

NATIONAL BUREAU OF STANDARDS REPORT

8939

REPORT ON LATIN AMERICAN TRAVEL

Concerning: The participation by the National
Bureau of Standards in the Standards Seminar
sponsored by the Agency for International
Development, held in Bogota, Colombia.

April 26, 1965 to May 7, 1965

SUBJECTS: (1) MODULAR COORDINATION IN CONSTRUCTION
(2) BUILDING CODES

by

C. T. Mahaffey
Codes and Standards Section
Building Research Division



U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

THE NATIONAL BUREAU OF STANDARDS

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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

I was approached by John P. Eberhard, Deputy Director of IAT, during the latter part of March 1965, and asked to consider participating in a special AID sponsored mission to Bogota, Colombia. One of the purposes of this mission was to provide assistance to existing Colombian standards committees in the development of Colombian national standards in the general areas related to building codes and modular coordination.

Dr. L. L. Wyman (the chief instigator of this mission) and I had several discussions on the subject areas involved. Out of these discussions it appeared evident that I could make a significant contribution to the mission objectives. It was decided that I would be one of the party of eight specialists selected for this mission. The complete personnel list was as follows:

L. L. Wyman - Metallurgy	(NBS)
Bruce E. Foster - Cements, Concretes, Aggregates	(NBS)
Richard Adams - Fertilizers	(AG)
Herbert Shiefer - Textiles	(NBS)
Joseph Kanagy - Leather	(NBS)
G. M. Kline - Plastics	(NBS)
Ruth Busby - Pesticides	(AG)
C. T. Mahaffey - Modular Coordination, Building Codes	(NBS)

Dr. Foster and I arrived at the impressive new Bogota airport around 10:00 P.M. on Saturday, May 24. We were met at the foot of the plane steps by Dr. Wyman (who had preceded us by a few days and made all the arrangements), Milton Drexler, chief of the construction and industry section of the permanent AID mission to Bogota, and Dr. Javier Henao, the director of ICONTEC (Instituto Colombiano de Normas Tecnicas).

Sunday morning we were joined by Dr. Henao, who described in detail the program for the coming week. He also described the functions and relationship of the two Colombian sponsors of the seminar - ICONTEC and INCOLDA.

ICONTEC is a comparatively new organization established to foster the development of Colombian standards for materials, processes, test methods, etc. ICONTEC supplies the forum and the recognized procedures whereby all parties at interest can participate in the formation of voluntary national standards. Through an arrangement with the Colombian government, standards produced through the mechanism of ICONTEC are officially recognized as Colombian national standards. The role of ICONTEC is closer to that of our ASTM than it is to ASA for two reasons:

- (1) ICONTEC's primary purpose, like that of ASTM, is to develop standards.

- (2) In Colombia ICONTEC is the only standards-producing organization and thus there is no need for an ASA to select only those standards demonstrating a national consensus of opinion from the work of hundreds of standards-producing bodies.

Like ASA, ICONTEC is charged with coordinating the standard needs and activities in the nation.

Dr. Henao went on to explain the role of INCOLDA. During his discussion and with the helpful background information volunteered by Dr. Wyman, the reasons why the seminar was jointly sponsored by ICONTEC and INCOLDA became clearer. INCOLDA (Instituto Colombiano de Administracion) is somewhat similar to our American Management Association. The members are the directors and administrators of various commercial enterprises in Colombia. They are influential in the formation and conduct of top management policy decisions. To a large extent they represent the broadening industrial strength of Colombia. Forward-looking people in both organizations recognize the importance of standards to industrial growth, as do Milton Drexler and his assistant, George Fitch. These people felt that a wider recognition of the value of standards was needed to set the stage for concerted Colombian action through ICONTEC. As the number of standards increase, their interrelationships and interdependencies increase, necessitating a wide ranging attack on many different fronts. Voluntary standards in particular need a widely-based support, based on a full understanding of the nature and role of standards in an expanding industrial technology. The great need for Colombian standards can be filled by ICONTEC through the vigorous support of INCOLDA.

