might be especially useful even if limited to just the production of the initial rough draft, thus quickly providing a single Colombian document for common use in further collaborative efforts.

At an early date, a comprehensive organization chart embodying all elements needed to maintain and operate (excluding enforcement functions) the national code system should be prepared. Such a chart will be a great aid in understanding the relationships between the code requirements and the standard solutions and their respective committee functions and responsibilities. This understanding will have a measurable effect on the language used in the code and will provide an excellent guide for establishing the number and scope of the many standards projects required. The organization chart developed for the ICONTEC C13.5 plumbing committee might serve as a useful working model for the larger and more comprehensive chart. It should be remembered that some of the functional groups currently arranged under the jurisdiction of the plumbing code committee were assigned there

on the assumption that the plumbing code committee might be a separate entity. In the larger concept some of these functional groups could more efficiently be assigned to the overall code committee. Administrative details, staff support, and the training committees outlined could be reassigned. This realignment would leave the plumbing code requirements committee, the plumbing standards committee, the plumbing innovations approvals committee, and possibly the plumbing definitions still within the responsibility area of the C13.5 group.

The comprehensive chart could list the following operations committees:

(1) Structure and design. -- This group would be responsible for two distinct functions; the structural integrity and space arrangement requirements and the acceptable standard solutions of these requirements. They should also be responsible for evaluating innovations that are intended to be marketed or used on a national scale, and that fit into this committee's scope.

(2) Fire. -- This group should be concerned with the evolvement of suitable criteria for the handling and storage of hazardous materials, fire separation requirements, fire equipment access requirements, etc., similar to the material in the BOCA model fire code (now under consideration by Dr. Silva of CCC).

(3) Plumbing. -- This group is now well established in ICONTEC. The committee is fully committed to the development of a two part document based on the New York State code, and the resulting work of this committee should fit into the general code concept without any difficulty. Through the exemplary concern of Dr. Eduardo Garcia of INSFOPAL for the success of this code project, the

services of Dr. Santiago Escallon have been made available to this ICONTEC committee. He will do much of the actual drafting work required and should be considered as an important member of the overall development team.

(4) Electrical. -- The work of this ICONTEC committee has progressed to a point where they are about ready to produce their first draft. This work will cover residences and multiple dwelling requirements (up to but not including an apartment size that would normally require an inside transformer). Like most existing electrical codes it is a mixture of performance and specification type requirements. Though this type of a document is not exactly the same format as is planned for the other code areas, it is recommended that it be assimilated in its present form into the overall code program. A careful examination of this document should be made by the CCC - Medellin drafting group in order to decide whether this electrical work should be incorporated into the code as a requirement or as an acceptable standard solution. Perhaps a short electrical safety requirement paragraph could be developed for the code, ending with the sentence ...."Electrical installations made in accordance with ICONTEC standard No. (?) shall be considered as complying with the intent of the requirements of this code."

(5) Elevators. -- An ICONTEC committee has just recently been formed in this area. They plan on using the widely known USA Standard A17 as a model for their development work. Like the electrical code, the document they will be using as a model is also a mixture of

performance and specification-type requirements and solutions. However the use of this document in the United States has not seemed to hinder the manufacture and distribution of elevators and has produced an outstanding safety performance record for this type of equipment. The resulting work of this ICONTEC committee could be handled in the same way as suggested for the electrical committee's work.

(6) Heating, ventilation and air conditioning.

ICONTEC and the CCC-Medellin group should come to some agreement on the nature of this committee and its relevance to the proposed Colombian code system. The code is concerned only with safety requirements in these areas and should not be looked on as a design manual for successful ventilating systems. The National Fire Protection Association and the American Society for Heating Refrigeration and Air Conditioning Engineers should be a good source for acceptable standards in these areas.

In general, each of these 6 operating committees should have its own innovations, or non-standard approvals group. On a national scale, this approvals group should be responsible for evaluating new products or systems. Their major concern should always be the health and safety aspects of any proposal brought to their attention.

