459

INDUSTRIALIZED HOUSING

HEARINGS

BEFORE THE

SUBCOMMITTEE ON URBAN AFFAIRS

OF THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

NINETY-FIRST CONGRESS

FIRST SESSION

Part 2: July 23 and 24, 1969

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WITNESSES AND STATEMENTS

WEDNESDAY, JULY 23

THURSDAY, JULY 24

SUBMISSIONS

CONGRESS OF THE UNITED STATES, JOINT ECONOMIC COMMITTEE

Chairman Bolling Announces Hearings on Industrialized Housing by the Subcommittee on Urban Affairs

Representative Richard Bolling (D., Mo.), Chairman of the Subcommittee on Urban Affairs of the Joint Economic Committee, today announced that the subcommittee will hold public hearings on industrialized housing, July 9, 23, and 24. In announcing the hearings, Chairman Bolling said:

"These hearings will supplement the compendium of papers by experts on the subjects of 'Industrialized Housing,' which the subcommittee released on April 28 of this year. We have planned to receive testimony from the Department of Housing and Urban Development as well as from those in the industry actually working to put housing production on an industrialized basis. The hearings should develop valuable background for the subcommittee's further studies of long-range urban planning both here and abroad."

A list of witnesses, together with the time and place of the hearings, is given below. Additional witnesses may be announced later.

SCHEDULE OF HEARINGS

Wednesday, July 9, 10:00 a.m., Room 6226 New Senate Office Building
Harold B. Finger
Assistant Secretary for Research and Technology, Department of Housing and Urban Development
Charles L. Biederman
Vice President, Technical Services, Levitt & Sons Corp., New York
Wednesday, July 23, 10:00 a.m., Auditorium, New Senate Office Building (G–308)
Ezra Ehrenkrantz
President, Building Systems Development Inc., and Associate Professor of Architecture, University of California, Berkeley
Peter Terzick
General Treasurer, United Brotherhood of Carpenters, AFL–CIO
Thursday, July 24, 10:00 a.m., Auditorium, New Senate Office Building (G–308)
James R. Price
Chairman of Board, and
George E. Price
President, National Homes Corporation, Lafayette, Ind.
Richard Rosen
President, Urban Systems, Inc., Boston, Mass.

INDUSTRIALIZED HOUSING

WEDNESDAY, JULY 23, 1969

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Subcommittee on Urban Affairs met, pursuant to recess, at 10 a.m., in room G-308 (the auditorium), New Senate Office Building, Hon. Richard Bolling (chairman of the subcommittee) presiding.

Present: Representative Bolling.

Also present: James W. Knowles, director of research; and Douglas C. Frechtling, minority economist.

Chairman BOLLING. The subcommittee will be in order.

This morning the Subcommittee on Urban Affairs continues its hearings on industrialized housing. At our opening hearing, held on July 9, we heard from the Assistant Secretary of the Department of Housing and Urban Development, Mr. Harold B. Finger, and from Mr. Charles L. Biederman, vice president of Levitt & Sons Corp., large producers of onsite assembled housing.

Before proceeding to this morning's testimony, I should like to enter into the record at this point the statement of Peter E. Terzick, general treasurer of the United Brotherhood of Carpenters & Joiners of America, who is scheduled to testify this morning but unfortunately is unable to appear.

STATEMENT OF PETER E. TERZICK, GENERAL TREASURER OF THE UNITED BROTHERHOOD OF CARPENTERS & JOINERS OF AMERICA, WASHINGTON, D.C.

Mr. TERZICK. My name is Peter E. Terzick. I am general treasurer of the United Brotherhood of Carpenters & Joiners of America, and I sincerely appreciate the opportunity to appear before this subcommittee to present my views on the subject under consideration by the subcommittee.

First, let me say that the United Brotherhood has been deeply concerned about the lack of progress in meeting the housing needs of the Nation. Despite all the legislation which has been passed, despite the great concern which many groups in and out of government have manifested in eliminating the ghettos which plague our cities, the housing problem grows more acute year by year for those in the middle and lower income brackets.

Certainly, the inquiry being made by this subcommittee is both timely and appropriate. The Housing Act of 1968, which had our

wholehearted support, envisioned some brave goals in housing. However, there are no indications in the present situation that these goals will ever be met in the foreseeable future.

Nineteen hundred sixty-nine, instead of being a banner year in house building, is going to be a rather mediocre one. And the prospects for 1970 are no brighter.

Primarily, there are two problems in the housing field. One is the inability of the industry to turn out 2,600,000 houses per year; the other is the inability of low- and middle-income families to purchase houses under the exorbitant financing rates now in effect. Rather than being two problems, these items may be different facets of the same problem. The industry cannot long continue building houses unless there is an adequate market for them. Unfortunately, there can be only very limited demand when land prices and finance charges skyrocket as dramatically as they have in the past few years. The poor and the near poor are priced out of the market.

It is no exaggeration to say that the situation in housing is at a crisis stage. On the one hand, need is growing at an unprecedented rate, as the large group of war babies reaches marriageable age; but, on the other hand, interest rates and land speculation are putting decent housing beyond the reach of all but the relatively well off.

When the solutions to the housing problems that plague us today are finally arrived at, I am certain that factory-built houses will play a substantial role.

The United Brotherhood of Carpenters & Joiners has been involved in the prefabricated home field for a quarter of a century. We have more than a hundred industrial contracts with companies manufacturing prefabricatd homes or components thereof. Last month we signed a contract with the Stirling-Homex Corp. of Avon, N.Y., which manufactures modular homes.

Modular homes are a relatively new approach to the factory building of houses. Modules, consisting of one or more rooms completely finished, are erected on an assembly-line basis in the factory. These modules are then hauled to the building site where they are tied together permanently. They can be one-level houses or they can be stacked to make two- or three-story dwellings.

Some 1,500 Stirling-Homex houses are to be built in Dayton, Ohio, under the auspices of the Department of Housing and Urban Development. Dayton has one of the most rigid building codes in the Nation. However, the factory-built houses meet or exceed code requirements.

It is expected that they will involve a cost of $17,000 to $18,000, including the site. Rentals will range from $50 to $60 per month.

Corporations are entering the modular home field at a phenomenal rate. We are now carrying on a dialog with several dozen companies going into the field in all parts of the Nation. For our part, we welcome this development, and we will work closely with those companies which are willing to recognize the United Brotherhood and employ our people in the manufacture and erection of their houses.

However, I believe it should be pointed out that the advent of modular houses built in factories cannot and will not replace conventional construction. There is sound reasoning behind this statement. There are four main cost categories involved in the price of a home: land, materials, onsite labor, and finance.

Of the four categories, the onsite labor cost contributes the least to the ultimate cost of the home. In the October 1968 issue of the Journal of Home Building, a breakdown of the sales price of an average home in 1944 showed that 29 percent of the sales price was attributable to labor costs. In 1966, that portion of the sales price attributable to labor costs had dropped to 18 percent. This drop was due to increased productivity, offsite fabrication, and other improved technologies in homebuilding. Since, in this period, labor cost was the only category which showed a reduction in the percentage cost of the home, it should be obvious that the cost of labor is the least amenable to reduction in the overall cost of homes.

Taking into account the spectacular increases in the price of land over the past few years, plus the unprecedented increase in interest rates, the portion of the housing dollar attributable to onsite labor costs has actually been shrinking. For example, there has been a 36-percent increase in the prime interest rate in the past 6 months. When you translate the jump in mortgage rates from 6 and 6¼ to 8½, 9, and 9½ percent, you add a cost factor that really submerges the hopes of millions of people to own a home.

By way of example, let me point out that a veteran of the Korean war returning home in 1952 had little difficulty in finding a house with a $10,000 mortgage at 4 percent. This made the monthly payments around $47 or $48 per month. On a 30-year mortgage, the interest and mortgage costs totaled about $17,000. Today, a Vietnam veteran who obtained a $20,000 mortgage would face interest rates of 9 or 10 percent. At 9 percent, the total payback in 30 years would be somewhere in the neighborhood of $58,000. At 10 percent, the figure would come closer to $64,000. Thus, it is easy to see that, while the interest rates have more than doubled between 1952 and 1969, the payback costs have more than tripled. This is a catastrophic increase, and no amount of efficiency in construction can do very much to offset the gouging now taking place in the money markets.

Land costs also increased dramatically. During the past 9 years, the percentage of the selling price of a house attributable to land jumped from 12 to 20 percent. Land has been increasing at the rate of 7 percent per year on the average. During most of this period, wholesale commodity prices rose by less than 2 percent. So land speculation, too, has added substantial costs to the price of a home.

In fact, it seems to me, the time has come when the Government needs to be devoting serious thought to setting up a permanent land-use policy. Because land has been a very plentiful commodity in our Nation, no set of priorities has been developed for the utilization of land. With the supply of land remaining static and the population increasing at a geometric rate, these two factors are on a collision course. Some hard thinking is needed on the development of land policies which can insure orderly and efficient utilization of our shrinking resources.

Among the measures recommended by the AFL–CIO is the estabment of a housing land reserve, geared to increasing the amount of land available for low- and middle-income housing both inside and outside of urban areas. Not the least important function of such an agency would be the development of subsidy programs to assist in reducing the cost of sewer, water, and other development costs which

now place much existing land out of reach for low- and middle-income housing.

Essentially, what is needed is a partnership between Government, industry, and labor to attack the problem of inadequate housing. Such a partnership was envisioned when the 1968 Housing Act was passed. Unfortunately, the partnership has not emerged as yet.

As far as the United Brotherhood is concerned, we are ready and willing to work closely with industry, Government, financial institutions, and all other groups that have a responsibility in the field of home construction to seek new approaches to solving the mounting problem of adequate housing for all.

I am hopeful that hearings such as this one can help to focus attention on the problem and thus hasten the day when our housing goals can be achieved.

Chairman BOLLING. The demonstration of this past weekend of what can be achieved through the systematic application and organization of a variety of technologies—putting man on the moon and getting him off again—makes it particularly appropriate that our witness this morning is an exponent of the application of systems procedures in organizing industrialized building. Mr. Ezra Ehrenkrantz is the president of Building Systems Development, Inc., of San Francisco, and associate professor of architecture at the Berkeley campus of the University of California. His contributions to systemetizing the building industry earned him the Engineering News-Record award of construction's man of the year this last February. I would like the record to include the article on that award. Without objection, that will be done.

(The article referred to follows:)

SYSTEMS-BUILDER EZRA EHRENKRANTZ . . . CONSTRUCTION'S MAN OF THE YEAR*

"The construction industry is sleeping," says 36-year-old architect Ezra Ehrenkrantz, named by ENGINEERING NEWS-RECORD as Construction's Man of the Year.

Contending that it is "Victorian in its work habits and building procedures," Ehrenkrantz has put construction on the road to what he calls industrialization by introducing systems building to school and college dormitory construction.

Ehrenkrantz and his San Francisco-based company, Building Systems Development, Inc. (BSD), have shown just how industrialized the construction operation may become. A couple of examples: The Board of Regents of the University of California took bids for $18.5 million worth of dormitories. Florida took bids for 16 schools worth $10 million. The two bid calls, though for different types of buildings in two widely separated areas, had one thing in common: All the bidders on these projects were manufacturers, not general contractors.

As practiced by Ehrenkrantz, systems building involves large-scale manufacture of various compatible building components that have been developed, in many cases, for a particular project. After the components, such as structural system or partitions or HVAC system, are produced and tested by their manufacturers in a prototype structure, the traditional segments of construction come into the picture.

Architects and engineers use the prefabricated components in their design of a building. Contractors then bid for site work and the erection and assembly of the various subsystems that together form a systems structure.

• **Component construction**—An example of the Ehrenkrantz systems approach to planning and design is his first project, known as School Construction Systems Development.

SCSD, completed between 1965 and 1967, used the same set of components for the construction of 13 elementary and high schools in California. The total value of the schools was $30 million, and the components accounted for half that amount.

On the basis of performance specifications, manufacturers designed compatible components to fit SCSD needs and competed for contracts to supply them. The project achieved a 20% reduction in the cost of the building components—structural-ceiling-lighting, heating-ventilating-airconditioning, partitions, and cabinets and lockers.

SCSD had its immediate origins in the late 1950s, when the U.S. was hit by a shortage of school construction funds in the face of an increasing need for more and better schools. The California legislature leaned toward the use of stock school plans to meet the crisis. Ehrenkrantz, then a practicing architect in San Francisco, thought a more desirable alternative could be found in planning concepts derived from Great Britain's industrialized building systems.

For aid in establishing systems building in California school construction, Ehrenkrantz turned to Educational Facilities Laboratory, Inc., of New York City, a nonprofit corporation the Ford Foundation established to help school agencies and colleges in the design of their buildings.

EFL, which has since supplied most of the money to finance the investigation of systems design for school construction, granted $50,000 in 1961 for a feasibility study of the use of a prefabricated component system. SCSD

*Reprinted from Engineering News-Record, Feb. 13, 1969. Copyright 1969 McGraw-Hill, Inc.

was born and EFL eventually granted $600,000 to aid the project.

Several California school boards were already looking for an economical alternative to stock school plans. They told Ehrenkrantz they would use a prefabricated component system if it would provide increased quality and keep school construction costs within their budget limits.

By mid-1962, SCSD's project architect, Ezra Ehrenkrantz, had convinced 13 autonomous California school districts to use identical components in the construction of their schools. This offered potential components manufacturers a large enough market to interest them in competing.

• **Untraditional planning**—In planning the SCSD project, Ehrenkrantz bypassed the traditional method of programming fixed spaces, to be arranged and enclosed by an architect and engineer and competitively bid by contractors. Instead, he went to teachers and students to find out what they needed. From educators he learned of the teaching methods in use and those that might be used in the future. They also told him what was wrong with current technology and spatial arrangements in existing schools. Their criticism boiled down to lack of physical flexibility—restrictive structural spans, immovable interior partitions and the lack of materials quality.

The user-need data collected resulted in specifications establishing how materials should perform now and in the future with other building components.

Ehrenkrantz convinced manufacturers that because the performance specifications could not be met by any existing building products, there must necessarily be huge, untapped markets if products could be designed that satisfied the needs. This, combined with the market in hand, brought in the desired competition and, eventually, products. Almost 500 of 1,000 schools constructed after SCSD have used one or more of the components that resulted from this pioneering project, Ehrenkrantz says, including demountable movable partitions, flexible airconditioning ducts, and lightweight, long-span prefabricated steel trusses and roof decks. Another 500 nonschool projects used one or more of these components.

SCSD's success, not only in the cost and quality of its schools, but in the wide acceptance of the components designed for them, established Ehrenkrantz as the country's leading practitioner and theoretician of systems building.

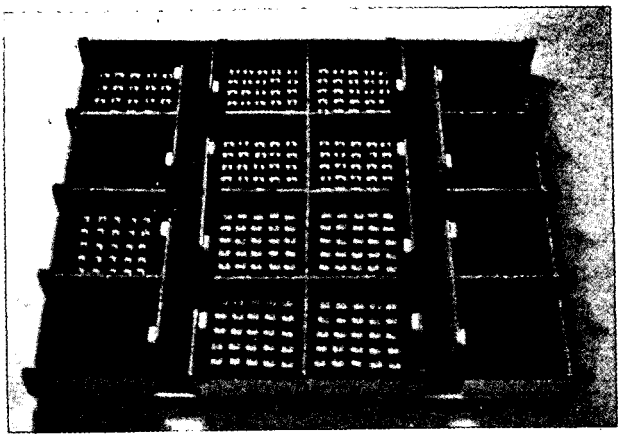
• **Early Ehrenkrantz**—The possibility of applying mass-produced prefabricated components to California school construction was by no means a chance product of Ehrenkrantz's impressive intelligence. He'd been hard at work on the concept for several years and was already well known at EFL long before SCSD occurred.

After graduating in architecture from Massachusetts Institute of Technology in 1954, Ehrenkrantz went to England on a Fulbright fellowship to work on a master's degree at the University of Liverpool. During his two-year stay in England, he also worked at the national Building Research Station, outside of London.

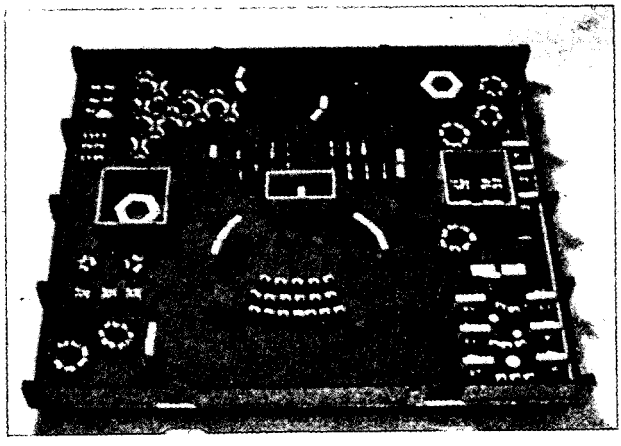
To solve a serious shortage of schools immediately after World War II, the British turned to industrialized construction techniques, including prefabricated components.

When Ehrenkrantz returned to the U.S. in 1956, he talked with EFL officials about what he'd learned of British school design and construction. EFL assigned him to make a study of United Kingdom procedures, which he completed in 1958.

Ehrenkrantz and the California school shortage happened at the right time for each other. Since then, Ehrenkrantz has been making things happen for himself.



STANDARD school planning, containing similar classrooms off control corridors (model, above), can be achieved with systems components if desired, says Ehrenkrantz. But the components also permit walls to be demounted and relocated . . .



. . . or eliminated (model, above), if teaching methods change. Spatial changes in a systems-built project are achieved through longer structural spans, fewer interior columns and adjustable mechanical equipment and lighting.

• **On the road to success**—As a result of SCSD, Ehrenkrantz established BSD in 1965. Last year, BSD's volume was $1 million. The company's 48-man staff is involved in systems building programs across the U.S., and is consulting with school groups in Canada.

Last year Ehrenkrantz's systematic appraisal of the federal government's designated model cities won his company a contract for a preliminary study that led to the Department of Housing and Urban Development's In-City program for low-cost housing.

Later, Ehrenkrantz's firm won a $4.9-million contract from HUD for the program's second phase. Under Ehrenkrantz's agreement with HUD, Kaiser Engineers of Oakland, Calif.—formerly BSD's subcontractor on the project—

became prime contractor and BSD became a subcontractor to Kaiser.

Also last year, the University of California accepted a BSD-programmed package of new, standardized, compatible building components for its proposed $18-million to $30-million University Residential Building Systems (URBS) project. The new components for the project's structure and ceiling, heating, ventilating and airconditioning units, and partitions promises to increase the quality and flexibility of student dormitories without increasing costs. From URBS will come a precast concrete structural-ceiling component, an inverted-T system with a cast-in-place concrete floor, for use in buildings 1 to 13 stories high. The distance from finished ceiling to the floor above is a uniform 18 in. The system will offer its greatest economy, say URBS officials, at relatively long spans of 30 to 35 ft.

Another systems-building landmark occurred last year. SCSD started to prove the value of its flexibility. Barely two years after completion of construction, interior partitions of some of the schools are being demounted and moved to new positions. The flexible mechanical equipment and lighting components are being rearranged accordingly. So without any great expense to school systems, existing structures are rearranged to accommodate changing teaching methods.

Last year Ehrenkrantz also saw launched or planned dozens of projects and studies in the U.S. and Canada. His firm was directly commissioned or consulted for all of them.