Dr. Henao indicated that he was expecting Dr. Foster and me to provide a five-day series of lectures to INCOLDA members on standards, with special emphasis on cement, concrete and aggregates (Dr. Foster), with building codes and modular coordination as my special subjects.

I carried out my part of this program with a series of two-hour lectures, Monday (4/26/65) through Friday (4/30), from 8:00 A.M. to 10:00 A.M. (Dr. Foster spoke on his subjects from 10:00 to 12:00). The following list of those in attendance is representative of the group at the INCOLDA portion of the seminar:

ASISTENTES AL SEMINARIO DE LA CONSTRUCCION

Dr. Pablo Lucio	Bavaria S. A.
Dr. Edgard Ramirez	Bavaria S. A.
Dr. Jose Manuel Patino	Instituto de Credito Territorial
Dr. Carlos A. Varona	Instituto de Credito Territorial
Dr. Alfredo Garcia Romero	Instituto de Credito Territorial
Dr. Antonio Munevar	Instituto de Credito Territorial
Dr. Eduardo Nino	Instituto de Credito Territorial
Dr. Jairo Villalobos	Instituto de Credito Territorial
Dr. Jorge Saravia Nieto	Cementos Diamante S. A.
Dr. Alfonso Londono	Cementos Diamante S. A.
Dr. Fernando Diaz Amaya	Socio Personal
Dr. Fernando Martinez	Restrepo y Uribe Ltda.
Dr. Jaime Chaparro	Caja de Vivienda Militar
Dr. Alvaro Cardenas	Banco de la Republica
Dr. Gabriel Antonio Hernandez	Banco de la Republica
Dr. Jorge Sanmiguel	Cementos Boyaca
Dr. Luis Eduardo Rojas	Prefabricaciones S. A.
Dr. Antonio Maria Gomez	Comite Administrativo de Normas
Dr. Humberto Cabal	Personal
Dr. Victor Suarez de Castro	Sociedad Colombiana de Arquitectos
Dr. Luis Daniel Bohorquez	Sociedad Colombiana de Arquitectos
Dr. Jose Francisco Sanchez	Sociedad Colombiana de Arquitectos
Dr. Jose Manuel Arboleda	Sociedad Colombiana de Arquitectos
Dr. Arturo Londono	Universidad Javeriana
Dr. Ricardo Naranjo	Sika
Dr. Alvaro Mondragon	Laboratorio Quimico Nacional
Dr. Hugo Gomez	Laboratorio de Ensayo de Materiales - Universidad Nacional
Dr. Alvaro Mejia	Central Hidroelectrica de Caldas
Dr. Jorge Barraza Roa	Ingetec

The subject matter covered during each of the five morning sessions is outlined below:

Monday	April 26	- Standards & Codes
Tuesday	"	27 - Modular Principles
Wednesday	"	28 - Outline of a Suggested Building Code System
Thursday	"	29 - Details of a Suggested Building Code System
Friday	"	30 - Review of Modular Practices

During the last morning session, I asked Dr. Jose Manuel Patino to come up front and give a graphic description of a very ingenious self-help cement block house being built in Bogota. Dr. Patino is an architect with the Instituto de Credito Territorial and is greatly responsible for the success of a particular group of houses in the 12,000 units that go to make up the project Ciudad Kennedy.

Ciudad Kennedy is an AID sponsored low cost housing project being built on the edge of Bogota. A large percentage of the living units erected there are known as "self-help" housing. The purpose of a self-help designed house is to provide the maximum amount of enclosed space for the least investment by the purchaser. To get this cost to an irreducible minimum, the construction program is designed to permit the prospective owners to contribute their labor during the construction of the houses. It is probably the most trying type of architectural design work, and especially so when building material sizes have little or no relationship.

Dr. Patino, being well versed in the principles of modular construction, was undaunted by the lack of modular sized cement blocks in Bogota. He developed four new related sizes (similar to our modular blocks but on a 10 cm rather than a 4" module), and then designed a four-bedroom two-story house that used only these four sizes without any site cutting and fitting. The house also includes modular sized window frames, concrete floor joists, door lintels and circular stair treads--all of precast reinforced concrete. Approximately 1000 of these single design houses are scheduled to be built in Ciudad Kennedy.