The work area assigned to these approvals committees will probably be of crucial importance to the success of the operation of this proposed code system. Since it is intended that, in so far as practical, all solutions to code requirements are to be relegated to the standards portion of the code system, the work of the approvals committee can be expected to be

quite heavy during the early life of this new system. Many applications of generally accepted materials, components, systems and design solutions will have to be considered. To be useful nationally, descriptions of these generally accepted solutions will need to be carefully prepared. This, in effect, is a standards writing operation. The approvals committee can hardly be expected to grant approvals to materials that are poorly described, whose installation practices are only sketchily described and whose use limitations are not defined. Close cooperation between these approvals committees and ICONTEC will be required in order to generate the type and number of suitable standards required.

The operation of a performance code relies heavily on the availability of performance test methods and facilities and the development of this testing capability should be a goal of all of these approvals committees. The development of adequate test methods and testing facilities will require time and need not deter the initiation of this type of a code system. In the interim, the informed judgement of these approvals committee members, regarding the adequacy of submittals in relation to the health and safety code requirements, can be relied on to bridge this testing gap. As these approvals accumulate they can, at an appropriate future date, be combined into sections as has been done in the 'Supplement' portion of the Canadian code system.

In addition to the above 6 committees, two additional committees are recommended. One group should be charged with developing the important administrative details concerning the daily operating interface relationships between the enforcing authorities and the prospective builder or owner. Such items as plan submittal procedures, building permits, occupancy permits, stop work orders, test and inspection procedures, appeals procedures,

etc. would fall into this category. Since many of these subjects are within the usual jurisdictional rights and traditions of the many municipalities involved, it may be difficult to get widespread agreement on some of these points. However, since this section is usually not intended as a set of mandatory requirements in a code system but more as recommended guidelines, inclusion of this material in a special section can materially advance the use of uniform procedures in this area.

Much of the successful enforcement of the code requirements will depend upon the quality and quantity of municipal inspectors available. Because of the importance of this subject it is recommended that a special committee be established whose major concern would be the development of an adequate training program for building code inspectors. SENA seems like an ideal organization for this purpose and its potentialities should be fully exploited. This training program should include some form of a national licensing of qualified inspectors (even though the inspectors are to be employed by the municipalities) to improve and maintain the status of the difficult job of the municipal inspectors.

All of the above committees should be established under a broad-based high level national building code committee. Their function, to coordinate the activities of many diverse groups in order to insure a practical, consistent, and compatible code operation and maintenance system, requires that they be actively engaged in many aspects of the building process. Besides the usual professional men, the group should include a fire marshall and a representative of the code enforcement agents. This committee would be primarily a decision making group and since they probably would all be extremely busy people in their regular occupations, they cannot or should not be expected to actually perform all of the functions normally assigned.

Therefore it becomes imperative that they be provided with an adequate staff to handle the daily volume of routine problems and to prepare the material needing code committee action.

This staff should also be large enough to be able to provide services as technical secretaries to each of the six operating committees and to act as a group in maintaining a high degree of consistency in the code system. Such functions as the routine handling of requests for code interpretations and for initiating needed system changes could reasonably be assigned to the staff group. It might be possible that they could also handle the important task of developing and maintaining uniform definitions of terms used throughout the code system. Nothing causes as much confusion, exasperation and requests for interpretation as the non-uniform use of common building terms, and special consideration needs to be given to this subject. These definitions should explain the code terms used in a manner that will enable municipal or regional users of the code to quickly and accurately relate local terms to the intent of the code language. Establishing these terms early in the development work will also provide a high degree of internal consistency among the many development committees required.

The main code committee will also need the services of a general material-systems approvals committee. This group could be made up of one member from each of the approvals committees planned for the six operating committees. Their function would be to handle specialized designs involving the work area of two or more of the operating committees and to handle all appeals that may be made of decisions reached within the latter group.

Concentration on solving the operationsl aspects of this proposed national code system should materially aid the CCC-Medellin group in their

development work. Though it may appear somewhat complex at this time, a worthwhile comprehensive building code is of itself a highly complex subject. The jurisdictional area serviced by a code system has a relatively minor effect on the size or scope of the functional groups needed for its operation and maintenance (excluding enforcement). A good code system for Colombia need not be much more complex than a good code system for any large municipality. Thus the most efficient use of Colombian resources would favor a national code system, since it would eliminate the duplication of effort required for the operation and maintenance of individual municipal codes.

(C) Agency for International Development.