They include:

- The $20-million Schoolhouse Systems Project in Tallahassee, Fla., which adapted SCSD's building components, thus cutting the area's standard school construction costs in 1968 by 25%.
- The Great High Schools project in Pittsburgh plans construction of five new schools to accommodate the student bodies now enrolled in 22 existing schools. Each new school will cost about $30 million.
- Academic Building Systems for Indiana University and the University of California involving systems building of more than $100 million worth of university classroom and laboratory facilities.
- BSD participation in joint ventures to study systems building for post offices and Veterans Administration hospitals.

Ehrenkrantz also was recently commissioned to apply the systems approach to the planning and construction of 3,500 low and middle-income housing units in East St. Louis, Ill.

• **Missionary zeal**—Despite the inroads the systems approach made in 1968, Ehrenkrantz's ideas are controversial. He must constantly explain the concept, and it's a task he never tires of.

No matter what he's doing—working, lecturing, traveling or enjoying his scant time with his wife and three children—Ehrenkrantz is preoccupied with the concepts of systems building. He's constantly probing to discover some new facet, resolve some underlying contradiction or anticipate a problem. He invariably has an answer for his opponents.

"The future of a large segment of construction industry practice will be in systems building," he will predict to any listener. He is quick to disassociate his concepts of systems building from modular box design, prefabricated construction or packaged building. "The systems approach to construction is aimed at producing individually designed buildings that use a high proportion of systems components," says Ehrenkrantz.

Opponents of systems building argue that it ignores construction tolerances. Ehrenkrantz argues back that a major goal of systems building is the solution of the engineering-architectural prob-

lems of incompatible edge conditions in existing building components.

Others oppose systems building because it turns design over to many sources rather than giving control to one man or firm. Ehrenkrantz agrees, and says this is an advantage. "Problems are evolving at a rate greater than can be handled by one individual," he says. "Our sociological and technological knowledge is so vast and extensive that many minds must be employed to solve problems and crises. To handle today's environmental problems, planning teams should consist of experts in architecture, engineering, planning, manufacturing, economics, management, labor and the social sciences."

• **A wider choice**—Some architects, says Ehrenkrantz, dislike designing a project from lists of preselected components. He says they forget that they work with "givens" in virtually every project that crosses their boards—that enormous collection of products in SWEET'S CATALOG and similar data. He contends existing habits don't lead to improved quality of materials.

But, Ehrenkrantz says, systems building demands much improvement. He recalls that in drafting the performance specifications for partitions to be used in the URBS project, investigation showed that all available partitions fell short of the performance programmed for the project. He says they could not meet edge conditions, or wear-and-tear requirements. They lacked flexibility because they couldn't accept interchangeable surfaces, such as vinyl, natural wood, or chalkboard, and furniture could not be mounted on them. Ehrenkrantz says that when no existing partitions satisfied need, he concluded that a vast market existed for manufacturers. Manufacturers were in a position to "add to the keyboard of components used by architects," he says.

"How can this possibly stifle creativity?" he asks. "The procedure promises to increase the choices of materials available to the design professions." He claims it also enlarges the potential for innovation, because each systems project should contain different cost factors, different user-needs in terms of location, climate, and spatial and functional requirements.

Because of the nature of the approach, starting with desired user-needs, says Ehrenkrantz, each project's performance specifications should be noticeably different. He says this means the manufacture of some components that fit only a specific project. In other cases, specifications should result in unique ways of using existing products.

"The design professions," Ehrenkrantz says, "must see the rise of the package builder as a result of their failure to deliver projects to the client within the predetermined budget and construction time." The rise of systems building, Ehrenkrantz claims, is an attempt to wrest the initiative from package builders and convince clients that architects and engineers can keep costs within estimates and deliver the project on time.

Unlike the package builder, however, design professionals can offer the client a unique product, numerous options in design, environmental controls, spatial relations and materials quality.

Currently Ehrenkrantz is applying the systems approach to city planning. An associate of Ehrenkrantz recently commented: "He's great at putting pieces together. And his disposition is aimed at alleviating social and esthetic ills in the nation."

As the pieces of systems building continue to fall into place and achieve the desired goals, Ehrenkrantz looks forward to the day when the construction industry will wake up and see environmental crises as its special opportunity to improve life. "In this context," says Ehrenkrantz, "if the problems one faces are looked upon as opportunities, then may all our crises be big ones."

Chairman BOLLING. Mr. Ehrenkrantz's presentation will be accompanied by slides to illustrate the various points he will make this morning.

We welcome you this morning. You may proceed in your own way. We will insert your prepared statement at the end of your oral presentation.

STATEMENT OF EZRA D. EHRENKRANTZ, BUILDING SYSTEMS DEVELOPMENT, INC.

Mr. EHRENKRANTZ. Thank you very much, Mr. Chairman.

Our group has become involved in an approach to construction which we call systems building. It is a word that is used by many other people to define hardware systems—whether it be the structure or the air conditioning or other portions of the building.

I would like to define the word in the way that we use it because otherwise my slides and the rest of the testimony will leave a number of questions unanswered.

We are concerned with the total process of how to build. The building process, in our approach, includes the need to equate the available resources with the user requirements—that is, with the needs of the people who will be housed.

The resources for any type of construction are five in number. To build, one must have land, financing, management skills, technology, and labor.

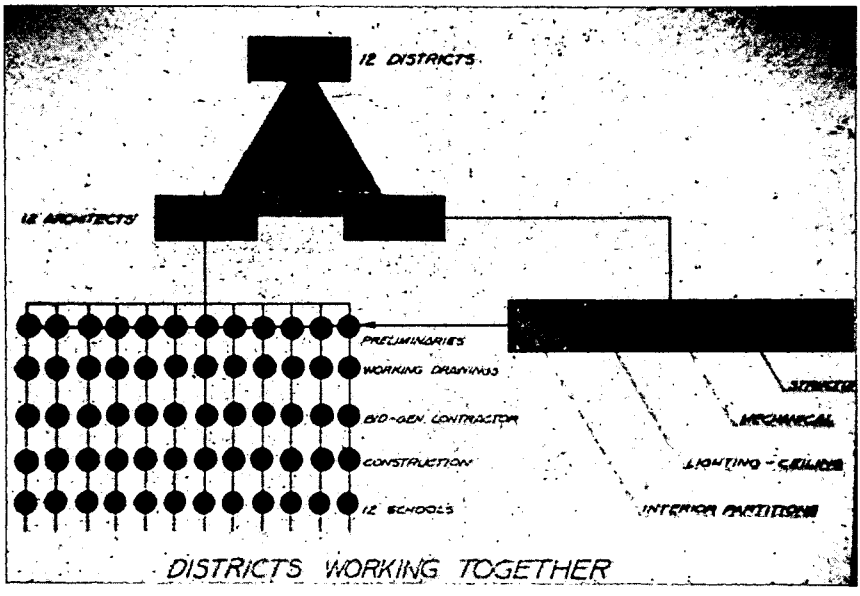
If any of these resources is constrained from being freely applied to the housing process, then a veto power has been asserted against the construction of housing. If the land or the money or the management skills through which the process of building is organized and planned properly, without the technologies and the labor we still cannot build. Since we must have all of these and cannot build if any one of the resources is missing, if we are going to talk of a system of building we must relate to all of these factors, in a total process. Even if a new technology saves money, it cannot do its best job and it is not an acceptable technology if it causes a greater cash flow due to the need for more time to get the building built, or if a scarce building trade skill is needed to install it, or if to deliver it to the job takes too long or costs too much.

On the other hand, if a more expensive technology can speed the process of building, if it has the capacity for saving money in financing or in time, if it causes better performance or reduces operations and maintenance costs over the useful life of the building—then in fact it may be a technology which we can afford.

Our conclusion is that we must take into account not only hardware systems that go into buildings, but the software as well—the marketing and the management techniques that are needed to order the entire process.

In the written presentation which I prepared for your subcommittee, I have called attention to a number of points which I think can best be explained through the use of slides. In these slides I will show projects on which we have been working, and I will give examples of how we apply our philosophy.

When we first started in systems building we were working on a project for a group of school districts. Our initial effort was to set up a new organization composed of these school districts. The group was called the First California Commission on School Construction System. Its purpose was to build—get past the process where schools were built one at a time—schools which did not meet educational needs and which could not be built effectively within the State educational aid budgeting.



The organization of the School Construction Systems Development Project—a "new client."

We were concerned to develop a process through which we would have a chance to build structures that would not be obsolete when they were first occupied and to accomplish this we organized a new group. The group included 13 separate school districts. These districts banded together to provide a reasonable market. On the basis of this increased market, it became possible for us to call on the building industry to develop new products that would meet their very specific needs of this known market.

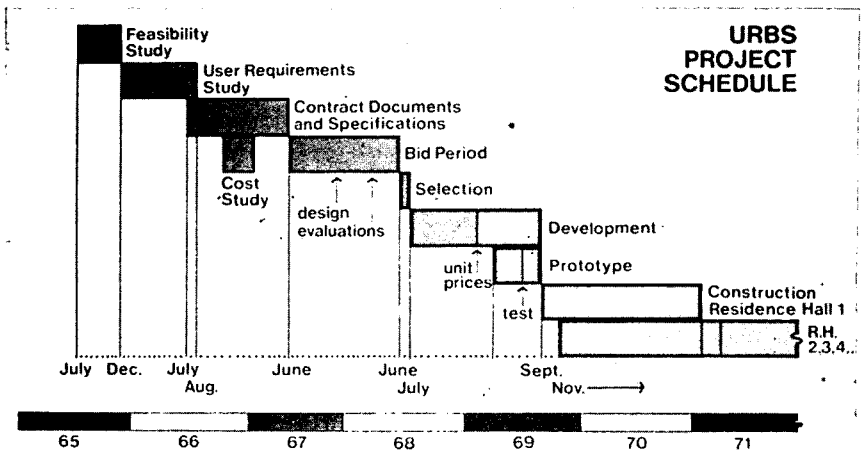
Physically, we were looking to develop a keyboard—a set of building components—which all of the different school architects could use to design individual schools.

In this case each of the school districts used its own architects and each architect designed a unique school that would meet the specific requirements of his school district. None of the schools look alike. All have different needs and they express them differently.

In defining the school needs we worked with the people from the school districts—curriculum designers, teachers, superintendents. Through this process the needs were defined. Then we translated those needs into technical performance terms. It was on these performance specifications that bids were taken.

On the basis of their bids, manufacturers were selected for partitions, for ceilings, for air conditioning, for the building structure, for the casework, and lockers, and for other components. Once they were tested and developed, these products were used by each of the architects to build individually designed schools.

The process that is necessary for development has been demonstrated on another project for student housing. The schedule which we developed shows that a 5-year period is necessary if all aspects of a new building system are to be followed through with thoroughness—the feasibility studies, the development of beginning user requirements, and the development of contract documents, costs, and performance specifications. Next, bids must be taken from industry to create new products that do not exist but that meet the needs stated in the definition of user requirements. Then it is necessary to go to the development of these products, the construction of prototypes units—all leading up to development of processes for large-scale production.

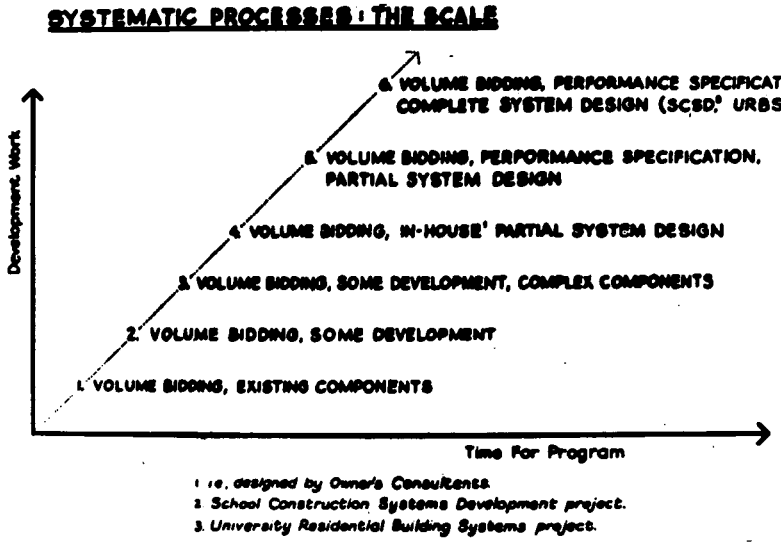


The time scale of the University Residential Building System.

We find that, in the development process, if we do everything in an orderly way as we relate sources to needs, the total process will necessarily take a considerable period of time.

The nature of the development work that can be done changes with time. As the time for a program of development increases, so does the level of developmental work that can be undertaken. If a project offers only a very short period of time then it will be possible to only secure volume bidding on existing components. If you have a great deal of time for a project, you can base the volume bidding on performance

specifications—and end up with the design of a complete new system where all of the hardware is new, and where the definition of the requirements to be met is also new. If we are to meet the major needs of our country during the decades ahead, it is this kind of program that can and must be developed.



Programs to meet the major needs of our country cannot be accomplished in a short period of time.

At the same time, we can move much more rapidly to meet the immediate problems. That we cannot ignore.

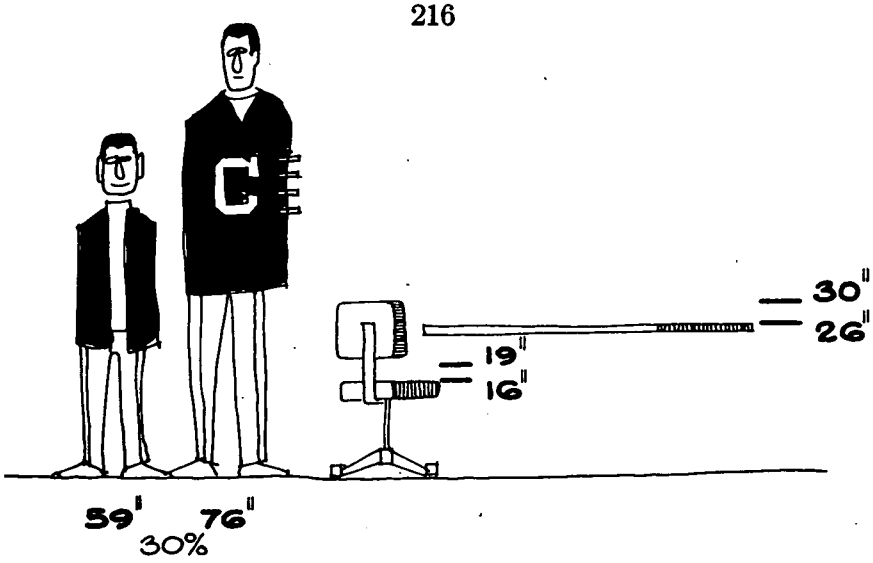
In working to develop student housing for the University of California, it has been necessary to account for changes in the size of the student population, in the mix of students, and in the requirements of the students themselves as values change. In designing for any group of people, we must begin to define their user needs and this is so for any group, and to accomplish it is a rather substantial task.

This type of work has not been done for housing. As a result, we do not now have in existence appropriate statements as to what the basic user requirements are that we are trying to meet as we build any basic type of housing.

In looking at the problem, we find that some of our requirements have held up over the ages. The need for someone to work or study, a person's need for light, the higher cost needed to provide for thermal control by allowing air to move under a structure—these are universal requirements for man.

But there are other requirements—when and how do students or other people join together in groups? These needs change over time.

In student housing we have found that different groups sharing different facilities present a problem. Perhaps two students will share a room in a building, but because of the way it is designed it may be that 32 will have to share large bath facilities.



We must pay attention to the differences that occur within different poeple.

In buildings designed differently, we may find a different mix. The same two students may share a single room, but a group of eight students may have their own bath and lounge facilities. When we take a look at the behavior patterns occasioned by these different groupings—this clustering of people differently—we find that behavior should have a tremendous impact on the design of facilities and on the design of the hardware systems that are used to provide the facilities.

But we believe that this kind of work must be done, and we have discovered innumerable instances where major problems have arisen when it was not done but where the facilities being provided were considered the best that could be provided.

Just to give an example. At one major institution six students were housed in single rooms and they shared a common lounge. This was considered the best possible way to live. But in studying what happened it was found that students had absolutely abysmal academic records. On checking for a substantial period of time, it was found that the major reason was that since six people can fit in a car, when the students went out for coffee breaks at night one student would ask the second one to go, the two would ask the third to go along, and in the end they would all go. This is a problem that is eliminated if eight students study together. Eight do not fit in a car. The conclusion is that we have had to experiment—in many ways.

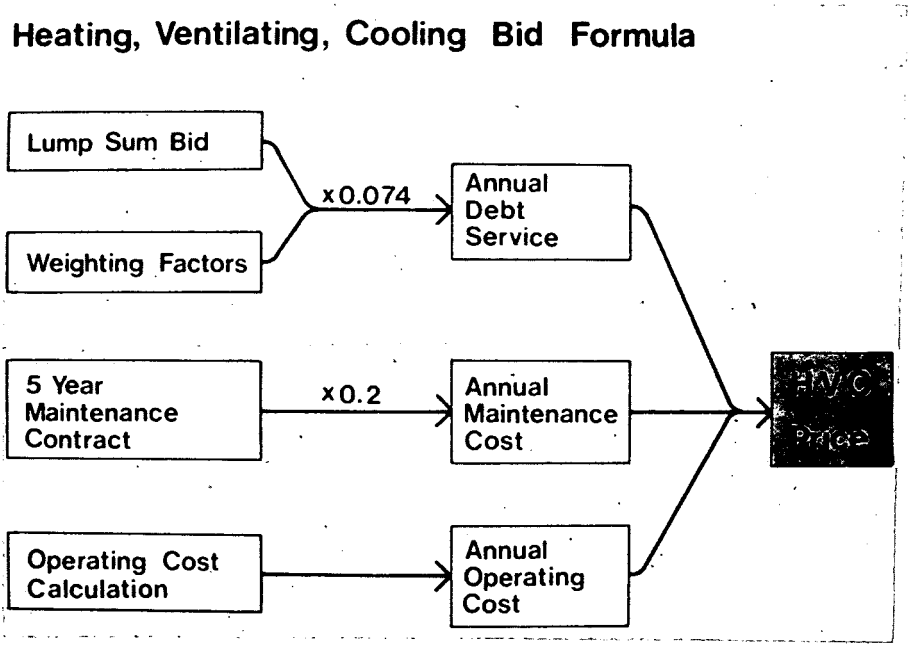
There are different forms and different groupings. They may relate to security patterns in housing and the way in which people may live together and work together to jointly supervise their own facilities. To test various patterns requires that there be side-scale experiments that are not yet being made.

As we know, we must also pay attention to the kind of differences that occur within different people, including simply their different sizes.

In terms of aspirations we find that how people view where and how they will live frequently takes forms and patterns that may vary from group to group. These variations, too, may or may not be handled

within a basic system, but in any case it is necessary to provide for them in building design and configurations so that the major things we build can be organized and designed in an efficient way.

We must be responsive, then, to people's differing needs and aspirations. We can do this by keeping account of the fact that one requirement is cost—and we must not limit ourselves to the first cost of a building. In our work in student housing we have now taken bids that included all costs of owning the buildings. This is the first time this has been done. The *cost per year* of the components individually was the basis for manufacturers' bids. The bids included a formula for the annual costs of debt service and the annual maintenance cost. In addition, the maintenance cost included a 20-year contract. As a result, we knew we had fixed prices and we knew that costs would escalate, and we based annual operating costs on the characteristics of the technologies developed in the system.