With the piece volume generated by this 1000-house project it was feasible for Dr. Patino and his group to:

1. Design simple metal molds for the window units, stair treads, concrete joists and lintels for the prefabrication of these building elements.
2. Design and prefabricate the electrical wiring conduit and the water supply piping.

Note: Both of the above activities are being performed in open sheds located on the construction site.

3. Assist in the establishment of a cement block factory for the production of the modular standardized blocks.

The whole concept of this modular proportioned house represents an important departure from the traditional hand-craft type of construction generally employed in Colombia. Currently, bricks and blocks vary in size from manufacturer to manufacturer, and usually these sizes bear little relationship to wall opening dimensions. It is not uncommon to make templates for window and door openings after the walls are up and then build the units for each individual opening. On the other hand, the size relationships established by the Patino-ICT (Institute de Credito Territorial) houses represent a starting point for the rational growth of the size interdependencies necessary to horizontally integrated industries. It was for this reason that I asked Dr. Patino to give a first-hand account of his work to the INCOLDA group.

The afternoon and early evening portion of the first week's seminar was spent with ICONTEC committees at ICONTEC headquarters.

Dr. Arturo Londono, Dean of the School of Architecture at the University of Javeriana, and the leading proponent of Bouwcentrum in Colombia, is Chairman of the ICONTEC Subcommittee on Modular Coordination. I met eight of the members, architects for the most part, and attempted to learn from them the present status of modular coordination in Colombia. It did not take long to determine that they were all well versed in the principles of modular coordination and modular drafting practice. They were aware of the progress made in Sweden, France and Germany and in some of the other Latin American countries. The committee did not need to be convinced that the use of modular principles was essential to the development of a true building industry in Colombia. Their problem was concentrated in two areas:

1. How to convince the majority of their fellow architects of the advantages of modular practices.
2. How to convince manufacturers to switch over to modular sized building products.

The determination of these two problem areas indicated that the committee, as constituted, represented less of a consensus group than it did of a core of forward-looking planners able to see in modular coordination a basis for a sound Colombian industrialized building technology. It is evidently unrealistic to attempt to establish national size standards for bricks, doors, windows, etc., without active participation of the industries affected. It is equally unrealistic to set such voluntary standards without the concurrence of designers and specification writers.

A parallel approach to these problems was suggested to the committee:

1. Instigate an intensive educational campaign aimed at convincing Colombian architects of the advantages of modular practices.

2. Initiate a high volume demand for modular sized building material products through such large scale building operations as those under the control of the Instituto de Credito Territorial, that have housing projects all over Colombia.

The suggestion that building material sizes and shapes need to be standardized usually draws an instant negative reaction from architects. Their first concern is that such standardization represents an undesirable infringement on their artistic freedom of expression. They immediately picture rows of look-alike houses as a natural corollary of building element size standardization. It takes time, but it is usually not difficult, to show them that such standardization does not necessarily produce identical buildings any more than a standard piano keyboard results in identical tunes. Once past this old chestnut, specific examples of how modular drafting practices (even without the existence of modular building materials) simplify and clarify architectural drawings and details, is also very effective in enlisting the support of most architects. Because modular drafting practices make drawings easier to read and because dimensioning to modular grid lines make the layout of buildings easier and more accurate, architects, contractors and builders can be reasoned into becoming modular coordination supporters, once the simplicity of this construction tool is clearly understood.

Building material manufacturers usually require a different approach. It is no more difficult getting them to agree on modular size standards for their products than it is to get them to agree on any specific size standard. As long as Colombian manufacturers continue to be unable to fill current orders for non-standardized products, it will be difficult for them to justify the expense of switching over to some theoretically perfect set of size standards. Once they are even partly convinced that size standards of some sort are inevitable, a strong incentive for modular sizes can be introduced in the form of large volume orders. The Instituto de Credito Territorial, having seen the cost savings possible as evidenced by the Patino-Ciudad Kennedy houses, can use their high volume requirements to make it easier for manufacturers to switch over to size-integrated products. Other large scale building projects, such as the proposed physical expansion of the Universidad del Valle in Cali, can also be used for this purpose.