Standards activities in Colombia should continue to occupy the attention of this important agency, since they can provide a basis for stability and thereby long lasting benefits from AID sponsored programs. A national network of building standards provide the same service to the national commerce of a country as a network of roads. Like roads, standards don't do anything of themselves, but they provide a lasting base for today's and tomorrow's commercial traffic that they support. They are the basic tools of reliable communication within this highly fragmented industry. Because of the great number of relatively small firms involved in the making, distributing and erection of a multitude of different pieces in a wide variety of structural designs, intercommunication through standards assumes unique and sizable dimensions. As is often the case, the amount of standards activity required is out of proportion to the amount of support that can be elicited from the vast majority of the firms involved. A few

organization can and do provide more than their share but they cannot do all of the work that is needed. In view of these problems it is my recommendation that the AID officials most involved review this situation with the directors of ICONTEC, and others, with the intention of finding feasible ways and means of developing the support for the standards activities required.

Because a single national performance-type building code system offers the maximum opportunity for the introduction of safe innovations in building materials and methods, the proposal for such a Colombian program is well worthy of whatever support the Agency for International Development can provide. Cooperation with the work of the ad hoc ICONTEC committee (proposed in the ICONTEC portion of this report) is highly recommended. In addition to helping in smoothing the way for a formal cooperative arrangement between the Bogota and Medellin development groups, this assistance could be extended into developing support for the operating staff that will be required. No code system, performance type or otherwise, can be successfully operated and maintained without an adequately sized permanent staff. Finding the financial support for this staff activity may actually be easier than finding the right people. The people who will be involved in the code development work, because of their deep familiarity with the operation of the system, could provide an excellent source for at least the main staff officer.

All successful code operations are dependent upon the availability of good quality control methods and facilities, and performance type codes are no exception. Because this type of a code system does encourage the development and use of new materials and new methods to a much greater

degree than specification type codes, it also depends heavily on the availability of performance evaluation centers. Performance testing, not only of materials but also of construction systems (some of which may be quite large) will become of increasing importance to the Colombian building industry in the near future. Studies of Colombian needs in this area could profitably be initiated at this time.

If a formal arrangement permitting a high degree of cooperation among the ICONTEC-CCC-Medellin groups can be provided, the code development work should be able to proceed fairly smoothly toward the production of the operating procedures for the code system, and the first draft of the code requirement portion of the system. Exposure of this first draft could produce a significant volume of comments and criticisms from many different sources. As these comments are received and considered by the drafting groups involved, it may be necessary to prepare a second draft. When the drafting groups are about ready to finalize the second draft, it might be advisable for AID to consider sending some of the principals involved to the United States for conferences with the many available technical experts at the NBS Building Research Division. Since second draft resolutions of the comments received may cover a variety of subject areas and may need to be vigorously defended by the code drafters, such conferences at this crucial point could be of great value. During this conference period, arrangements might also be made for these visitors to discuss problems of an operational nature with the operating staff of the New York State code system. After the second draft is completed and coincidental with its exposure for comments, it might be advisable to consider bringing a team from the United States to assist the Colombian group in explanatory code seminars in selected cities.

CONCLUSIONS.

It is difficult to imagine a more insidiously delaying influence on the growth of the building industry in Colombia than the appearance of a multiplicity of independently developed, specification-type building codes. It is equally difficult to imagine a more constructive influence at this time than the appearance of a Colombian national performance type code system. Not only will the latter tend to encourage improvements in materials and methods but, by establishing a readily understood value on the important role of standards, it will also provide an excellent spur for an expanded interest in the development of national standards. With an adequate background of national standards, the potential inherent in the Colombian building industry can be fully realized in a much shorter time and on a more lasting basis. If this standards activity were to be so guided as to result in the appearance of modular sized building products, the final basis for the growth of this segment of the Colombian economy as an integrated industry will have been established.

Both the setting and the timing are just right, now, for a significant accomplishment in the field of building codes and standards in Colombia. The country is fortunate in having so many key individuals who understand and believe in the efficacy of a national performance code system at this crucial time. If they can be permitted to continue to exploit their convictions, capabilities and enthusiasm in this area, the whole Colombian building industry and the people it serves will be greatly benefited. In addition, the code system they develop could serve as an excellent example and model for use by other South American countries.

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