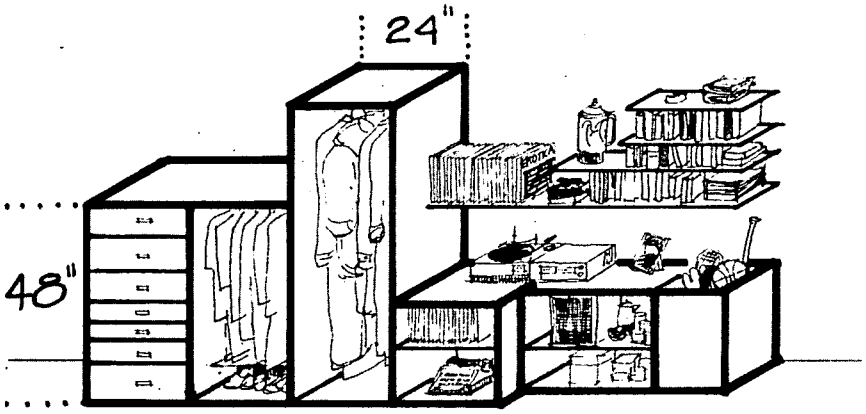
Special bid formulas allow bids to include all costs of owning buildings—not just first cost.

We worked out a system so that if the air-conditioning equipment were not to perform up to the bidder's projected level of efficiency—so that more money would be needed to cover operating costs of the equipment—then a deduction would be made from funds paid in fulfillment of the maintenance contract. As a result of this procedure, it became possible for us to compare annual costs of a system. Our conclusion is that more sophisticated equipment frequently can be developed if you include the annual owning costs of the equipment and the total building in your calculations of what an item costs.

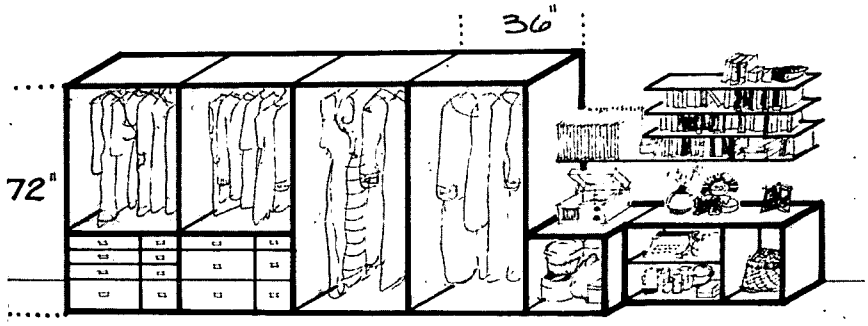
A system building approach does not mean prefabrication of specific buildings. Instead, it increases and in fact provides the power with

which one can design, working on basic modules so that anything can be built within the system.

To get into the substance of requirements in the student residence program we asked what the needs are for students. It is interesting to note that not only at the University of California but at probably 95 percent of the institutions throughout the country, exactly the same need for storage space and casework is provided for men and women students. But in our work at the University of California we found that there is actually a major difference in men's needs for storage as compared with women's.



MEN'S AVERAGE



WOMEN'S AVERAGE

Probably 95 percent of the institutions in the country provide exactly the same storage space for men and women students, despite findings at the University of California. (2 slides.)

We are concerned with developing systems that enable the users to have an impact on their environment. We want to and can offer opportunities for use of different materials that will provide an opportunity for variation. In the case of the designs for the University of California students we have made it possible for them to supply their own coverings and surfaces for walls, as part of the system.

People using buildings have a great desire to express their own individuality and their own approach to life. At the University of California we developed a snap-in wall system, permitting the students to supply their own surfacing and their own materials to cover the walls. If a girl wishes to buy a bolt of red velvet she can paper her room with it herself and when she leaves she can take the material away.

If an institution begins to use heavier and heavier materials, hoping they will be able to be maintained or to stand up over time, what they may be doing is to provide a challenge to the inhabitants. They may simply be designing buildings which say clearly that "you can't destroy it." In this situation, too often people will take the challenge. Vandalism and carelessness will result.

A building that allows individual expression can channel destructive feelings into creative acts.

It is much better to think in terms of developing our structures so that we can say: "Express yourself." Then we may find creative rather than destructive expressions of use.

Perhaps a case study of our work to develop user requirements has to do with their study habits. We find that students study infrequently at desks. Most of the time they study on other surfaces at

other places. Partly this is because desks are often not appropriate for study. But we have also found that one of the locations where students want to read large books is in the bathtub. We have therefore set specifications for design of a bathtub that will include a back seat that would be contoured for reading.

Since a shower is also required, and a shower needs a greater width of space than a tub, we had to work to design a surface for study, in the tub area.

We also found that one reason large groups of people sharing a bathroom do not take baths is because of debris left in a tub by former occupants. As everyone knows, when you try to clear a tub by running water into it, the debris flows upstream and stops at exactly the same place where it began. With the shelf at the side of the tub, a water exit under the shelf becomes possible. It then becomes possible to clean the tub by regular flushing action.

These small items illustrate how people use buildings. If we are to design buildings for people on a large scale, we must begin to understand what the needs and the living patterns are. We must design with the kind of spaces that there should be in rooms and for the furniture that will go into it. We must also think in terms of the way in which you move through buildings.

We have been studying the different widths of housing, and we have found great problems when we try to relate how people live to the dimensions that permit a housing manufacturer to move his units along a highway. At 12 feet it may be possible to develop units that will meet highway codes, but whether you can also develop units that will provide the best use of space for people who are to live in houses of these widths may be another question. If you take a look at the differences between what you can do in a space of 18 feet as compared with 12 feet or 22 or 19 feet, and if you want to find the best range of sizes for family housing, you will conclude that 19 to 22 feet are more appropriate dimensions for users of houses than 12 feet—which is the width you can move along a highway.

Yet as we think of gearing up for production of housing, we may begin to overlook these needs and we may work only with what we can move along highways or with what meets other, more technical, requirements.

In examining the need for variety and flexibility, not only in the sizes of dwelling units but also in room sizes, it is possible to arrive at different options as to how our study of user requirements helps us to develop insight into changing trends and the way in which spaces are used and the way in which people live now or desire to live in the future. When this is done, buildings can be responsive to change and can be thought of as having a dynamic life over time. Buildings can respond to a range of user requirements, so that the facilities can, in fact, be designed to have different initial forms. But no matter what the form is, buildings will evolve over time as the needs of users change.

As we consider the requirements of buildings we must keep in mind the first cost—that is, what we must spend to build—and we must develop techniques to cost buildings not by the different trades that are

needed but by the work that is done. We must compare one floor system that costs $4.83 with another at $3.71 per square foot. These can be compared in constant dollars for the same client, the same program.

As we look at the different parts of a building that performs different jobs, we must develop a costing context that enables us to see how the various parts perform. We must know how to relate the costs to how well we can accomplish such things as sound separation and the thermal requirements of space. In one residence hall that we studied, the walls were designed to provide for 45 to 50 decibel sound separation. But at the same time, the door was purposely undercut so that there would be a return for the air-conditioning system. The result was that, while the sponsor was paying for the higher level of acoustic control, only a sound separation of 10 to 15 decibels was being achieved. A lot of money was wasted on the acoustic performance of the walls, because there was no total building system designed to meet a consistent set of performance requirements.

In our program for the University of California student residences we agreed to a slightly lower level of sound control for the walls, but at the same time we changed the doors to achieve acoustic performance at the level of 25 to 30 decibels instead of the former 10 to 18; as a result, we will have less total cost, but a higher level of performance.

PERFORMANCE GRADING FOR URBS SPECIFICATION - page 1 of 2
(ITEMS RELATED TO CAPITAL OUTLAY)

a NUMBER OF STORIES	1		3	4	5	6	7	8	9	
b CEILING HEIGHT (Feet)	8	9	10	11	12	13	14	15		
c CRITICAL SPANS (Feet)	0-5	5-10	10-15	15-20	20-25	25-30	30-35		40-45	45-50
d FLOOR LIVE LOADINGS (Pounds per square foot)	40		60	70		90	100			
e TYPE OF CONSTRUCTION	V	III	III - 1 hour	IV						
f WALL SOUND INSULATION (Sound Transmission Class)	0-10	10-15	15-20	20-25	25-30		35-40		45-50	
g FLOOR SOUND INSULATION (Sound Transmission Class)	0-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45		
h DOOR SOUND INSULATION (Sound Transmission Class)	0-10	10-15	15-20	20-25		30-35	35-40	40-45	45-50	
i GENERAL ILLUMINATION (Foot candles)		30	40	50	60	70	80	90	100	
j DESK ILLUMINATION (Foot candles)	20	30	40		60	70	80	90	100	
k TEMPERATURE CONTROL	Bldg.	Floor								
l HEATING, VENTILATING, AIR CONDITIONING	Heat	Heat Vent.	Heat. Cool							
m ROBUSTNESS *	1	2	3							
n FINISHES *	1	2	3							
o LIGHTING FIXTURES (Per double room)	1	2	3							
p DUPLEX OUTLETS (Per double room)	1	2	3							

* - Weak, easy to damage, annual care required
2 - Susceptible to damage with rough treatment
3 - Hard to damage, difficult to repair
4 - Resistant to damage

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PERFORMANCE GRADING FOR RESIDENCE HALL D - page 1 of 2
(ITEMS RELATED TO CAPITAL OUTLAY)

a	NUMBER OF STORIES	1		3	4	5	6	7	8	9	14
b	CEILING HEIGHT (Feet)	8	9		11	12	13	14	15	16	
c	CRITICAL SPANS (Feet)	0-5	5-10		15-20	20-25	25-30	30-35	35-40	40-45	45-50
d	FLOOR LIVE LOADINGS (Pounds per square foot)		50	60	70	80	90				
e	TYPE OF CONSTRUCTION		III	III - 1 hour	IV	IV - 1 hour	II	I			
f	WALL SOUND INSULATION (Sound Transmission Class)	0-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45		
g	FLOOR SOUND INSULATION (Sound Transmission Class)	0-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45		
h	DOOR SOUND INSULATION (Sound Transmission Class)	0-10		15-20	20-25	25-30	30-35	35-40	40-45	45-50	
i	GENERAL ILLUMINATION (Foot candles)	20	30	40	50	60	70	80	90	100	
j	DESK ILLUMINATION (Foot candles)	20	30	40	50	60	70	80	90	100	
k	TEMPERATURE CONTROL	Bldg.	Floor	Orient'n							
l	HEATING, VENTILATING, AIR CONDITIONING		Heat. Vent.	Heat. Cool	Heat. Vent. Cool						
m	ROBUSTNESS *	1		3	4						
n	FINISHES *			3	4						
o	LIGHTING FIXTURES (Per double room)	1	2	3	4						
p	DUPLEX OUTLETS (Per double room)	1	2	3	4						

* 1 - Weak, easy to damage, annual care required. 3 - Hard to damage, difficult to repair.
2 - Susceptible to damage with rough treatment. 4 - Resistant to damage.

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Performance specifications translate user requirements into a technical form to which industry can respond. (2 slides.)

In our work to develop good lighting in schools, we have found a need for low brightness and low contrast in the lighting, so that the blackboards can be seen without glare and the printed pages can be read comfortably.

In this case we set forth a series of performance requirements, and when they were presented to the lighting industry, half the industry said the standards could not be met because they contradicted the laws of physics—which was a pretty strong condemnation of the performance specifications. The other half of the industry quietly designed systems that are not doing the job effectively.

We developed a combined lighting and ceiling system that covers large areas of the ceiling. The system requires that there be a capacity for acoustic absorption in the ceiling and that air be able to move in and out of spaces.

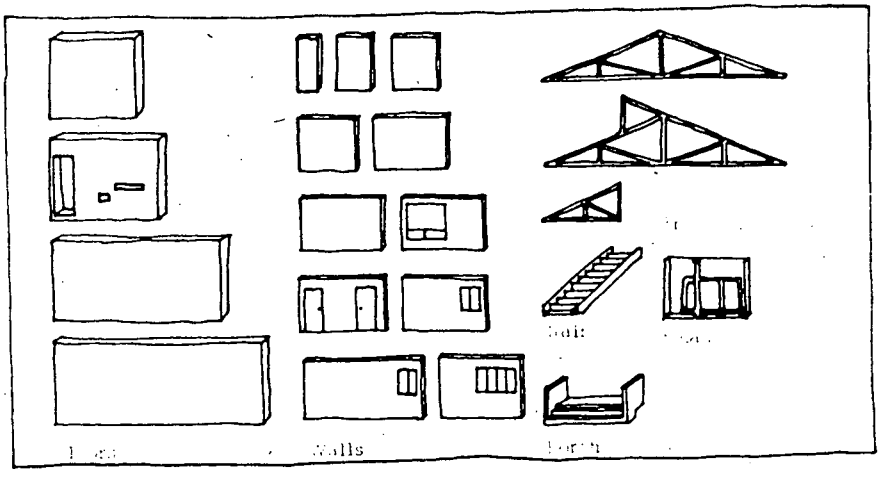
By developing performance specifications, a method is evolved for translating user requirements into a technical form that industry can respond to and this type of vehicle for translating needs into technical terminology is needed.

If industry is to gear up and produce, industry needs specifications which are understandable, which can be tested, and through which industry can develop and test products and can show that the producers will in fact meet the carefully stated needs.

In many cases, before sending performance specifications out to bid, it becomes necessary to be sure that there are ways for industry to meet the requirements. Therefore we have done our own design work internally, to develop components that will prove the performance needs can be met, before we go out to bid.

The tooling and the manufacturing capability of industry invariably provide better ways of doing jobs than we have conceived—once we go out to bid. But first we have to show how the job can be done.

THIS KIT OF PARTS



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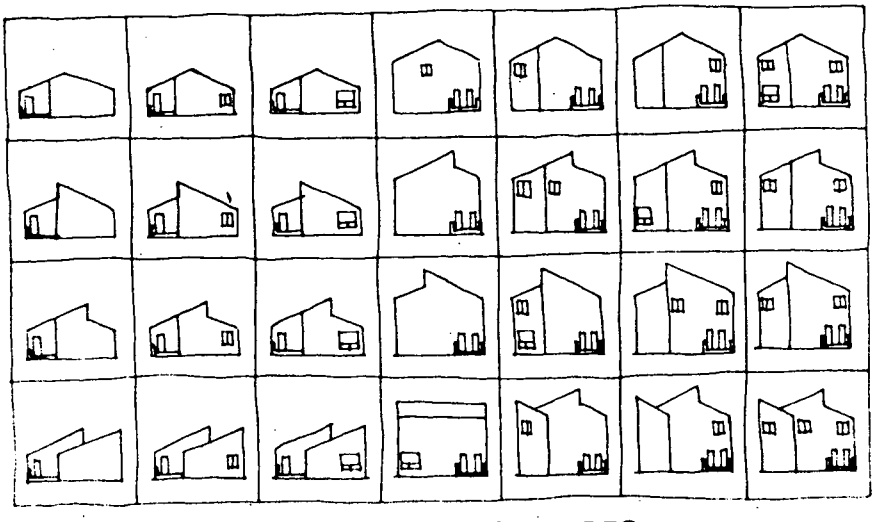


A VARIETY OF HOUSE TYPES.

The components from a recent housing program.

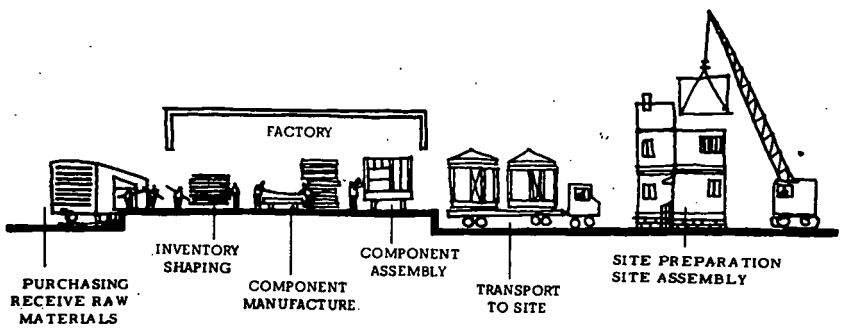
In other cases we indicate through diagrams a range of ways in which a given set of performance specifications can be met, then we find that manufacturers will be able to bid who represent a wide range of materials—one using timber, another steel, and another concrete—all to meet the same set of specifications. In saying what the job should be rather than how it should be done, we have found that we can get a tremendous range of competition.

Now, as we start a new building program we know that we must be concerned with the entire process by which buildings are built—from the use of raw materials at the start, right down to completion of the buildings.

For instance, in a recent housing program it was our purpose to design a kit of parts that can be produced effectively, to provide a large variety of different housing types.

The program for doing the job had to be well ordered, and so, as in our other work, a critical path flow diagram had to be designed showing how all of the parts would go together. Then it had to show how just the smaller subsections would fit together at the building site—to do a total job within an assembly process.

In that case we are working with pieces and parts, as they are purchased, as the components are put together into modules, and as those modules are developed into buildings. Because of shipping, in some cases you may ship the components to the site. In other cases you may want to have modules at the site. This will vary with each different situation.



COORDINATION OF TOTAL BUILDING PROCESS

As we start a new building program we must be concerned with the entire process by which buildings are built, from raw material to completed building.

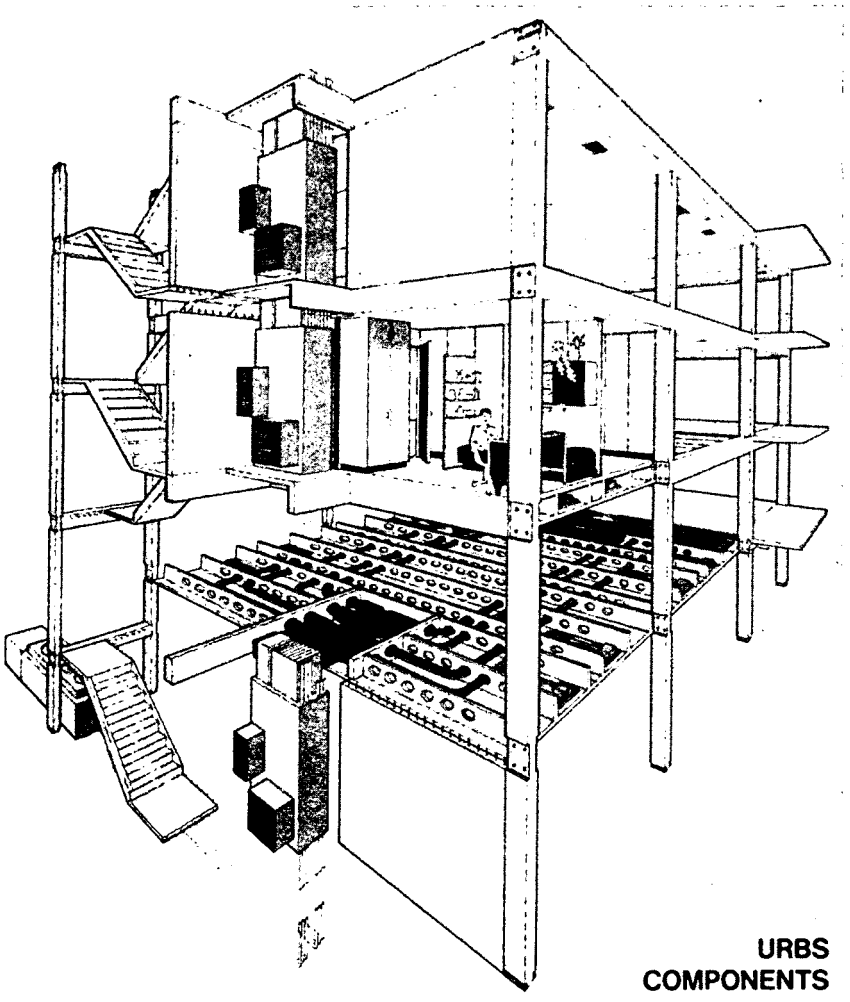
But how the sequence is arranged provides a control of all the pieces and parts—so that they will all work with one another and do a total job, and so that the job provides for appropriate variations to meet needs, and so that entire process will move quickly, meeting a given set of user requirements.