There are enough men in influential positions in Colombia who understand this size relationship problem to accomplish the two objectives listed above. Men like Dr. Londono, Patino, Arboleda, Bohorquez, Lleras, Vasquez, Borrero, Campo and others are aware that modular coordinated building material sizes are a sound and economical way for the Colombian building industry to become a true industry and to meet the housing challenge it now faces. Two facts serve to illustrate this challenge:

1. Last year 34,000 new housing units were built in Colombia and during the same time 43,000 new families were formed.
2. Currently, building materials represent between 70 and 80 per cent of the total cost of a house.

Dr. Patino suggests that as much as 17% of this abnormally high cost of materials is due to the wasteful site cutting and fitting of unrelated sizes of materials, not to mention the high cost of custom fitted door and window frames.

Most of the afternoon ICONTEC sessions with the Modular Coordination Committee were spent in developing ways and means of interesting architects in participating in the committee's activities and of finding the appropriate tools for enlisting the support of the material manufacturers.

Two afternoon sessions were devoted to problems connected with the development of a Colombian national building code system. Differences among zoning, housing and building codes were discussed, as were the advantages and disadvantages of performance and specification type codes. The difficulties of formulating a code capable of safeguarding the health and safety of building occupants and of the community without stifling the development of innovations in materials or systems were discussed. Dr. Osuna and Dr. Andrade were impressed with the type of building code system used by the State of New York and arranged a meeting with various members of the Colombian Chamber of Construction (Camara Colombiana de la Construccion - CAMACOL).

During this meeting I was subjected to a barrage of searching questions that did much to clarify the flexibility of the proposed code system. Dr. Manuel Lleras, the Chamber's peppery Director, took a most active part in the questioning. With Dr. Osuna and Dr. Arboleda acting as translators, we were able to establish the important role of ICONTEC in the development and operation of a Colombian national code. I stressed the importance of keeping the code interpretation and materials evaluation group wholly within the framework of ICONTEC, even if this meant the use of staff people. By this means innovators and enforcement agents are provided with a single approval center for materials and systems. At the same time this very powerful group would be under the direct control of all parties at interest. Thus materials producers, code enforcement officials and the public would benefit from a living set of building regulations through the consensus forum of ICONTEC.

The first two and one-half days of the second week were spent at the Universidad del Valle in the city of Cali, about 150 miles west of Bogota. I arrived at the Cali airport close to noon and was welcomed by Dr. Jesus Velosa and Dr. Harold Borrero. Dr. Borrero spoke excellent English, having graduated from Penn State. He is now Dean of the School of Architecture and Plastic Arts of the Valle University. He took me to the hotel and briefed me on the schedule he had arranged. We were to go

to the University Hospital in the afternoon to meet the famous Dr. Jose Vasquez, Director of the Institute of Construction at Valle University. At 5:00 P.M. I was to give a two-hour talk on the subject of standards, codes and modular coordination practices, to the faculty and the fourth and fifth year students of the school of architecture.

The interview with Dr. Vasquez turned out to be an important event in helping to mesh the forces that are attempting to shape the future of the building industry in Colombia. Dr. Vasquez is a dynamic man, and as he unfolded the role that he has planned for the expansion of the University of Valle, it became apparent that this man and his work would play a big part in introducing the Colombian building industry to the significance of national standards. There was no need of convincing him of the advantage of modular standards; what he wanted to know was how he and the University could play their most effective part in getting such standards established and into use.

I was able to suggest that in the planned physical expansion of the University he had the means to accomplish three important objectives:

1. Introduce Colombian architects to the simplicity and effectiveness of modular dimensioning and drafting room practices by insisting that all University drawings make use of modular drafting techniques.
2. Work with ICONTEC committees engaged in establishing modular sized building products.
3. Use the vast piece volume of the University's expansion program to enable Colombian manufacturers to switch over to the new size standards.

Dr. Vasquez seemed pleased with these suggestions. I suspect they merely reinforced most of his own conclusions. I tried to emphasize the importance of working through ICONTEC in establishing the new size standards, suggesting that any unilateral action might retard rather than advance the voluntary national standards cause.

It was a very interesting meeting, and I came away feeling that this man and his program for the University would have a very strong impact on the growth of building technology in Colombia.

The two-hour talk with the faculty and students (5:00 - 7:00 P.M.) covered the general field of modular practices, building codes and standards. I tried to emphasize the necessity for balanced representation on standards committees, the important relation between consensus and voluntary standards, and the various means of consensus determinations. The audience took an

active part, keeping the excellent interpreter Mr. O'Fallon very busy. Afterwards Dr. Borrero, the very charming Sra. Lyda Borrero (who teaches landscape architecture at the University), and I enjoyed a leisurely dinner at a pleasant restaurant in downtown Cali.

The next morning, Dr. Borrero took me to the University where he carefully outlined the present role of the school and the curricula expansion proposed. Apparently, universities in Colombia play a much larger role as information centers than the schools here in the United States. A very large part of the building research conducted in Colombia is done at the universities. It is for this reason that the University of Valle is divided into eight divisions, one of which is the Institute of Construction headed by Dr. Vasquez. The School of Architecture, headed by Dr. Borrero, is in this Institute. In this manner current research on pressing industrial problems is made known to the faculty and students in a very direct way. The entire eight divisions, involving the same research-curricula organization, are also tied together with a correlating mechanism for maintaining the interdependencies of the divisions.

Dr. Borrero was anxious that the subject of standards and modular coordination be included in future university studies. We discussed this matter with the Dean of Studies, Dr. Campo, and were able to induce him to consider adding these subjects to the University's curricula.

I went to lunch with Dr. Borrero and a prominent Cali land developer. During this time we visited several housing projects and observed the various tradesmen at work. On the way to one of these projects I noted an enormous saucer-shaped structure that seemed to have no visible means of support. It turned out to be the bull fight ring, made of post tensioned concrete. We also visited one of the SENA trade schools designed by Dr. Borrero. It is a beautiful contemporary building of brick and concrete featuring a cafeteria canopy of intersecting hyperbolic thin shells of concrete.

Back at the University we met with the Planning Committee of the University and went over the scale model layout for the physical expansion of the school. This is a most ambitious project involving nearly 1,000 acres of land, dozens of new buildings and with a goal of 10,000 students by 1974. Dr. Borrero and Dr. Vasquez deserve a lot of credit for their objective appraisals of future Colombian building technology needs and for the careful, minute preparations they have made for reshaping this University toward filling these needs.

The previous day's talk was repeated for the benefit of area building material manufacturers, again between 5:00 and 7:00 P.M. Greater emphasis was given this time to the advantages of modular sized materials and the necessity of national standards. Questions from the audience brought out the same concern noted in the Bogota meetings concerning the selection of the most advantageous basic module. Many of these manufacturers were

willing to concede the construction advantages of modular sizes but asked for advice on how to choose the best module for Colombia. They were aware that four inches was at least the unofficial basic module in the U. S., but recognized the growing use of 10 cm for this purpose in other countries.

I apprised them of the coming COPANT meeting in Caracas on the subject of modular coordination. I urged them to see that Colombian delegates attend this Pan American meeting, instructed to push for the firm establishment of a single basic module for all Latin American countries. Several manufacturers felt that a 10 cm module might make it difficult for them to buy U. S. equipment (such as block-making machinery). I tried to point out that many differing basic modules in Latin America would be as bad as no module at all, and again urged them to participate actively in the June meeting of COPANT.

The next morning one of the manufacturers at the meeting picked me up at the hotel and we visited his precast concrete plant on the way to the airport. Senor Melguizo has a bustling plant making many varieties of concrete products such as telephone poles, various sizes and shapes of light poles, cement blocks, hollow flooring blocks, precast concrete lintels and floor joists, paving blocks, etc. Like many other Colombian building material manufacturers, he cannot catch up with his new orders.

I rejoined Dr. Henao and Dr. Londono at ICONTEC headquarters in Bogota that afternoon. We reviewed the Cali trip during which it became apparent to both men that a Colombian delegation to Caracas was imperative. The resolution of any doubts regarding the basic module is needed before the various standards committees can operate effectively. Both men urged me to meet the Colombian delegation in Caracas and I promised to investigate the possibilities on my return to the United States.