We were working in a student housing system, now being tested by the University of California, where well over 30 different manufacturers designed and bid unique products.

The system developed includes a new type of concrete structure. The wet members of the structure are perforated, and the services needed in the buildings can be moved in two directions through this rather unique type of concrete structure.

In developing this material and system, we have come up with some particularly interesting technical developments. For example, the concrete members are pierced to provide penetration through them for mounting air conditioning, piping, conduit, and other service components. In testing the strength of the material, the Portland Cement Association found that the concrete members were made stronger when regular holes were cut through the members. In this extremely interesting discovery, we learned that the process of cutting the holes increased the strength by 25 percent. We then found that we had been preceded in this discovery by the aerospace industry, where a group had been testing frames to achieve a particular structural strength. Finding that the frames failed in the same place each time, the technical staff finally yielded to the derisive cries of the custodian of the laboratory, who said "cut holes where it fails."

After many failures, one of the engineers cut the holes, and the structure did not fail. Everyone crowded around the laboratory custodian and asked why. His comment was, "Well, you know, toilet paper never tears on the holes." An interesting thing is that with the concrete members it took 7 years for this piece of information to be transferred from the aerospace industry to the building industry—accidentally.



Over 30 different manufacturers designed and bid unique products for this student housing system.

In the structure I am describing we were going for long spans to provide for flexibility in the arrangement of space. We had also developed an air-conditioning system that was designed to be compatible with the structure. One of the interesting things here is that a building system was designed through the process that saved about 8.5 percent in the first cost of construction. Much more will be saved in owning costs of the buildings over time—very substantially more. It is hard to tell at this point just how much. In addition, the performance has been improved because the average span will be raised to 30 feet from a nominal 14 feet, so that the spaces provided in the building would be extremely flexible. In these buildings the partitions are 100 percent demountable, and each student has complete control of his or her environment.

Through this process, the performance was improved tremendously. A significant market was provided for which manufacturers could develop new products to meet new performance specifications, and the first cost of the building was less.

Our first experience with this process was on the school project, where our first costs of construction were 18 percent lower than the costs for building conventional schools under some aid programs. The performance was improved very considerably in this first project.

Since that time, costs have been reduced rather than raised. The actual cost of building schools with the systems-designed components was less this past winter than it was in August of 1965 when our first school went under construction with the components.

With the increases in volume of construction, we have found that if you plot this volume on log-log paper, on a 94-percent slope, the costs will go down along that line as the volume of production increases. Fortunately in the school program, the use of the components has proceeded at a faster rate than building cost escalation. As a result, it is in actual dollars paid on a bid that the school districts are spending less for components than they were in August of 1965, and this is obviously counter to the normal trend in the building industry.

In the student housing system, the development of components took about 5 years. Industry designed the components. In another case a team of five different consultants worked for a large school district, to develop a system for educational parks and in this case the time available was shorter, with the five consulting firms undertaking the system design directly.

Many different procedures can be used. Each procedure will have a different time span, and different potential payoffs in terms of introducing new technology. But all can provide an ordered way to innovate and develop new products to do a specific job of meeting user requirements.

In the initial school project we had a group of over 40 manufacturers who participated in a bidding procedure to develop components that all worked together to do the educational job required. These components are designed so that they fit together. Within this program we have had tremendous cooperation from the building trades, from code people, from many others.

We had a number of significant changes, and many firsts. For example, flexible ducts provide for very good flexibility of air conditioning within our spaces. This was the first flexible airduct developed in the country.

We have five or six other such firsts within a program based on only $25 million of school construction—this was the carrot that we presented to industry for development of new products. However, the market was clearly representative of unmet school needs throughout the country. Therefore it enabled us to indicate that the $25 million was really a pump-priming situation rather than the total market.

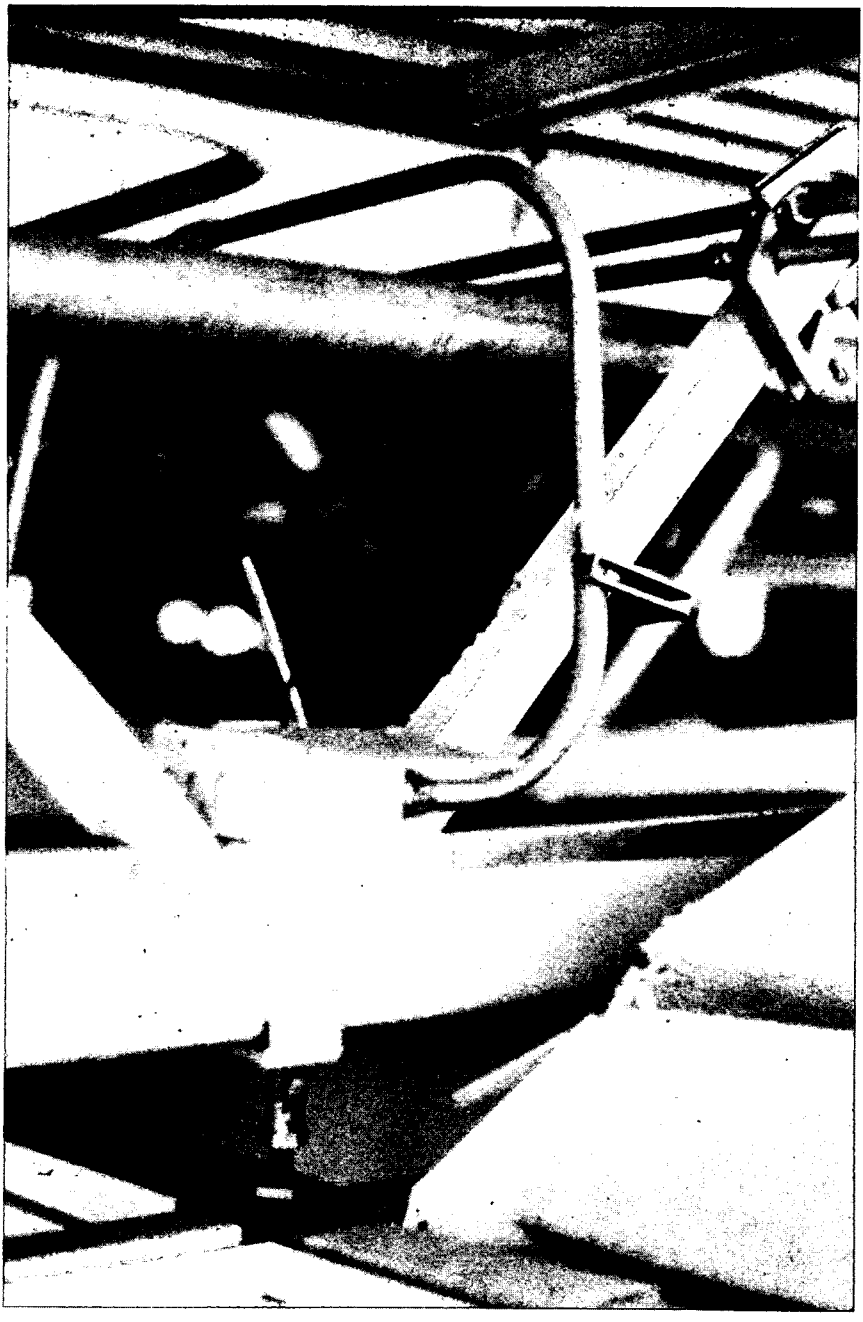
We have developed new materials which provide fire protection for steel. The steel itself was used in new ways, so that the weight of the steel structure was about half that of conventional structures needed to span the space.

Our average span for schools using this system is 60-plus feet. The partitions are completely demountable. Any educational space can have its own thermal control system in that space. The components are so designed that no two building trades need to occupy the same space within the building as it is being built.

The air ducts are right under the structure, the hatched-in space, and the grid spaces are where the conduits for small pipes go. What was designed offers the chance to develop an order for all these components so that they—and the coffers and the lighting and the ceiling components—will work together at a level of efficiency which is much higher than normal at the building site.

Normally we save 20 to 30 percent in time and these savings relate to the cost of getting schools constructed.

The components respect the locations in which they are supposed to move. One small new item that we developed is a little attachment device which holds a group of runner that then supports the coffer. This device is called the spider. It attaches to and levels the structure. It holds the runners for the ceiling and the air conditioning, and it combines the work of four different manufacturers although it is a single product.



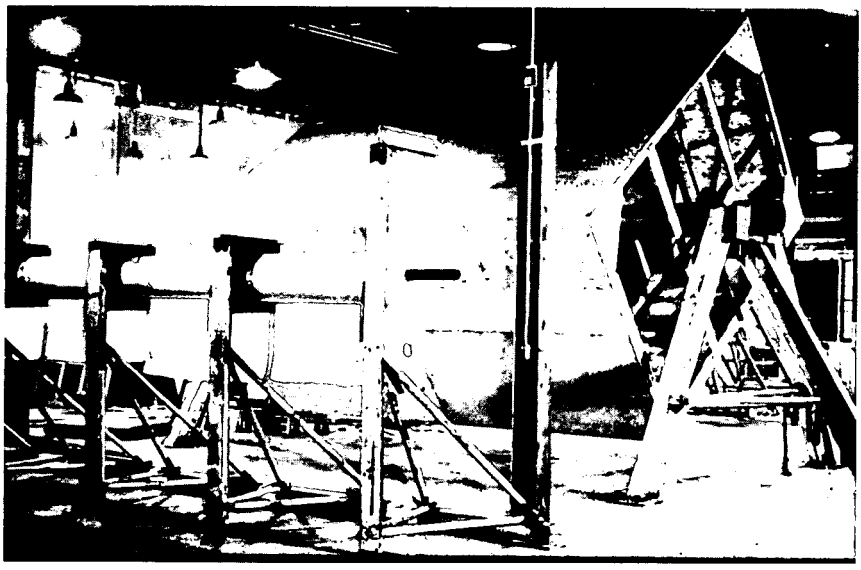
The little "spider" at the bottom of the truss performs several critical functions while combining the work of four different manufacturers.

Unless you know that the products of different manufacturers are to be used together to gain significant volume, obviously it would not pay to design a specific piece of hardware, since tooling for such a unit may cost something in excess of $20,000.

The need is for predictable long-term markets, if one is going to develop hardware which will tie together the components of many manufacturers. This kind of efficiency can be developed under prefabrication of the structure and of the air conditioning, but also of the lighting elements and of everything that goes into the building. It can also relate to organizing their delivery to the site in an effective manner.

In our projects where companies are developing new technologies, you get a sense of why time is important.

In one situation we have begun a process to wind housing around a base structural material. In the process, a glass reinforced plastic material can be wound in a variety of shapes. The shapes can be cut into panels, or into building products, or for use as total shapes. They can then be assembled in many ways, and put together.



A room-sized mandrel around which plastic is wrapped to form housing.

The shapes can be completely wound on a mandril. Normally that would have to be done with a steel form which would retract, to get the building units off of the mandril.

To go through the processes needed to develop such new technologies, however, takes both time and substantial money. It is necessary, therefore, to know that there is a market at the other end of the process.

As we look at housing programs, too often there is a demand to get under construction a very few months after a project is conceived. We are not given time to specify requirements that will make it possible for companies people to act that are willing and able to go through a

developmental process—beginning with finding out needs and developing new technologies in a step by step procedure that will end up with products which will actually do the job.

We cannot deny the need for immediacy, nor am I suggesting that we do so. But we must begin to work on two different tracks in our timing, at least. On one trade we must use what is available to meet our immediate requirements. But we must also move on a longer time schedule if we are to develop better products that will meet more well-defined user requirements—unless we are to continue stirring around to meet current needs within the current year. In my view, this is one of the really major problems of the construction industry.

We have not taken the opportunity to husband markets, to give incentives that offer a sufficient opportunity, that sufficiently define what the requirements are, so that industry has a chance to do what it can do, what it has shown in our California school project that it can do. So far, this opportunity has not been given in housing—to develop truly new technologies and systems based on known markets.

As you develop components for housing you come up with a set of parts which can provide innumerable options relating to how they are put together.

We can have a group of choices as to housing cores, for the services, a group of bedroom options, and literally 2,000 different planned opportunities based on a single set of components.

We have developed a few examples—taking a two-story, two-bedroom unit and using the same components; and a two-story, five-bedroom unit, again with the same components; and then, one-story, three-, four-, and five-bedroom units.

In these different designs we have used different core units, because when we went from three to four bedrooms the number of bathrooms changed, and different kitchen combinations were used. These are not just changes in facilities. They relate to different internal arrangements as well.

As to the external design, we have bulk sketches of the kind of variety that is possible. Then in relating the designs to the sites, it becomes possible to mock up a whole phase of different ways of working in bulk.

Our work on these plans and designs was for public housing and it is now in the form of a proposal which has been submitted to the U.S. Department of Housing and Urban Development.

As you develop components to meet the performance by industry, you must go through a testing program. In the California school project, we were testing the use of the structural components. In testing we used a tent to keep the solar heat off the structure, so that solar expansion and contraction would not affect load testing and so that load requirements could be met and code approvals secured. If the market is large enough you can test. Almost invariably, if you can provide good test results you can meet any set of code conditions.

We have found that when we have had a large enough market so that the volume market will permit testing, codes have offered no obstacle.

After we passed the load requirements test in the schools program, we had to go for fire testing to assure that the ceiling components and structure that were combined for use together would meet a 1-hour

fire requirement. After 70 minutes of fire exposure the structure held up and we got our weight permit.

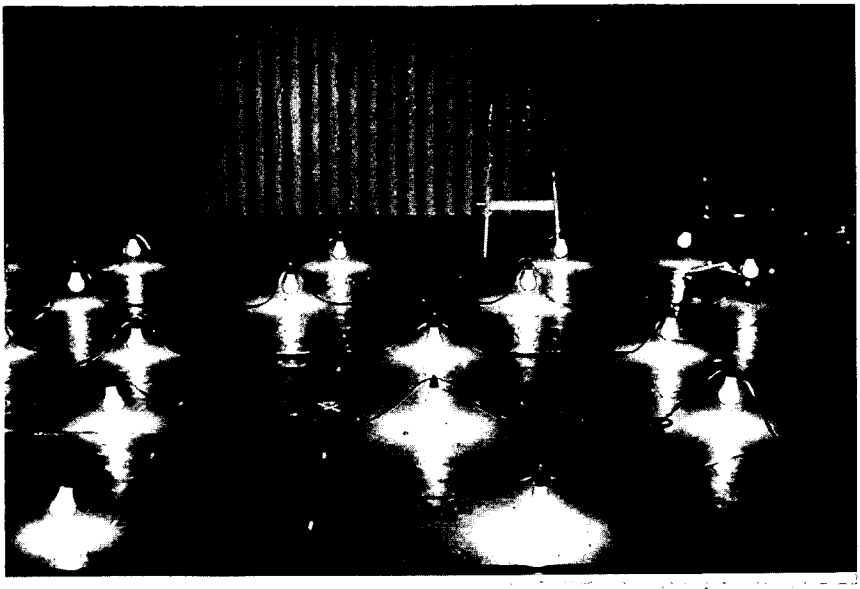
For our thermal environment in the same school programs, we had to meet very stringent performance criteria. We specified plus or minus 2 degrees summer and winter, in any space, at both the breathing level and the 6-inch level. We used the 6-inch level because in our physiological studies we discovered that the average teacher had rather poor circulation, and that normal air stratification caused him to have cold feet. The teacher who had access to the thermostat turned the temperature up—making it too warm for the children and putting them to sleep, or nearly so, and—incidentally—using a great deal of extra money in terms of energy to heat the space.

In developing this type of criteria, and insisting that they should be met for 20 years under maintenance contracts, we provided a very stiff requirement for the bidders. The air-conditioner manufacturers had to design air supply and return diffusers that would work in a coordinated way with the ceiling products of another producer. The reason was that the shape of a lighting coffer will affect the air dynamics within a space, and that it might make it either possible or impossible to meet performance standards that bidders were prepared to contract to maintain for 20 years.

So in this kind of development process where the testing is done—in the case of the coppers in cardboard—the testing was done over a 9-month period.

Thermal couples on poles placed in classrooms were used to see that the requirements could be met, and then in our mockup building we tested the performance. The standard was met, with plus 1 or minus 1 degree. Fortunately we found that a 100-watt bulb gives off the same heat and energy as the average high school student, and so we could simulate student loads in and out of the buildings rather easily by using light bulbs.

The work was done in a mockup building that was specifically constructed for the testing. Laboratory testing of separate components means nothing. Our traditions are to test walls and the ceilings separately for acoustics—and then we find that the sound goes through the joints between the two.



Field testing provides the opportunity to "take the temperature" of the building and discover whether the work must be redone.

All of our performance requirements are based on field testing. Thus we can develop opportunities to go in and take the temperature of the building, so to speak, and discover whether the work must be redone. Otherwise we have no control over the total process.

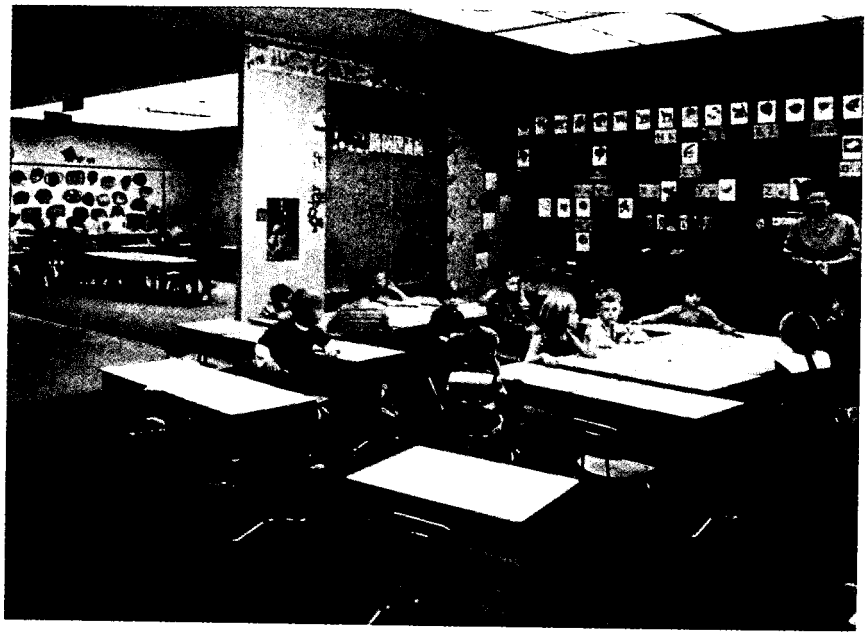
In this mockup building we went through a sequence: all the partitions and the ceiling components were moved six times, and the air-conditioning was rezoned in a complete move by one man in 1 hour. These components are now being used that way in schools, and it is awfully interesting to see teachers determining how educational space should be used over time.

I believe these approaches can be translated so that we can organize space for our housing requirements, and live in a dynamic way, and I believe that today it is an absolute requirement.

In some cases we have provided relatively rationalized housing programs, where we have just used existing products in a systematic way. We have one such housing project now under construction in Detroit of 500 units. In this case our costs were about $2 more per square foot than the program described above.

Changes in volume or scale reduce what you can do with design configurations in terms of pitched roofs and offsets, and the costs can be very much different in small versus larger projects.

When I talk of flexibility with a standard set of parts, I am going to run very quickly through a range of the schools designed with the SCSD system. One is an elementary school that was built on a sloping site; it meets a variety of changing requirements internally.



The walls themselves are magnetic tackboards, allowing a forest of different things.

The walls themselves are magnetic tack boards. Items can hang from the ceilings, and frequently there is a forest of different things.

One of hundreds of different SCSD school buildings now in use.

Twenty months after our first school was occupied, there were 900 school buildings in use. This gives an indication of how fast good products can take over and get used, once they are developed.

(The prepared statement of Mr. Ehrenkrantz follows:)

PREPARED STATEMENT OF EZRA D. EHRENKRANTZ

Mr. Chairman and members of the subcommittee, I am delighted to have the opportunity to share with you my thoughts concerning a systems approach to construction. My firm has translated these thoughts, based on initial work in the field of educational facilities, to our work in housing. I hope that they will be of use to your committee.

INTRODUCTION

In the United States today the traditional building industry is unable to meet the pressure of demands for the production of its required physical facilities. This inadequacy is not due to ill-will or to lack of resources and technical capability, but rather it occurs because the organizational context in which the construction industry works has not developed the capacity to do the job.

Each group within the building industry is locked within a series of checks and balances of its own, and each has a particular stake in some aspect of the status quo. It may be that building codes, labor jurisdictional disputes, attitudes of contractors, subcontractors and professionals do prevent innovations from being applied. We must acknowledge, however, that each group is attempting to make positive changes within an organism that provides so many constraints that progress is minimal.

It is essentially the total structure of the building industry that inhibits the effective development of new products, components and construction. The scale at which individual projects are built does not provide a sufficient base for construction efficiency to be developed in a manner analogous to other industries.

Our limited basic resources of land, finance, technology, management, and labor must be properly used. National housing problems call for a concerted attack on every phase of the process by which housing is provided for the purpose of reducing costs and/or improving performance. Technology cannot solve the basic problem alone, but it can make a significant contribution when developed in concert with other resources and directed at real needs. It is evident that new technologies can reduce somewhat the initial construction cost of housing and can significantly raise the quality of the physical environment without raising the cost. Improved technology, more so than any of the other resources, holds the potential of industrializing housing production. Without technological advance, low cost housing needs cannot be met. There is simply not enough land or enough skilled labor to give everybody a hand-built frame house on an open lot.

USER REQUIREMENTS

If technology is to provide for the real needs of people seeking housing, their requirements must be understood. Current building programs for lower or moderate income housing too frequently relate to patterns of life assumed appropriate or acceptable for people who can independently afford good housing. These programs may not recognize the variety of life styles, family types, and conditions of lower and moderate income families. These families frequently have more complex living patterns, such as those occasioned by single parent households and extended families. Middle income families have resources to supplement major living requirements outside their household, such as nursery schools and recreation which they can pay for and reach. Low income families frequently do not have the money or mobility to satisfy these requirements. The dwelling unit and its immediate neighborhood must, therefore, provide for a broader range of activities than those required for middle and upper income families.

The appropriate study and expression of activity patterns which may be stated as "user needs," has not yet been made. Consequently, it is difficult to specify exactly what should be developed to provide appropriate housing for lower or moderate income people. Technology thus is frequently misdirected to solve assumed, rather than real problems. Technical problems are easier to define and solve than social problems. The end result of working on unreal problems is failure and, unfortunately, failure repeated over time results in disenchantment with technology.

The Need For Large Predictable Markets

Any approach to the development of new technology must begin with appropriate market studies of the nature and quantity of real and perceived needs. New developments must deal with systems of delivering housing which will meet these needs. One must ask before developing new products, "Who am I designing for and what are their requirements?"

Competition exists between all market opportunities for men and money. It is one thing to define needs and another to get people to work on methods of providing for them. Incentives must be created to attract manpower to the development of new products for housing, rather than for other markets which may offer a better return.

The scale of operations will be determined by the market size and this scale will have a direct effect on the manner of utilizing resources. A large organized volume of new housing construction would make possible levels of efficiency and management not normally available within the construction industry. This volume may range from five thousand to fifty thousand units in a single program. Each level may provide for different approaches to production, such as use of a more capital intensive plant and more effective scheduling of manpower. Change in scale of operation is essential as a prelude to new developments. In order to satisfy the needs of a large housing market made up of different user groups, a high level of product sophistication is required. Designs must be developed so that standardized building components will fit together in different ways to provide for this variety. This flexibility could permit the aggregation of many specific markets to create volume. The present practice of developing new ideas through custom building one project after another, limits the scale of the market and results primarily in decorative changes. Significant development cannot occur without a more thorough approach to construction and this requires the market to justify it.

Understanding the Development Process

A systems approach to construction which allocates resources to needs is essential to the effective development of new technology in building. It calls for the rational development of new products and procedures in response to a given situation of user needs and markets. Initially, needs are defined in social terms. It is therefore important to develop a method of communication so that the basic user requirements can be translated into meaningful terms for industrial response in the creation of new products. Performance specifications, which state what technology must do, rather than how it must do a job, can provide such a method. Social needs can be expressed in terms of performance requirements. These requirements can be understood by industry and they can provide a meaningful target. This work must then be related to target costs. In the process, trade-offs between required levels of performance and attendant costs must be made.

The cost of research and development, tooling, production, and marketing is so great, that it is difficult to expect companies to undertake major programs of innovation purely on a basis of speculation. The future opportunities must be spelled out in detail. This is particularly true in an industry where each project has been regarded as a custom situation. Competitive bidding has made it difficult, if not impossible, to introduce innovations effectively as it is very difficult to set up competition on a new invention as required on public work. New ideas have to be available from at least two other manufacturers before it is legitimate to specify a given product. This procedure reduces the incentive for major innovation. Another major drawback to introducing new products is the fact that the learning process increases initial costs. Unless one has substantial markets for the amortization of these learning costs, innovative projects are penalized. It is difficult to find the people willing to pay more for a given project, on the basis that future projects will be cheaper. Industry is reluctant to pay these costs, because they have no assurance that future designs will use the same products. Because of these and other constraints to innovation, it is important to develop a systematic approach which provides for research, development, tooling, production, and construction of buildings in an organized way. An effective method must be provided for the delivery of new technology.

The fact that technology has not kept pace with requirements in construction is primarily due to the lack of significant markets and mechanisms for proper introduction of the work. This has resulted in the financial failures of many new approaches, which in turn have reduced the interest of many companies to make further investments. The Lustron House, which was designed for mass production with considerable government support in the fifties, provides one such example where the lack of an organized market was a primary cause of failure.

The Systems Process

A systems approach is not limited to any specific technology but tries to equate resources and needs. One may find that the best utilization of resources for a particular problem may be obtained through improved procedures for building at the site. Each case must be related to available technology, needs and dollars without preconceptions as to how the job should be done.

The systems approach begins with an identification of the user requirements including the potential changes in use to which a building may be put over its useful amortized life. This provides the basic user criteria which the system will have to meet. The criteria may include: acoustic separation between apartments; level of thermal control; the properties of surfaces for impact, fire, abrasion; the amount of area required for different functions; the relations of spaces one to another; the relation to outside areas; organization of the spaces to provide for security; and the management systems for operations and maintenance of completed buildings. The development of criteria and their relation to cost requires trade-offs in allocation between the different factors. One must not put too much of the resources into the thermal environment if, as a result, one takes the money away from appropriate party walls to provide for acoustic privacy. It is in this way that one can balance the organization of the resources to do a proper job.

It is important to recognize that building systems concepts cannot be applied dogmatically to buildings or to organizations. They must be evolved in each new situation creatively. The systems approach is a process to apply careful study to everything that is required. If a building, a neighborhood or a community is to be developed efficiently, it is necessary to start with a knowledge of what is needed and what resources are available.

In organizing for a new scale of development, one must acknowledge that for each situation there are many alternative strategies. One must develop the procedures to evaluate these alternatives and make appropriate decisions. The basis for developing these decisions does not exist and we are not doing sufficient experimental work to develop it.

SCSD—An Example of the Systems Process

When we find that agencies acting as clients for housing are unable to organize their building program so that appropriate solutions can be found, it may be necessary to develop a new type of client. We have had an analogous experience in education, where individual California school districts had difficulty in providing new buildings which met educational requirements within the budget. In the California School Construction Systems Development project, better known as SCSD, our first task in the development of a new building system was to create a "new client" composed of thirteen school districts. The size of this "new client's" market provided the incentive to induce manufacturers to develop new building components. These new components had to meet sophisticated educational requirements while providing versatility of individual design.

Our mandate was to hold the line on costs, while providing for greater flexibility and better school environments that would respond to changes in educational programming. In response to a committed market of $25 million for the school buildings, the industrial participants eventually spent approximately $10 million on technological development. It was possible to obtain this level of commitment because the SCSD market was considered as a pump-priming mechanism for larger markets.

In the program, industry produced systems which in many instances exceeded the specified requirements. In addition, an overall saving of some 18% in first cost was realized on the installed components. These components accounted for 45–55% of the total building cost. The quality of construction provided favorable projections for future savings in operations and maintenance costs. For example, the saving of one watt of electricity per square foot over one year in an average high school is equivalent to the salary of one teacher. If a high school uses three watts per square foot more than is needed, as was sometimes found to be the case, savings in electricity could pay for three more teachers. It is quite possible that in publicly administered housing, savings in operations and maintenance may be sufficient to provide for substantial improvements. If insufficient attention is paid to the cost of maintenance in the initial design, the high cost of upkeep will cause neglect with attendant deterioration over time.

In a study of the operations and maintenance of 250 schools that was performed by Benjamin Handler of the University of Michigan, it was found that, when related to its cost over a forty-year life, the first cost of a school approximated one-eighth of the total forty-year owning cost of the school. Money spent on financing the school equalled that of the entire first cost. Operations and maintenance costs were approximately three and one-half times the initial cost. Alterations needed to keep the buildings from becoming obsolete averaged two and one-half times the first cost.

In September 1966 the first SCSD school was opened and by the fall of 1967, the components produced for SCSD had provided spaces for nearly 19,000 public school students in the project's thirteen schools. Within twenty months after first occupancy, there were 900 buildings in which SCSD-designed components were in use. The first cost of using SCSD components was lower during this past winter than when they first went out to bid in August of 1965. Due to the increased demand for production, it has been possible to reduce prices faster than building costs have escalated.

In the SCSD program it was possible to obtain longer structural spans than those used in conventional school construction and demountable partitions with surfaces to accept chalk or tack usage for purposes of flexibility. Other new products developed for this project included: improved lighting, ceiling components, air conditioning and casework which contributed significant advances related directly to educational requirements. The use of industrialized components reduced construction time by approximately 10 to 30%.

Insights Developed Through Our Systems Work

Although SCSD is our only example where the final results are in, we have been involved in a number of other systems developments. These include student housing for the University of California, projects for a number of government agencies and we are working on a variety of housing programs—ranging from units for families requiring public housing to vacation homes for well-to-do buyers. In some of the programs we are working to develop new technologies for the production of hardware only. Each program requires different strategies to meet its unique user requirements, but the basic process remains the same. While we see great potential for improvement in the SCSD program, we have learned that the opportunities for system building increase with the complexity and cost of the project. As we take a look at housing, we find that the opportunities for substantial cost reductions through use of new technologies are not likely to be as great as they will be in more expensive and complex types of buildings. An industrialized building process can make possible a savings in the assembly of the building, but these savings may be offset by requirements for higher quality materials to be used for precise manufacture. For this reason, we must look to programs which attrack the entire process of housing production and delivery. To this end, the new technologies may make their contributions more to the organization and management of efficient total programs, than to major initial savings in first construction costs. At the same time a number of building systems that are now being developed in the United States do have the possibility of making significant savings in terms of first cost. I would add the cautionary note that we should not evaluate these programs on the basis of their first cost alone. Rather, the basis for judgment should be how they contribute to the annual cost to the user, the total quality of housing and to the methods and speed with which it can be built. In a specific instance, we found that a 50% reduction of construction time for housing clusters in a project reduced the cash flow requirements by 350% for the same number of units. In such a case, one might even accept a slightly higher first cost for construction.

Three Approaches to Construction

There are three models of how we can organize to build our urban environments:

1. *Conventional construction,* which is not able to do the entire job today because it falls short in terms of cost and capacity. There is not only a housing shortage, but a greater proportion of the American public is unable to afford new housing each year because building costs are rising faster than the GNP. We must therefore look to new methods, at the very least, to pick up the slack.
2. *Prefabrication,* which mass produces houses like automobiles. This is a strong direction in which many companies are now working, albeit with rela-

tively unsophisticated techniques. It results in the design of houses which are sold off the shelf for a variety of needs whether they are appropriate or not. If this is the only available way to fill the housing gap, it must be used. However, one is concerned that the counter reactions to the provision of space designed to fill immediate needs, which is not responsive to those needs, may help create our next cycle or urban slums.

3. *Systems building*, where the task is to equate user requirements with resources in a creative and responsive manner to provide best value for the dollar. One must take advantage of industrial efficiency by using standard mass produced products. This need not be any more confining than the keyboard of a piano is to a composer, if we have a framework where the different components can be used together in an interchangeable manner. In fact, it can provide an opportunity to gain more freedom and design flexibility than exists today with conventional construction. This is especially true if we include the constraint of cost.

Need for Long-Term Planning

The necessity to push in the direction of efficiency and economy of housing in response to developing pressure is obvious. The real question is whether we can organize this work so that it results in a society which respects the individual or not. In retrospect, if one wishes to view the government supported post World War II housing program with a jaundiced eye, one may say that they acted initially as a cream separator to take the middle class out of the cities and then through urban renewal to displace the poor, breaking down the social bonds of a once stable community. New construction was required, but we are now living with at least some problems that were occasioned by those programs. Industrialization of the building process is necessary to house our needy and increasing populations but considerable research effort is required on quality as well as quantity.

In using systems approaches and standardized building components, we need not create sterile or uniform environments. The limitations to a building's configuration and appearance need be no more stringent than those of the designer's vision, while retaining the opportunity to work within the context of cost, time and user needs.

We must be certain that the new round of increased housing production which will emerge will not sow the seeds of our next cycle of urban problems.

The Development Process

We and others have found that the development process requires a five to seven-year period. This is true of building system developments that have occurred in many countries. The cycle is based on the need for newly-developed technologies to go through the various stages from basic research to design, to development and testing, and then to application. We must take short cuts to start providing housing more rapidly, but we must simultaneously begin work on longer range programs if we are to provide lasting solutions.

I believe that it is important to develop building technologies and systems that are based on American expectations and standards of living, and that take into account an appropriate mix of what our people need and aspire to. We cannot hope to adapt systems developed in Europe or to develop instant and lasting solutions. We must undertake major long term development programs. It is only in this way that we will be able to harness the industrial potential of United States industry to the country's needs. A proper institutional structure, time and the systems process can be the source of significant technological breakthroughs; these may relate to the quality and cost of the products which enclose and service our spaces, as well as the method of assembly. Incentives for long term development coupled with an organized process to make it possible to introduce the results of this work onto the market in a profitable manner do not exist or are so constrained that ideas which merit pursuit frequently are abandoned.

Our emphasis is on speed. Existing pressures require that the work be done by individual companies and designers on a solution oriented basis. When this is done, one inevitably concentrates on specific interests in particular materials—such as steel, concrete, wood or plastics, or in different construction approaches such as box or panel construction—each having a different measure of fabrication on-site or off-site. We must at the same time direct a portion of our effort to a problem oriented approach.

There are about 400 companies presently working on new developments for housing in the United States. Most of these are producing components that do part of the total job. Very few companies have total building systems that can do the entire housing job—systems that are developed and in use. The technologies of the various portions of a house made by different companies must be coordinated if a total system is to be developed. Without long term planning opportunities, a company may develop some new ideas but will do so in the context of existing products on the part of other suppliers with whom the new work will be used. As a result, we are now faced with the problem of trying to develop new building systems for housing on an ad hoc basis without the opportunity to take advantage of our national capabilities.

We must also recognize that a realistic development cycle must be evolved if there are to be true breakthroughs. Long term development is required, and we must have programs to motivate this type of development. In the School Construction System Development (SCSD) project in California, it took us more than five years to develop our program and to achieve first occupancy. That kind of time is not normally offered for project development.

Experience in the United States and other countries shows that there must be a predictable market to use the technologies at the end of the developmental period, or it obviously does not pay to go through the process. Programs have been cycled in some countries so that three systems are continually in development or use—while one system is being used for large scale construction, a second is being tested through prototype models, and the third is in the beginning stages of conceptual design. As a system in use phases out, the system at the prototypical stage may take its place while a new system will go into the initial design development phase. This kind of cyclical schedule requires long term planning.

Our firm has participated in crash programs. One cannot stand back when needs are so urgent. Within this context we have done the best job that we could do. It is exciting to be working on a variety of programs at different time scales and we must be willing to respond to immediate problems with urgency. However, it is extremely important that a significant allocation of funds and resources go to the development of longer range programs for housing technologies. These programs should have goals established that are related to basic needs and meeting people's requirements with the opportunity to do something other than an off-the-shelf, rapid-fire program.

Conclusion

In looking at the state of construction in the United States today, we must come to the conclusion that we are at an impasse in terms of our ability to get value for the dollar. We have not yet created institutions whose building markets will permit the development of a building systems approach that provides for desirable cost, time and performance characteristics. Until we develop the capacity to do this, we will continue to work at the craft scale, or with solution oriented prefabricated housing. This is not acceptable if we are to do the job that must be done to provide good physical facilities in a good urban environment for our people.

In order to combine markets and to design appropriate individual buildings, major systems programming is needed. This cannot be done if we are going to rely on short-term, ad hoc programs in which ground must be broken a year from the time when the idea occurs to someone to build. This is the norm on which most of the work going forward in the United States is based at this time. Unless there is a payoff, a creative role for those people who are anxious to be involved in finding long term solutions to these problems—and unless we can provide the time and the money needed for such a true payoff—we will not be able to improve our buildings and our urban environment in a carefully planned, increasingly livable way. At this juncture it appears that one alternative is a deterioration in the American way of life, and this is a prospect which no one cherishes. Instead, we look to the future in realistic hope. Through a systems process, I believe we have an opportunity for that hope to be realized.

Summary of Recommendations

Recognizing that the traditional building industry cannot meet current demands for housing and urban facilities, we should:

1. conduct concerted attack on every phase of the process by which housing is provided. Technology is a prime factor, but only part of the total package of land, finance, technology, management and labor;

2. understand and provide for people's specific requirements; in particular, recognize that lower income people have less buying power, less transportation mobility, even some living patterns and family types which vary from families of more means. Define user needs;

3. express user needs (physical and social) in terms of required performance to which industry can then work. Make appropriate trade-offs between performance and cost responsive to user requirements;

4. provide incentives which will attract men and money to developing the housing industry and its products;

5. organize an initial and continuing volume market to permit needed efficiencies, as well as to promote research and development by industry and to amortize "learning costs";

6. reduce building industry constraints to innovation;

7. support the introduction of innovations in to the market through national testing, temporary certification and permanent certification procedures;

8. use Federal programs as major testing grounds for innovation;

9. design buildings and award building contracts in consideration of initial construction costs, operations costs and maintenance costs—not on initial construction costs alone;

10. assure the development of building standards which have national acceptance and which will permit the marketing of housing on a nationwide basis;

11. expand the Federal role now beginning in HUD of supporting, with money, experiments and large-scale production in housing programs, especially programs dealing with long range planning, research, development and testing;

12. recognize that we must move immediately on both short and long range programs.