I also attended one of Dr. Foster's subcommittee meetings that afternoon. They were working their way through an ASTM test method, trying to restate it in Colombian terms. It was a pleasure to watch the easy, factual way that Dr. Foster was able to assist them over those portions that might otherwise have been misinterpreted.

Dr. Foster, Dr. Londono and I revisited Ciudad Kennedy to see a small group of semi-prefabricated houses. The wall panels were of precast thin shell concrete. Using a form of a tongue and groove joint, both the inside and outside faces of the wall were site erected, forming a hollow wall space about 4" wide. Coarse concrete was poured into this space to form practically a solid concrete wall. Theoretically, no additional finishing was required, but a stucco coat inside and out made a nice-appearing wall. Except for such final finishing these were not self-help houses in the same sense as the Patino-ICT units.

Dr. Foster and I entertained Dr. Londono at dinner that night as a way of expressing part of our appreciation for his many personal kindnesses. Besides, we enjoyed his company.

Thursday morning a meeting of the full Modular Coordination Subcommittee was held at ICONTEC headquarters. Dr. Henao presided at this meeting that had Dr. Moro and Edmond H. Hoben of the U. S. AID mission to Colombia as special guests. Both of these men are housing advisors interested in urban development - Dr. Moro from more of a technical viewpoint while Mr. Hoben tended toward financial interests.

Dr. Moro was intensely interested in the Patino-ICT houses at Ciudad Kennedy and questioned Dr. Patino at great length, attempting to evaluate the effectiveness of the construction system used in measurable terms. Since ICT has many housing projects, most of which use traditional materials and methods, they have actual cost figures for direct comparisons. Dr. Patino's figures indicated a 17% reduction in the material cost for the modular houses and 8 man hours per square meter of floor space as compared with the usual 16 man hour p.s.m.

Mr. Hoben told of an interesting phase of his work. He has been instrumental in setting up savings and loan associations in several South American countries. The one in Chile represents a unique approach to the problem of encouraging savings in the face of inflationary problems. Through an arrangement with the Chilean government, both the savings held and the loans outstanding are adjusted once a year by means of a yearly cost of living price index.

Several important conclusions began to emerge out of this last meeting:

1. The selection of a Colombian basic module, agreeing with that of other Latin American countries, is of primary importance for ICONTEC standards committees.

2. ICONTEC housing standards activities need to be accelerated. A housing standards board, made up of a well balanced group from all sections of the country, representing at least the major parties at interest needs to be formed. This board should be capable of defining the specific areas of needed standards and be able to assign and coordinate the standards projects required. The board should insist on the use of sizes based on practical adaptations of the basic module selected.

3. More demonstration projects like the Patino-ICT houses are needed. National publicity should be built up around the advantages of modular construction.

4. Because the use of modular practices can assist in integrating the Colombian building industry and can increase its productivity, our AID mission should continue to support those projects using modular practices.

5. A national building code committee should be formed to continue studying Colombian needs in this area.

6. Such organizations as Bouwcentrum, CAMACOL, INCOLDA, The Society of Colombian Architects and the universities can be used to focus attention and support for the role of ICONTEC in gaining the concerted effort of various national interests needed for the development of voluntary Colombian construction standards.

A brief meeting with George Fitch that evening ended the business program for Dr. Foster and me. At Mr. Fitch's request we gave him a frank appraisal of the two-week seminar. The six points outlined above were discussed in some detail.

Before ending this description of an exciting two week experience, I would like to call special attention to the high quality of the work accomplished by our AID group in Bogota. I'm sure that the enthusiastic attention Dr. Foster and I received from the Colombians was due in large part to the high regard they have for such men as Milton Drexler, George Fitch and Edmond Hoben. The sympathetic, unobtrusive and very knowledgeable manner in which these men handle their difficult assignment merits everyone's appreciation. In my opinion they are doing more than should be expected in assisting Colombia toward economic viability and self-sustaining growth.

In the same way, Colombia can be proud of such men as Drs. Henao, Londono, Patino, Vasquez, Borrero and Osuna. These dedicated and knowledgeable men are also making a vital contribution to a better way of life for Colombia.

Everyone I met in Colombia had a kind word for Dr. L. L. Wyman. They recognize him as a friend and value his knowledge and personal interest in their problems. His experience in this area, passed on in the form of kind advice, is appreciated by all, including myself.

SUMMARY

What did I accomplish? In the sense of the question--how many oranges did I pick?--the answer must be--none. And yet I feel that a great deal was accomplished and at a time when it was most needed.

Colombia has a small and scattered group of men that understand and appreciate the value of national standards and know the potential of modular coordination for building technology. Backed up by our people in the AID mission, they have been attempting to enlist the support of various segments of the building industry for the development and use of national standards. My contribution strengthened their contentions and outlined workable ways of achieving the desired goals.

With such general interest groups as INCOLDA, I attempted to sell the value of national standards by trying to show that standards are the language of building technology. Without good national standards there cannot be good national communication. Just as good architectural drawings are the linear basis for an unmistakable communication among all concerned with the erection of a building, so national building standards are a verbal basis for a common understanding among all concerned with the building industry. Large vertical integrated companies, such as the auto makers, control the manufacture of most all of the parts in their product and can often get by with just company standards for intra-company communications. Such company standards will not serve the needs of horizontally "integrated" industries like the building industry. National building standards particularly those utilizing modular sizes provide the inter-company communication required to efficiently assemble the thousands of "end product" parts that go into houses and other buildings.

I took a different approach with the ICONTEC committees, since they were already convinced of the role of standards. They wanted information useful in encouraging balanced committee participation and specific examples of the work of such committees. I gave them many standards recognized by ASA, almost a hundred Commercial Standards and Simplified Practice Recommendations dealing with building materials, several catalogs of standards, both of my Unicom manuals, plus copies of the New York State Building Code and Code Manual.

I assisted the committee in developing a workable program for introducing architects to the simplicity and usefulness of modular dimensioning. The available means for enabling manufacturers to switch over to modular sizes were also outlined. The urgency of establishing the Colombian module was recognized and the necessity of Colombian delegates attending the Caracas COPANT conference of modular coordination was established.

I was able to outline the various related elements of a national code system that would provide a national control over the use of innovations without stifling building research.

A great amount of work lies ahead for ICONTEC. The concept of voluntary standards has a definite appeal to all thinking people. However, to function efficiently, avoiding the discouraging time drag usually associated with voluntary standards programs, the use of staff people for the preparation of standards drafts is highly recommended. It is not altogether lethargy that makes standards writing take so much time. Committee members are experts in the area concerned and have pressing daily job responsibilities. It is extremely difficult for them to find the time for the meticulous care needed in the preparation of a good standard. A few staff people, with a general experience in standards work, can pick the brains of the committee experts, dig out the cross reference standards required, outline those areas needing further research and physically prepare drafts of standards for committee deliberations. In this manner, the valuable time of the committee members is conserved, the consensus principle of voluntary standards is retained and the time required to produce the voluntary national standard is considerably reduced.

If Milton Drexler and George Fitch were able to loan a few standards draft writers to ICONTEC for a short period, the apparent effects of their mission in Colombia could be greatly accelerated. As advisors to ICONTEC committees, they could speed up the preparation of new standards and the adaptation of existing standards. They might also develop a continuing draft preparation program, through the use of architectural students at the universities. It is known that architectural schools are now attempting to emphasize the students' knowledge of construction materials. The advisors' guidance in standards drafting would broaden the advanced students' knowledge of the materials of construction, sharpen their appreciation of the value of national standards and provide a wide source of assistance in the preparation of the standards needed. Such a program is feasible and would have a good effect on the future respect for and use of voluntary Colombian standards.

There is now in Colombia a growing, enthusiastic interest in voluntary national standards. However, there is an awesome amount of work that needs to be done. It is ICONTEC's responsibility and Milton Drexler's concern that this enthusiasm not falter in meeting the needs of the burgeoning Colombian building industry. I hope these identical objectives received some benefit from my contribution in this AID-sponsored standards seminar.