Chairman BOLLING. Thank you, Professor Ehrenkrantz.

Mr. EHRENKRANTZ. I think this gives a very quick runthrough and, perhaps, illustrates what we are concerned about when we speak of a systems process developed from needs through the physical facilities which will meet those needs, with attention to the total management process by which the whole job is done, including the potential creation of a new type of client, a new entity, to sponsor the work if existing organizations do not have the scale and capability to do the job.

Chairman BOLLING. Mr. Ehrenkrantz, that is a fascinating presentation, one of the most interesting things I have seen in the years that I have been alive, and not just around here.

There are some questions raised by your slides and by your testimony and I won't attempt to pursue them all.

We have a problem that I would like to see if we can resolve at least in general terms, and that is that so much of the strength of your presentation rests on the illustrations that I wish we could work out a method between you and the staff so that when we present our report we are able to present those illustrations that lend themselves to such treatment in a somehow more or less coordinated fashion. I realize it would be asking too much for you to work out a presentation that would solve that problem in a whole report, using everything that you have used, but I would hope that you would be willing, as you have been to come here, to work with the staff so that we could present in a written congressional report, with all the limitations that that involves, some of the rather dramatic material that comes up between your slides and your words.

Mr. EHRENKRANTZ. Fine, we will work on that.

(Illustrations are included in oral presentation of Mr. Ehrenkrantz, preceding.)

Chairman BOLLING. I think it is very important that we accomplish that, because this is a really enormously interesting presentation.

There are a number of other things that I am not going to attempt to pursue in detail, but I think will need a little clarification.

For example, I followed most of it, but I think I got lost on exactly what a winding process was. I am not going to ask you even to describe that now because I think I understand it in general enough terms, but I think between you and the staff we can clarify things like that so that our report conveys more broadly some of the exciting ideas that you have presented. I enjoyed, for example, your illustration of the discovery of the strength of the materials being increased by making holes, that it had been discovered entirely independently in one industry, and had been lost for several years before it appeared in the other. I think this may be the most useful function that this subcommittee can perform in more widely disseminating information, a great deal of which, it seems to me, is unique.

So I hope that that rather complicated task is not imposing on your good humor, because I think the report could be very useful.

I have some general questions. I won't attempt to go into all of the things that come to mind, but I am an ex-teacher, a former teacher, and I wonder if you found out generally why teachers have bad circulation. [Laughter.]

Mr. EHRENKRANTZ. I think an awful lot of teaching is done with teachers sitting at their own desks and over the years this may——

Chairman BOLLING. May take its toll of the circulation of the extremities.

Mr. EHRENKRANTZ. That may be one of the factors.

The other thing is that perhaps the ventilation systems have not been good for a long enough period of time so that the physical facilities may have well contributed to those problems as well. I really do not know specifically.

Chairman BOLLING. I think it is sort of interesting that it would turn out to be that way. Being in a business now that requires more circulation, perhaps, than teaching, I hope we do not all suffer from the same debility up here.

You indicated on several occasions in your comments that while you felt there was a considerable ability to carry over these techniques into housing, that housing nevertheless presented problems of a different order—at least I think I understood them to be of a different order.

Is that because it is less possible to agglomerate, or whatever the word is, the market?

Mr. EHRENKRANTZ. No. I think it is possible to organize markets within housing. I think one of the major problems is that in working with housing you are dealing with simple products that are being used today which are extremely cheap. In developing new technologies we frequently find that in order to be able to machine them, to produce them, to protect the edges in shipment, we have to use better and more expensive materials. Some of the savings that are made in labor and in precisely putting things together must be used to pay for the higher quality materials.

The opportunity for cost savings in housing, I believe, is less than in more sophisticated types of buildings. This makes the job in housing more difficult in terms of reducing costs than in hospital or school construction where so much money is going into the building of rather complex functions. But through the coordination of different activities,

the services and coordinating the enclosure with the structure, I believe it is relatively easy to make very major cost savings.

Chairman BOLLING. What I really had in mind was: Would it be possible to organize the kind of market for housing that would actually include a project of whatever type that would be really a community? I mean if we got over into the size of the kind of building that is envisaged—I am not now talking about new towns alone, but it would involve that quantity of construction—in other words, a community rather than a housing unit or a series of housing units, would that perhaps meet the problem or not?

Mr. EHRENKRANTZ. I think it would meet the problem, and I think we also have the techniques to develop a system which permits great variation, so that we will not have to search among different groups in a community and try to respond to the needs of this or that group. But we could understand the range of variations that must be met, and I believe it is possible to develop a technique, a given hardware system that can meet a wide range of needs—and so that you could offer housing for the elderly as well as family housing with the same group of components. I do not think that we should be looking for a specific group of people that you must isolate as being unique to build up the market. You can do this wtih generic communities, and from many cities and locations.

Chairman BOLLING. In effect, what you are saying is that one of the things that has concerned a great many people, at least in this country, who have gone to some of the totalitarian countries to see what their experience have been, what their success or lack of success has been. You are saying that the fact that we live in a society in which nobody can tell us exactly where and how to live, as can happen in other societies, that this difference does not preclude our ability to achieve a demand for a product that can be built in such a way that we save a great deal in costs.

I probably said that badly, but the point is that we have through other approaches the ability, or whatever the phrase is, to put together a market, a free choice market, which will be substantial enough to meet the improved cost factors that result from substantial numbers.

Mr. EHRENKRANTZ. Yes. I think we have an opportunity to develop a hardware system which can provide for the efficient use of automation or large-scale assembly techniques, which can be responsive to the needs of the individual. I think this capability exists, and I think it provides the opportunity that we have in this country for aggregating markets.

We do not have to classify people. We can develop systems that can respond to their needs. In doing this I think we can develop a richness in our urban communities, because the most interesting things that we find within our cities and particularly in the older portions of cities, are in those places where the stamp of people using them and living in them over time has made its imprint. I think we can do this in new construction so that not only can we provide for the needs of people but also that we can provide for them in a way that will establish a much more human total urban environment.

Chairman BOLLING. You mentioned new construction. This systems approach—is it possible to use it in rehabilitation of structures?

Mr. EHRENKRANTZ. Yes; I believe that it is. I think that one can

use the approach for rehabilitation. There are a number of directions in which we have done some background work. While we have not had any application directly in the field of rehabilitation, I feel certain from the experiences which we have had that this can be done.

We are now, for example, working on a study for HUD of self-help and mutual aid housing that includes rural as well as urban rehabilitation. We have begun to see in studying the problem that there are different skill capabilities of individuals that will enable them to perform more or less efficiently. We see ways of developing products so that the actual inhabitants of the buildings can contribute to rehabilitating them and can get a high equity on the time that they spend doing it.

I believe that specific hardware can be developed in building products and components for this purpose.

Chairman BOLLING. So you are saying, in effect, the possibilities are virtually unlimited if you could get a set of circumstances in which you had the opportunity to test the method?

Mr. EHRENKRANTZ. Yes.

Chairman BOLLING. You emphasized the need for not only meeting the problems that exist with the ability that we now have as best we can, but also the need to recognize that a good deal of this is required in planning and in execution prior to beginning construction, a substantial amount of time for what really sounds to me like a reasonable application of the scientific method of building. How much time are you talking about?

Mr. EHRENKRANTZ. Four or five years. In some countries one finds programs of this type going on in a 4- to 7-year period, on an orderly basis.

I found a case in Czechoslovakia which was rather interesting. They were keeping three separate systems going on at all times: One in use, another in testing, and a third in design. Every 2½ years or so the one in use will phase out, the developmental system phase into use, and the design system will go into development, and design of a new system will start.

So a cycling process has developed. The user requirements may not have been part of that cycle, which is essentially the technology development cycle.

Chairman BOLLING. We clearly have to put in a larger element of responsiveness because of the nature of the free choice society as opposed to one that is not.

Well, as you may or may not know, we started out the activities of these public activities of this subcommittee by listening to a very distinguished anthropologist, Dr. Edward Hall, who talked to us about the difference in different cultures in the use of space. He has another book about the different ways in which people of different cultures communicated with each other. You have emphasized repeatedly the fact that if we were building a structure for different kinds of people and using different ways or building different structures we must take this into account.

Has enough work, in your opinion, been done yet in the field of housing to have a very clear idea of how the rather remarkably different people of this rather remarkably diverse country react toward housing? Have we done anything like enough on that yet?

Mr. EHRENKRANTZ. My reaction is that we have not begun.

Chairman BOLLING. I think that is a good way to describe the situation. We have not begun.

Are there any special factors in your California school projects that you feel were of benefit to the success of the system, that would not be present in other areas of the country? I am talking about geography or government or any other factors in California. I am trying to get you to tell me whether you think this applies as well in most areas, or whether there is a fundamental physical difference or governmental difference or attitudinal difference in that area?

Mr. EHRENKRANTZ. I think that there is generally a little bit more of a frontier type of an attitude there than perhaps exists in other parts of the country. But the components that were developed there have been used in most of the States for construction of schools, since that project began. Work has been undertaken now in Pennsylvania and in a number of other places so that California was not unique. Because of a bit of a free-wheeling attitude toward new ideas, it may have provided a very good host for the first application. But I do not see anything that would prohibit this kind of approach being done elsewhere.

Chairman BOLLING. That leads reasonably to my next question: I would like you to respond in general to what kind of reaction you get from traditional builders and traditional manufacturers of traditional materials when you come up with an approach? Did you meet a great deal of resistance, some resistance, or what? I am trying to find out.

Mr. EHRENKRANTZ. We had a very mixed kind of value in terms of reactions. It was awfully interesting to see in different sectors of the building industry what kind of reactions we received.

There were some who supported our programs very strongly and others who were antagonistic at the start. There were some who were initially antagonistic, but since they have seen what happened in the total program, they have come around and have become very strong supporters.

The support within given industries has varied greatly. You find in air conditioning that a group of major firms was very much for it, and another group of major firms was very much against the systems approach.

Some people congratulated us when we asked for bids to include a maintenance contract for 20 years. They said:

> Now we don't have to worry about having to cut back on quality of the products so that we can pass a 1-year warranty with the lowest costs. We know we have to perform for 20 years, and we can look to do the best economic job.

Other people raised up their hands in horror.

I think the key thing is that there was sufficient support in all sectors of manufacturing so that it went ahead. Some people became involved because they were afraid they might miss out. Others saw it as an opportunity. The motivations varied.

Among contractors, in two areas we had bids on projects where contractors who built the first school had a chance to bid within our program on a second school. In one case the winner of the first school was the lower bidder in the second—he was the second lowest bidder by about $500. This indicates that once involved, they want to continue to stay involved and they bid sharply.

With the building trades we had very considerable support. We worked with the unions at the time we developed the user requirements. A committee was developed which worked with us, and it reviewed the needs before these needs were translated into performance requirements. Next, the committee reviewed the performance and then the designs as they were evolving.

There were innumerable major jurisdictional disputes that had to be settled during the developmental phase. This was done by labor, since they knew the problems in advance and they knew why we worked in a particular way.

We did not lose 1 day on any job for the SCSD project either in California or, to my knowledge, in the extension of this work to other States around the country. But we worked with the unions from the beginning and their members did not come onto the building site only to find that they were expected to work in a new and unique way.

Chairman BOLLING. In other words, you planned your human problems as far as construction work is concerned as well as you tried to plan your physical buildings for human use.

Mr. EHRENKRANTZ. The management process of the whole problem, I think, is a much greater one than the technical problem. They have to go together.

Chairman BOLLING. I would agree.

I have one last question that I surmise you may be able to answer. Is there any estimate of cost for a thorough study of user needs in housing? Any wild idea as to what it would cost? I spent a good many years before I joined my present committee assignment on the Committee on Rules, as a member of the Committee on Banking and Currency. One of the reasons why I left that committee willingly was that I saw it was approving vast sums of money on housing programs that I did not think was going to achieve the alleged objective. I do not think I have been disproved in my view. One of the things that disturbed me as long ago as the early 1950's was the fact that we seemed to be planning and encouraging the building of housing that inevitably would either not be adequate to human beings short term and long term or would not be satisfactory, although perhaps adequate. We have spent almost no money that I can find of substantial proportion in trying to find out how to build the least expensive housing that will be fully adequate for the human needs of the variety of people who make up the culture of the United States.

I am just curious, if you have a wild idea, as to how much it would cost.

Mr. EHRENKRANTZ. I can preface it by stating that our ability to study student user needs for the University of California in preparation to developing the student housing building system cost in the order of $150,000.

If we talk of basic needs of particular groups that can be isolated for housing, then something in the order of a half million dollars to a million dollars could produce a study which would develop hypotheses on which designs could be based. One would then have to look back and analyze physical facilities designed to meet these hypotheses, to see how they work, and then it would be necessary to build from that base.

The point of entry to do major studies, I believe, would be a half million to a million dollars, to take wide sectors of the country. Perhaps 98 percent of the country could be covered with something like five such groups.

Chairman BOLLING. Would you be a little more precise in what the five groups would be? Just give me one illustration.

Mr. EHRENKRANTZ. I think one obviously would have certain regional differences that relate to climate, patterns of life, use of outdoor space, scale of the urban community that might change community facilities available to people living in housing. Whether you live in the suburbs or in the heart of the city, the mix of things that must be provided within the dwelling unit might change because of the context in which the housing was placed.

You would therefore be looking for an urban situation where certain ranges of services and activities would be available—say within walking distance.

You would also have to look at suburban communities which I believe are most in need of a good user requirement study because in suburbs we spend money on two cars and many other things in order to make it possible for a family to survive. To find out how can we deal with the nature of their problems, and if there were a way to analyze in four or five different major organizational cuts at the problem, I think that a very substantial portion of the requirements could be covered.

Chairman BOLLING. Thank you very much, Mr. Ehrenkrantz. Do you have anything you would like to add?

Mr. EHRENKRANTZ. No. Thank you.

Chairman BOLLING. Your testimony has been to me absolutely fascinating. I am very grateful to you for coming and also for undertaking to help the staff in trying to convey as much as possible of what you have said to us here. I must say I am encouraged to know that you exist, and to listen to you. I repeat our gratitude. I am only sorry that this happens to be a day in the year in Congress when there are too many committees meeting in too many places and, therefore, other members of this subcommittee were unable to attend.

This subcommittee will recess today to meet tomorrow morning in this room at 10 o'clock to hear further witnesses. Again, our thanks.

Mr. EHRENKRANTZ. Thank you, Mr. Chairman.

(Whereupon, at 11:35 a.m., the subcommittee was adjourned, to reconvene on Thursday, July 24, 1969, at 10 a.m., in room G–308, the auditorium of the New Senate Office Building.)

INDUSTRIALIZED HOUSING

THURSDAY, JULY 24, 1969

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Subcommittee on Urban Affairs met, pursuant to recess, at 10 a.m., in room G–308, the auditorium of the New Senate Office Building, Hon. Richard Bolling (chairman of the subcommittee) presiding.

Present: Representatives Bolling and Reuss; and Senator Javits.

Also present: James W. Knowles, director of research; and Douglas C. Frechtling, minority economist.

PROCEEDINGS

Chairman BOLLING. The Subcommittee on Urban Affairs will be in order.

This morning the subcommittee continues its hearings on industrialized housing in order to hear from officers of two firms in the building industry: National Home Corp., Lafayette, Ind., a firm engaged in factory production of housing, and Urban Systems, Inc., of Boston, Mass.

We will hear the first group and then the second witness separately. Our questions will be concluded with the first group before we get to the second.

Mr. James R. Price, chairman of the board and chief executive officer of the National Homes Corp., will lead off. I would appreciate it, Mr. Price, if for the benefit of the committee and the record you would introduce your colleagues. You may proceed in your own way.

STATEMENT OF JAMES R. PRICE, CHAIRMAN OF THE BOARD, NATIONAL HOMES CORP.; ACCOMPANIED BY DAVID R. PRICE, PRESIDENT, NATIONAL HOMES CONSTRUCTION CORP.; FRANK P. FLYNN, JR., PRESIDENT, NATIONAL HOMES ACCEPTANCE CORP.; EDWARD DURELL STONE, JR., CONSULTANT ON SITE PLANNING AND ENVIRONMENTAL DESIGN; MILTON P. SEMER, WASHINGTON COUNSEL

Mr. PRICE. Thank you, Mr. Chairman and members of the committee. My name is James R. Price. I am chairman of the board and chief executive officer. With me is my son, David Price, at the end of the table, who handles the construction for National Homes. They are one of the 15 largest homebuilders in the United States, and a member of the Housing Producing Council. Next to him is Edward D. Stone,

Jr., who advises National Homes on the sociological and environmental aspects of housing, and is a very important member of our team. To my right is Milton Semer, our Washington counsel. Next to him is Frank P. Flynn, who heads our National Homes Acceptance Corp., which has made over two and a half billion dollars' worth of loans since 1947. The Acceptance Corp. is an important part of our company in providing both permanent and construction financing for all of our Government programs.

This is the management team that has developed over the years a wide range of capabilities including: Land acquisition and development, site planning and environmental design, construction, merchandising and sales, governmental relations, construction and permanent mortgage financing, business management, and marketing services.

I greatly appreciate your inviting us to discuss the role of industrialized housing in meeting this Nation's critical need for housing. I would like to briefly summarize my presubmitted prepared statements, just hitting some of the highlights.

National Homes is the largest home manufacturer in the United States. Over the last 29 years we have produced 350,000 homes. One point I think is significant: Last year taking the average of all the homes we shipped—which was 16,000, and into some 37 States—the retail price, including lots, financing costs, points, everything that goes toward cost, was $18,350. The national average for all home building was $25,400. I think this pretty clearly demonstrates even at the early stage of our technology there can be a significant saving made. I say "early stage" even though we have been at it 29 years, because we are not as far as we are going by a long shot. We will manufacture this year 24,000 living units. In the first 6 months of this year we showed a sales gain of 32.4 percent over the same period last year, while the industry itself was only showing a 6-percent increase. Our single-family house production was up 30.3 percent while the industry was down 4.6 percent.

At this point, I would like to point out a significant fact. A worker earning $10,000 a year, according to the norm set by FHA, should spend 20 percent of his income for mortgage payments, which would include principal, interest, taxes and insurance. Today this man cannot afford to buy a $20,000 FHA-insured home.

I want to point out, also, that taking our whole population, people earning $10,000 and less represent 65 percent of our population.

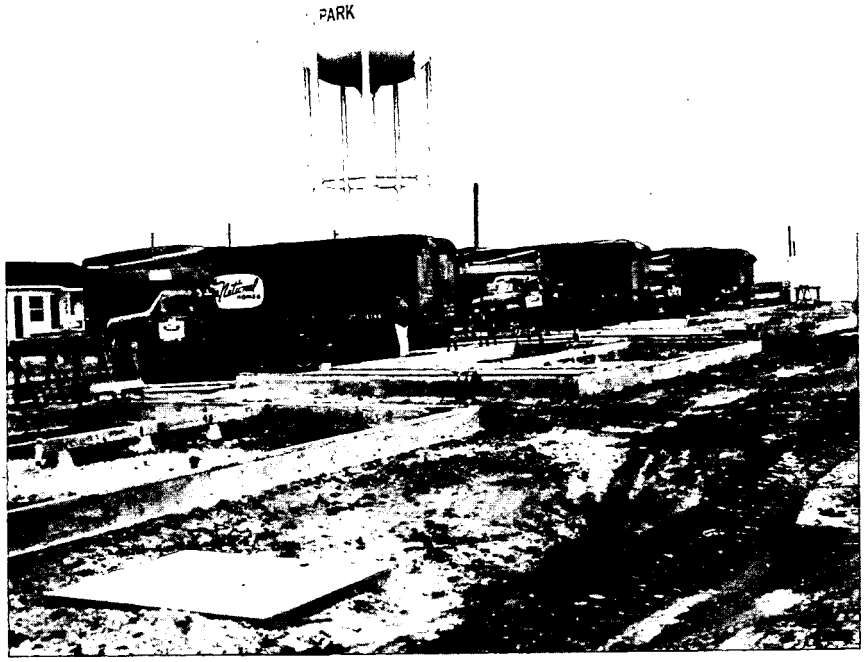
Our $10,000-a-year worker can afford a monthly payment of $166, but his payments on a $20,000 house, at the 7.5-percent interest which we currently have, with a maximum 30-year mortgage, amounts to $173. So he is not eligible for homeownership. By increasing the term to 40 years, still keeping your 7.5-percent interest, you would reduce the monthly payments by $8.23, to $164.77 a month and the worker would be eligible. This would help close a gap in homeownership that is not being served by anyone.

I want to point out that we do have subsidy programs that, on a limited funded basis, supply some housing to families earning $7,500 a year or less, but there frankly is no program for families earning between $7,500 and $10,000 annually. They are in no-man's land: No subsidy and no eligibility and no homes.

Since 1941 National Homes' products have been union made and carried the union label. The building trades have handled our products in the entire United States and in many of its possessions. The Brotherhood of Carpenters and Joiners organized National Homes' first manufacturing plant when they won an election in 1941. All National Homes' manufacturing plants have been organized by the Brotherhood of Carpenters over the years. In addition to Lafayette, our plants are located in Effingham, Ill.; Horseheads, N.Y.; Martinsville, Va.; Thomson, Ga.; Tyler, Tex., and New Albany, Ind. Builders franchised by National Homes are independent businessmen, and there are more than a thousand of these builders serving our major markets in 37 States generally east of the Rockies.

I would like to make some mention about our degree of industrialization. I would like, also, to identify some of the different types of factory manufactured products used to provide assistance and shelter.

The conventional builder who operates on-site is increasingly calling on factories, both small and large specialty shops, for prefinished windows, doors, wall sections, cabinets, roof trusses, and the like. Virtually all homes built today in the United States have some degree of prefabricated parts used in them. Eighty percent of our builders rely heavily on these components. I want to call your attention to the fact that this compares to the European countries where they refer to their open system. National Homes does not supply components for this conventional system. We have really two technologies that we work under. Both of them meet the FHA and Government engineering standards. Our first technology—which does tie into the European system—is referred to in Europe as a closed system, which really means this: The system uses large sections of walls, floors, trusses. They are designed and built in an integral system. The components are unique and not interchangeable with any other system. In other words, we undertake the design of a building as far as style, size, arrangements, and so forth, and these related items are marketed as a package. As you can see there in this picture, we have cranes mounted over our tractors and all our homes are erected by cranes.



In these vans that you see could be any of the variety of our technology number one. Our teamster driver at the site operates the crane and two or three workmen set the building in place. They can set up any of our buildings in a single day. We have different types of homes. The type that you see here in the second picture is an operation in Chicago where they are erecting three houses a day with these cranes.

This is a completely prefinished in-plant housing system. There is a utility core lowered into it for plumbing, heating, fiber glass bathtub and so forth. The carpeted floors are predone, and the interior walls and doors are all finished in the factory. These are occupied 4 days after erection.

Going on to our third picture, we manufacture a range of houses up as high as $150,000.

Chairman BOLLING. I missed the figure.

Mr. PRICE. $150,000. The picture you see on the screen here is about a $65,000 home today.

Now, here in our fourth picture, using this same factory system we have built a variety of garden apartments, townhouses, et cetera, and this picture illustrates a typical example of our product.

The mobile homes industry was the first to use three dimensional, totally manufactured, structures mass-produced in this country. The spectacular rise in the mobile home industry is because mobile homes are primarily economic. I want to back up just one step right here. Since no one is serving the $10,000 and under income group with conventional homes, basically, the only thing they can buy today is a mobile home, or rent a $125 a month apartment. The reason that mobile homes have experienced substantial growth, starting in about 1959, is because they have operated primarily in areas beyond where building codes and zoning laws were enforced. They used construction techniques and space which were—and are—less than acceptable by Government housing standards. They are independently financed by our banks and lending institutions with early unlimited funds because they are not limited to mortgage rates on financing. They are not inhibited in any way by the Government. This is the industry that has been supplying first-time home buyers who have no other opportunity for shelter. Last year one out of five homes purchased was a mobile home, and mobile homes this year are up 30 percent. They are going to produce 400,000 shelters for families this current year.

I want to point out, though, that a major proportion of these mobile homes are sold to young families. You can purchase a mobile home with earnings of $350 a month. Fifty percent of our youth in this country do not go to college. They ordinarily marry young and ordinarily they start families young. They go into our business community primarily as factory workers, service trades, policemen, firemen, et cetera. They must have shelter. The only thing I can say about mobile homes is, probably thank God we have them because they are providing some shelter units, but I feel better planning and environment should be taken into consideration. Mobile home parks, since they are primarily low-income housing communities, should have more emphasis placed on planning, environment, social facilities such as day nursing and meeting rooms, because usually the husband and wife both are forced to work.

National Homes is in the shelter business and the home pictured here demonstrates the product of one of our divisions. This is a typical mobile home that we produce.

Chairman BOLLING. Put a price on it for me, will you?

Mr. PRICE. Manufacture of mobile homes in Florida, Georgia, Texas, Phoenix, Indiana—will range in price in Florida and Georgia from a low of $3,500 to a high of probably $4,750 in the Indiana area.

Chairman BOLLING. What do you have in them, I mean what is behind those walls?

Mr. PRICE. Behind those walls is a complete plumbing system with a bathroom containing all the amenities we would have in an ordinary bathroom. Your kitchen comes complete including your range and refrigerator. The superstructure is ordinarily wood studs. The perimeter is covered with aluminum without any backer, and it has a galvanized sheet metal roof system.

The main thing that I am concerned about is that while we must have mobile home units because we have got to provide shelter units for our youth we must be cognizant of the environment created. I have been told that many people are concerned about how long the houses will last, and my answer to that is, if you take a look at the temporary World War I buildings around Washington, you will realize that nothing last longer than a temporary building. The only thing I can tell you is that the space that we are providing in them is unsatisfactory by today's standards.

Chairman BOLLING. There are——

Mr. PRICE. Maximum size permitted is 12 feet wide by 60 feet long on most U.S. highways. The 60 feet is measured from the tip of the tow tongue to the back of the unit. So the exterior is 12 by 65, and if you multiply that out, you have less than 700 square feet. In this 700 square feet would be a two-bedroom or a three-bedroom or a four-

bedroom structure. I'm not knocking it. I am saying since we have no other provision for housing—even though we have an expanding population—however, we should make sure that we raise these youngsters, who are going to be tomorrow's America, in an atmosphere that will help develop fine redblooded Americans.

Chairman BOLLING. I am not knocking it either. I am just interested because in some of the places I drive in this area you will see an old tin shack on a farm and beside it will be a brand new mobile home. Clearly, the people that are living there find it more economic to buy the mobile home than to try to do anything about the shack. It is an interesting sociological fact.

Mr. PRICE. Here is the real fact behind the whole thing. I came from a small town in Indiana called Fowler. I had an aunt living in Remington, a town of a thousand. She died last year. As a kid, when I was in Remington, it was primarily a community of retired farmers living there in their nice homes. To my amazement, now the town is now full of mobile homes. You can get the answer when you analyze the situation. The highest paid man in town was the postmaster, making $7,200 a year, so the only thing people could afford to buy was a mobile home. Remember, all you have to do to buy a mobile home is to earn $350 a month, have a warm wrist, and sign on the dotted line.

Chairman BOLLING. That is a new application to the principle of the warm body.

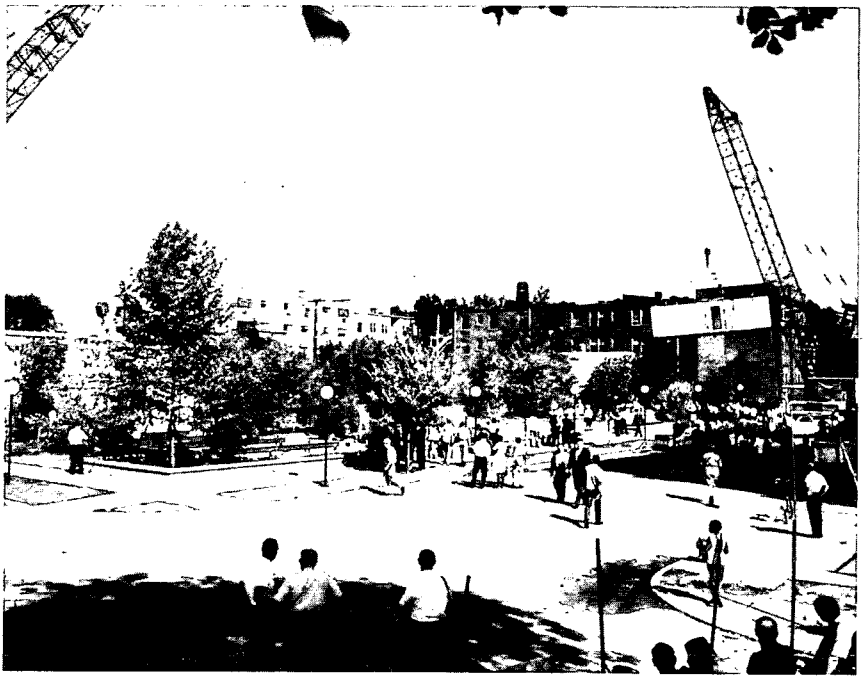
Mr. PRICE. That is right. There is one other thing I want to draw to your attention: a mobile home is handled, floor planned, and financed the same as an automobile. It depreciates—and there is a blue book and a red book on it—at the same rate as an automobile. When it is one day old, it is secondhand. It has depreciated one-third. Then in 3 years it is down to $1,500. So you never accumulate any equity to improve your station in life where you can afford to buy up to a larger home. But keep in mind these units are not financed as homes. This is personal property. It is called a mobile home for a purpose: there is no real estate tax against it. It still is serving a housing need.

I want to get into National Homes' largest expansion. Our greatest investment is in what I call our technology No. 2—industrialized housing. In July of 1968, National Homes started a new plant in Lafayette, Ind., to produce homes for low- and medium-income families for sale in inner cities as well as suburban and rural areas. We manufacture a three dimensional modular unit completely finished in our plant, including plumbing, wiring, heating, air-conditioning, appliances, floor covering, curtains, drapes, furniture, if desired. We have single-family units as well as townhouses, and garden apartments, with sizes ranging from one to five bedrooms. These building have Federal engineering approval by FHA and HHA as to the structural systems, design, room sizes and arrangements. This product has been completely pre-engineered, programed, and computerized. We use highly automated assembly lines. The Brotherhood of Carpenters and Joiners organized one new Lafayette plant the minute we opened it last year and their members are working there under ideal conditions, year round. This mix of man and machinery makes possible a building system of high quality because we have rigid in-plant quality control.

The carpenters in cooperation with the various Government programs, provide an in-plant training program enabling us to hire unskilled workmen and teach them a skill. This new housing product naturally carries the union label. Teamster union members deliver our units to the jobsite.

We know that last year the United States had about 1,600,000 housing starts. The building construction workers in this country were strained to do that job. We have a national goal to construct 2.6 million housing units a year. We have got to look to this labor force of building tradesmen to do the job. We know the high income people of our country are going to continue to have custom-made conventional homes, and perhaps they are going to need an increasing proportion of the man hours of this skilled force. We have to innovate through mass production a way to provide housing for the low- and medium-income group utilizing the skills that are available in order to produce the numbers that we need for one people.

I want to go through National Homes' initial delivery of its industrialized houses at 50th and Blackstone, Chicago, Ill. I have a picture of it here. I got a signed contract from the Chairman of the housing authority on the 8th of August.



I called Ed Stone, and he flew in and we did the site planning over the weekend. This was a redevelopment area where they had torn down buildings. We had rubble and debris to move and clean out before construction. We did our complete site planning, and preinstalled, trees, the sod, the communal areas, the patios, so a min-

imum of site work was all that was needed when our modular unit arrived. We sent eight four-bedroom, 1,200 square foot, bath and a half, air-conditioned townhouses—at 7 o'clock in the morning on August 20. You can see in this picture how we had prepared the site. The crane started putting those modules into place.

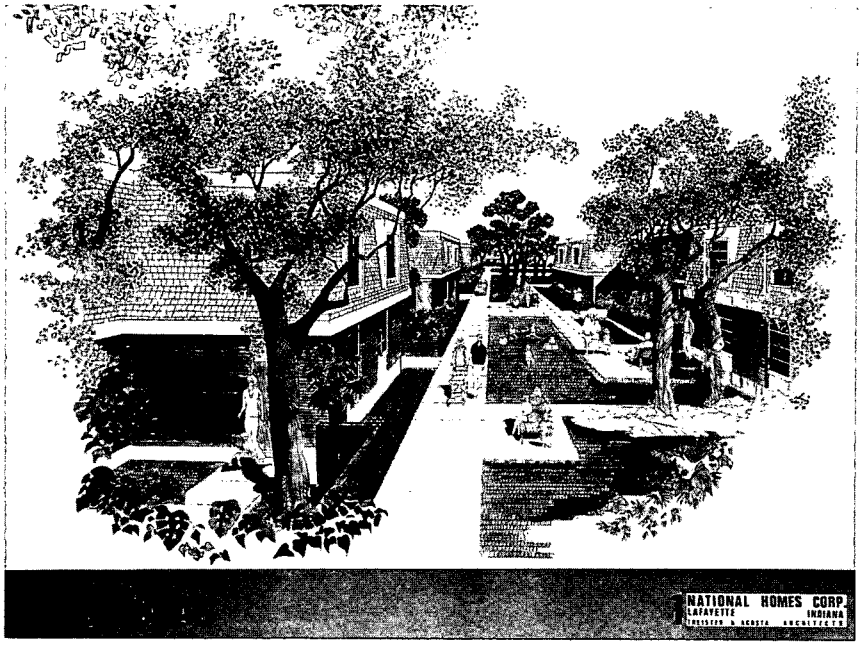
By 6 o'clock that night it was completed, the first family was moved in, and this picture shows the way it looked in a night shot. People streamed through these units till midnight, with the lines four blocks long.

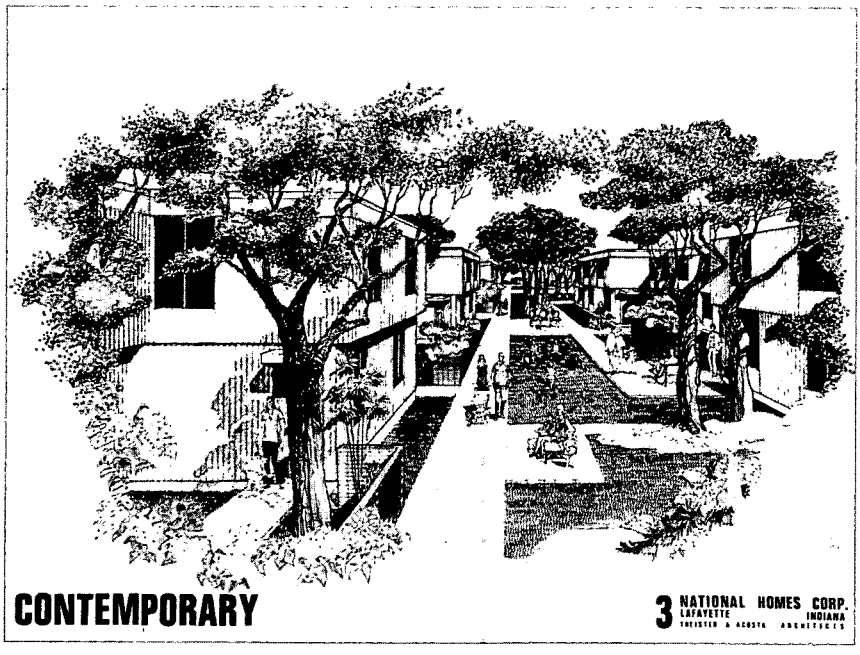
50th AND BLACKSTONE

I think this is a good demonstration of what we can do to utilize better our already short supply of skilled labor. Shortening the onsite construction time provides a great savings because security in inner city costs $70 a day, and construction loan interest costs $7 a day. I think we all agree that these two costs, $77 a day, are significant. Conventional construction in the inner city is running 18 months and is adding a terrible cost burden to housing that does not have anything to do with quality or better living.

We have created a wide range of townhouses that have durability, which are maintenance free, of good quality and architectural design.

I would like to show you some pictures here. The first shows you an example of one of our traditional designs that we offer, and the next picture shows you a contemporary. This contemporary design is being used in the Atlanta, Ga., 600-unit award that we won. It is also being used in a public housing project in Monroe, Mich. The third picture shows the colonial styling of some of these townhouses.


NATIONAL HOMES CORP.
LAFAYETTE INDIANA


CONTEMPORARY
3 NATIONAL HOMES CORP.
LAFAYETTE INDIANA

COLONIAL

The following picture demonstrates what we are doing in single family units. You can see the house is made in two sections, and even the brick is put on in the plant.

TRADITIONAL

To help our small builders in small towns like Remington and Fowler, we have a system using hydraulic jacks on a trailer so that they slide the house on and off the trailer. You move your people in that night with one of our homes. On the big jobs—like the one we just did, a 200-unit contract in East St. Louis yesterday—David's department will erect the homes and cranes will set them at the rate of a dozen a day. You can set a home every 30 minutes with our own construction company doing the work.

Chairman BOLLING. What kind of cost on that last unit—roughly? I don't mean precisely.

Mr. PRICE. It is a hard question for me to answer because if you are talking about the South, the cost of the house including land would be less than $12,000. On the other hand, if you are talking about Chicago where we have a $4,000 land cost, it would be around $16,500.

Chairman BOLLING. Thank you.

Mr. PRICE. Does that answer your question?

Chairman BOLLING. Yes; that is fine.

Mr. PRICE. I would like to point out a related item. Those are today's prices. As we crank up to real mass production, these costs can be substantially lowered.

Since 50th and Blackstone in Chicago, we have completed 75 more four-bedroom townhouses and they have all been occupied through the winter. It gave us a great chance in conjunction with Forest Products Laboratories, with Purdue University and the technical section of FHA to analyze and determine some testing results that you cannot determine in laboratory research. We found that certain groups had to have an 85° temperature as a comfort level while the average home is engineered for a 75° mean temperature. We found that we were housing from nine to 18 children in these units. We found that the humidity level produced problems that are not generally found in single-family dwellings where you have only two or three children. Second, we have been very careful in selecting materials for these buildings. We use industrial grade hinges and hardware. We use industrial grade windows with thermopanes so there is no problem of having to take out storm windows. All windows are removable from the inside for washing. Every care has been taken, because that is our philosophy. One way or another the Federal Government is going to buy the houses initially, however, the community or the individual is going to be stuck with home maintenance. So our homes are built as tough and maintenance-free as possible. We have a finish on our inside walls where you can take an indelible ink pencil, write your name on the wall, and wipe it off with a damp cloth. Children can write on it with crayon and you can clean it off.

I am trying to show you the depth of the planning and thought engineered in our homes. I have not covered it in here but it was in my statement. We got in this business clear back in 1943. We have been in and out of industrialized housing, but the conditions have not been right until now to talk about mass producing.

We have additional contracts in Chicago for a thousand industrialized homes, and have another 2,000 lots coming in sometime this week for us to analyze and have processed through CDA. We have 108 units in East Chicago Heights that have been precommitted on June 30 on (d) (3), and there are another 900 in with recent 236 fund-

ing. They should be funded in the next few weeks or a month. We have 115 in Monroe, Mich. We have 162 that are committed under 236 in Lafayette, Ind. We have 269 in East St. Louis; 197 in Springfield, Ohio. And we are working with many, many cities in the Midwest, because our plant is there.

I had a meeting Monday before I came to Washington with a group from Cleveland and have agreed to put a hundred in there before winter of this year.

We started a second manufacturing plant in Thomson, Ga. It will be ready to go into production September 13. The reason for starting this plant is twofold. No. 1, we won a national competition. Some year and a half ago President Johnson made some Government surplus land available for housing in Washington, D.C.; in Atlanta, and in Louisville. The housing authority in Atlanta set up criteria and held a contest. We won the contest, which was judged by a professional jury. I have with me here today Edward Durell Stone, Jr., and I would like for him to go through this project so you can see the depth of the thought and the planning that goes into each of these projects. We are opening the Georgia plant not just so that we can produce for Atlanta, but we have a hundred units to produce for Sumter, S.C., also. We have not even started the marketing effort for this plant, but we expect to expand our capabilities in this art rapidly. We intend to build three plants capable of doing 9,000 each next year.

Chairman BOLLING. Thank you, Mr. Price. Mr. Stone, you may go right ahead.

Mr. STONE. Mr. Chairman, thank you. Let me first say that when National Homes approached our firm to assist them we were vitally concerned with the state of housing in the Nation today. We were particularly gratified at being able to take some action with an existing capability to perform. Also, we were delighted with Mr. Price's attitude—National was trying new ideas, new approaches to the development of housing particularly for the lower and middle income groups.

I would like to leaf through the Atlanta project in a moment. It might be helpful to review the way we addressed it and the way I think with refinement we will continue to approach comparable problems. First of all a solution to be satisfactory has to be responsive to the needs of the people you are going to serve. In other words, the needs of the low-income family group are quite different, let us say, than the housing for the elderly in terms of not only their space needs, the arrangements of the necessary internal space, but also in terms of the amenities that are provided in trying to meet life styles and social needs.

There are certain fundamental and social and human needs that are universal to all family groups: Sense of identity, privacy—both visual and noise privacy—comfort in terms of climate control, relationship to open space, arrangements of open space, recreation, shopping—all of these are readily identifiable goals for all family groups.

However, within this general context you have to identify the special needs of any given group for which you may be trying to solve a problem.

This was the methodology, or the system, if you will, with which we approached the Atlanta challenge. We had a given site. The area is

quite a steep site adjacent to a Federal penitentiary. It had some other problems, like an interstate right-of-way bisecting it. With the site and the ultimate user identified we brought together what we felt was the appropriate planning team. We had physical and financial planners, because this was an economic as well as a design competition, as well as the research and development people from the industrial side. In order to better understand the specific needs of the user group we brought in a social planner who had been active in the Atlanta area to enable us to establish dialog with the people who were, in fact, going to live in the houses in the community we were planning. We had a need for some of the life science applications, geologists and ecologists. So we brought this group together with representatives of the community. I think this is most important and this must be part of the planning group if you are to truly respond to the needs of the ultimate user.

The physical plan, then, should speak to the end results of all this compilation of research. I believe it has, and the jury certainly felt so.

One thing that I would like to comment on in a general way, as a designer, is that industrialization and industrialized housing need not equate with monotony of design or decrease in quality of housing. If you consider the row houses in the East 60's in New York City, for example, they are about as architecturally monotonous as anything you can consider. But they create a street scene of proper scale and proportion. Trees have been added. There have been accent points. In other words, repetition is not in and of itself a bad thing in terms of an urban design solution to a problem.

I think there are a number of other examples that can be cited. If you are concerned with creating spaces that are meaningful in a visual way, the architectural backdrop need not be marble palaces. It can be quite a different thing.

So what we have been concerned with, and I think the Atlanta project is a pretty good example, has been the creation of a total environment utilizing, if you will, industrialized components. This project is, by the way now just about to get under construction. If I could ask you to follow with me very briefly, thumb through the book which constituted our proposal (see appendix, p. 287) and which, incidentally, was performed under time pressures that seem to be consistent in this entire industry. There is never enough time but you have to respond within that time allocated.

There is a general planning concept—see p. 289 of appendix. We were considering essentially a mixed use community with subcommunities developed within it. It was to be pedestrian-oriented; in other words, no through vehicular traffic in order to create safe neighborhood environments. It was not to relate itself to an internal town center with shopping, offices, the administrative function for this smaller community, schools, and parks. See p. 290 of appendix.

If you will come along to the next page of the appendix we outline the social objectives that we were trying to achieve. Essentially to bring decent housing at a price that could be afforded through this industrialized process. We were trying to create a stable total environment that would give people a sense of identity, relationships within subneighborhoods within the entire project. This was a program designed primarily for ownership, which I think is a very

meaningful and desirable goal rather than a strict rental program if at all possible. (See appendix, p. 292.)

If you will turn to the next page, you can see the site analysis that we were faced with. This is getting now into the physical planning. We had to buffer the project from the penitentiary. We wanted to preserve as much of the tree cover as was possible. We had to reconcile ourselves to this interstate right-of-way going through the site with appropriate buffering. There was a railroad on another side of the site.

We had some rather difficult site problems. We identified an ideal functional diagram. An exterior vehicular loop penetrated the parking areas related to larger clusters of housing and pedestrian circulation and bicycle circulation then linked the entire plan together. (See appendix, p. 294.)

This diagram, in turn, related to the overall areas of that sector of the community.

The specific plan itself is outlined under the general concepts (page 10 of appendix). The cruciform townhouse clusters evolved from our discussions with the people in the community. If this had been a middle income, white suburban kind of community the amenities provided would have been quite different. There would have been a different emphasis—you think in terms of tennis courts but this sort of thing which is not relevant in a situation like this. We were specifically told by the community that recreational amenities was not a relevant solution. What was more important was to create sort of an urban street scene, and the social spine this cruciform identifies. There are subneighborhoods even within the cruciform class and these clusters in turn relate to the larger project as a whole.

If you will, just leaf through the consideration of pedestrian bicycle circulation, and then a garden entrance court (see appendix, pp. 297 and 298). This was along a pedestrian mall that served these clusters of townhouse units. Each of these townhouse units, incidentally, as a dividend to the cruciform system looks out over a parkway, a green area. So on the one side you have the urban street scene. On the other side you are oriented to park.

This goes on and it is spelled out in somewhat greater detail. These units can be offset in a plain so you get visual variety, creating entrance courts, additional privacy both in the approaches from the pedestrian mall and in relationship to the green space behind. (See appendix, pp. 299 and 300.)

Another perspective illustrating the townhouse mall (page 301).

But in summary, what we are talking about here I think is the creation of a total environment—whether we have industrialized housing or onsite fabricated housing does not matter. I think the objectives we should seek are a meaningful social context, social, and physical context, for the communities we are trying to serve.

The report of the jury is also a part of our display. Our competition was quite good—strong, if you will. We are very proud to win this, because I think it represented a real breakthrough for industrialized housing. Some of their comments were as follows: "The site plan proposal was considered excellent by the jury particularly with respect to creation of an optimum living environment." It goes on, "For the following reasons." Well, I think you can create the

environment regardless of the building system, if the building system in fact meets those needs that have been preidentified.

I think that is what we are really trying to do.

Thank you, sir.

Chairman BOLLING. Thank you.

Mr. PRICE. I would like to add this, that all projects of any size that we do will adopt this same environmental approach as has been described here.

I also want to stress that we are not just selling houses. We feel that we are selling neighborhoods and communities. I think that is the element that has been lacking in a lot of our planning, or lack of planning, at least since World War II.

Our national housing goals cannot be met unless large volume mass-produced housing is brought into the picture. In order to double the amount of housing that we have by the year 2000, maximum use has to be made of the inner city land that is available. The amount we do have is going to have to be determined by the administrative as well as Congress and HUD. Then we will have to provide the land, because we cannot make new land on which to put the number of houses that are needed.

We have got to utilize this inner city land so that we are not creating slums but are getting maximum utilization of the land.

I want to call attention to another problem. While we hear we have from 13 percent to as high as 24 percent of inner city land available, this land is not available today. Because it was made available through slum clearance projects, with an objective not to replace housing but to improve the city's base, the end use of this inner city land has been predeclared for apartments, high-rises, commercial, industrial. It is going to take a permissible land use change by HUD to make available whatever quantity of this land is deemed desirable for low- and medium-income housing. The change is necessary so we can take the blot off the title to this land. You cannot build on this land as long as it has a predetermined and recorded end use.

Our suburbs present a problem, too. The suburbs today do not want low- and medium-income families. They have protective zoning. They have acreage requirements, things to prevent it. We have a major problem facing us. We already know that we have to double the amount of housing between now and the year 2000. We know that we have to put it on land, so when you are talking about reaching the goals land is the No. 1 thing, and I am talking about usable land.

We have the technology to build homes right now. We need mass orders, but mass orders cannot be achieved until you have, No. 1, mass land. My parting statement is this. Top priority ought to be given to the goal of a decent house and a substantial living environment for the American family. We placed man on the moon in 9½ years because we funded it and went for the objective. I think it is time that we place top priority to the goal of a decent home and suitable environment for every American family, proving adequate funding should be devoted to housing, our greatest problem on earth.

Chairman BOLLING. Thank you very much, Mr. Price and gentlemen.

Mr. Reuss.

Representative REUSS. Thank you, Mr. Chairman, and once again I want to congratulate you, sir, for creating these trailblazing hearings.

Mr. Price, it is good to welcome you again. You will recall not so many weeks ago you appeared before our House Housing Subcommittee and we had a colloquy about the possible use of your industrialized techniques in my city of Milwaukee, and we worked out a very constructive visit by some of your fine people to my city.

Mr. PRICE. Yes.

Representative REUSS. I want to thank you for making that possible. Something may come of it and I hope it does.

Mr. PRICE. I had been told that there should be another sometime before September on this subject.

Representative REUSS. Good. Let us make it August.

Mr. PRICE. I was told you were going to name the date.

Representative REUSS. Fine.

Mr. PRICE. We are always ready. I can go right now.

Representative REUSS. I have just one question on costs, and here I am anticipating a bit, Mr. Chairman. I have looked through the intriguing statement of Mr. Rosen, our next witness, and early in his statement he says the following:

> The report of the committee—
>
> Mr. Bolling's subcommittee—
>
> issued in April of this year suggests clearly why few homebuilders have adopted building systems as a means of lowering their costs of production. Most building systems derive economies when the scale of the project itself is large. In particular, your report points out that unless a project consists of four or more stories, conventional construction is likely to be no more expensive than systems construction.*

The portions of this April report which I believe Mr. Rosen had in mind are contained on pages 65 and 67 of the report, and I will paraphrase them. We quote from a finding of the national building agency of the United Kingdom that the cost benefits of industrialized construction techniques were found to be concentrated in housing of more than four stories. And then again, further on are detailed findings about construction in Rochester, N.Y., where on a low-rise apartment only a 7-percent savings was realized in total direct project construction costs. For a high-rise apartment it was estimated that the savings over conventional overall would be on the order of 16 percent.

I would welcome the comment of you and your associates on this. I have the feeling and the hope that even in single family construction you are able to make a measurable saving over conventional construction. I wonder if you can comment on that. And this is in no way to undermine Mr. Rosen who got his data from our report. But our data—some of it—is not very modern and the rest of it relates to just one experiment in Rochester. I am wondering if you can bring us up to date on this.

Mr. PRICE. I would like to answer it. There are many elements involved in your question, and I will take them consecutively.

Insofar as demonstrating savings in single family units, I feel that we have demonstrated it already in the South Carolina area. Our prefinished homes where you set them with the crane are being marketed

*"Industrialized Housing," materials compiled and prepared for the Subcommittee on Urban Affairs, Joint Economic Committee, April 1969, p. 65.

today for $12,700 including land and septic tanks. Our new modular three dimensional homes, even at the beginning rate of production in these plants, will cut a thousand dollars off of this price. Additional savings can be achieved when you can get these plants into high production; however, there is no one that can really give you the specific figures. That is going to take some real calculating by our engineers. This cost saving is a research project that we have underway, and it is going to be real substantial.

I have made a thorough study of the report on European systems. I have personally inspected them almost annually in the various countries. I have been in Norway and studied their systems. I have been in Japan and studied theirs. I also made a detailed study of this report that you referred to, and I have my brief notes before me.

The only thing I can say is that each of these have been a research-type project. There was no productivity feeding it, and their costs ran high. In Europe because of the lack of natural resources they are forced to use concrete systems. In their small component concrete systems in Europe they have found that they can economically deliver from 60 to 70 miles; their large components which would be comparable to what I do here in America, is deliverable up to 30 miles. Russia is the only one to date that is producing a third dimensional module. Thirty miles is the maximum range for the U.S.S.R. unless they can use water for transportation. They have three major plants, one with a 30,000 annual capacity in Moscow; one with a 15,000 annual capacity in their second largest city, and another plant with 2,700 annual capacity in another.

In the United States we have had as part of this report about seven various concrete systems. The test findings show that they ran exorbitantly high costs, $31 a square foot for the hotel that was built in San Antonio. And in each one of these systems they found the maximum transportability to be 7 miles. They also found that they had cracks and small spalling. I have seen the units in Russia. The first units done in Russia weighed 45 tons. It took gantry cranes and naturally it was uneconomical. In order to reduce their weight to 7 tons they used what we would call translucent ceilings and roofs. The industrialized housing report quotes said they looked like covered wagons in this country, and they looked that way to me. U.S.S.R. space requirement is substantially less than ours, and we are used to a higher standard of living than they are delivering there at this time.

I do not know what he is speaking of regarding Rochester. The only thing I know of Rochester, is that Stirling Home built some 12 or 15 public housing units, but Stirling Home is not a mass producing outfit. National Homes does not claim to be at any ultimate in third dimensional production. But a year from today I will be, because I have got sound orders today to get my plants to optimum and run them there. Then I can tell you costs. The figures I am quoting today covering my costs are really learning curves. So in the long range when you really get a plant up to its optimum production and level out, you are going to make terrific savings.

Now, insofar as the variety of this mix, what I have shown here today has been single family and two-story high units. We have this product engineering approved to go three stories high. We are now working and are going to make a submission under Operation Breakthrough for incombustible units five stories for cities like New York City, and 10 stories high for senior citizens, elevator-type buildings.

We are not going to use concrete because in the United States we have a wealth of other products, such as dry systems that are light in weight and transportable up to 300 miles economically. We are adding to the team that you see sitting here, Mr. Edward Durell Stone, Sr., who will be our leading architect on this team for our Breakthrough submissions. So we are going to add to our technologies two missing links, and we are not stopping with what we showed you today. We are exploiting further variety and appearance. We have always used good name architects in this endeavor. I have used a Washington contemporary architect, Goodman. I have used Royal Barry Wills for my Cape Cod. I have used Herman York. I have used Smedling from Orange, N.J. for my French provincial and my colonials, so I do not spare the rod on my research, development, style, and design. National last year alone, in 12 months from the time I started in April until April of this year, spent $1,800,000 in research as a company in third dimensional modular construction.

Each country uses what building material they have available. In Japan, I went over to the Expo, and in their first venture they had built a building, using a third dimensional modular system. They built their modular units out of steel because steel is readily available. They set them in a structural frame much as talked of in this country. The interior finish was of finished plywood which they are famous for producing and ship to us, for our use. In Norway, I visited the largest home manufacturer, and he is in the modular business. Naturally, since this is a lumber country his were completely wood. We bypassed wood in our system except for the structural frame for one reason, maintenance. We have selected materials that would have——

Representative REUSS. What was the one reason?

Chairman BOLLING. Maintenance.

Representative REUSS. Maintenance.

Mr. PRICE. We selected aluminum, brick, and stone for exteriors because we have tried to do everything we can to produce maintenance-free homes. We know that it costs more to build for low income than it does for an average unit because it takes more abuse. Low-income families do not have enough income to afford to pay a plumber, an electrician, or any service personnel to maintain their shelter units. They do not make enough money to do this. So we are trying to give them as nearly as possible a maintenance-free shelter.

Representative REUSS. May I ask this question. Let us assume that it is a year from now, and that you are geared up closer to the optimum industrialized production that you hope for. What savings in percentages would you hope to be able to obtain over conventional building methods in each of the following three types: high-rise apartments, low-rise apartments, and—make it four types—individual homes, and scattered site individual homes?

Mr. PRICE. I think that the saving curve is going to be the same as relates to each of these types. As I stated earlier, the average product that I shipped last year, which included homes from as low as $12,500 to as high as $150,000, retailed to the consumer including lots, financing charges, et cetera, cost $18,350. Your national average construction cost was $25,400. So there is some significance here. We are going to take this cost on down. I have a plant in Lafayette that is capable of producing 9,000 living units a year. I will have it up to that rate

by midsummer of next year. I will be able to accurately tell you how much we can take off, whether it is 25 or 30 percent. But that is not the real optimum that I am after. If we are going to meet the challenge of 2,600,000 a year—and that rate may need to be increased as you study it in more depth—you are going to need plants like automobile plants that should have capacities of 30,000, 60,000, 90,000 houses a year. As I see this now—and I realize it is early to have a prefixed conclusion—there are only two cities large enough to have a plant to serve just the city, and that would be New York and Chicago. I think the balance of the country is going to be served by plants like automobile assembly plants serve a 300-mile circumference working with a common market, massing the market to get the true advantages. When you do that you are going to cut your cost in half, at least.

Representative REUSS. So that——

Mr. PRICE. Land, more expertise, better land planning is the key to reducing land costs because there is not any more land being made. Not only is land getting higher all the time, but we are using it very wastefully. The planners in the past were advocating the suburbs to go to half-acre tracts and full-acre tracts. Well, that is almost as ridiculous as why a 2 by 4 is 16 inches on center. Using 2 foot on center, the cow used to walk from the barn to the kitchen. So they put it 16 inches to keep her out. That is a fact.

Representative REUSS. Of course land costs, I think we can leave that out of our comparison because a sensible conventional builder presumably can plan his land as sensibly as an industrialized builder.

Mr. PRICE. I do not think so for one reason. There are about a hundred thousand conventional builders—you have a few large ones, but the balance of them is too small to afford the research, development and the planning expertise to plan land wisely. Suburbia land originally required half-acre sites because of the wells and septic tanks, but because now we have put in sewers and streets and all the amenities, there is no longer that need. However, today, in order to insure that low- and medium-income families do not get in, suburbia is even raising the lot size requirements to an acre.

Well, the only thing I can say is, here is a natural resource that should be getting better densities than we are getting. I realize that I am talking long range, but it is going to have to be met. The children are already born who in some 21 years are going to have families and we are going to have to have a place for them. It is up to us to be thinking.

Representative REUSS. To conclude, leaving to one side all the other cost problems of homebuilding in this country, zoning and suburban physical attitudes and building trades' practices and building codes and use of materials, putting those to one side, it is your view that a modern industrialized large-scale producer of homes can beat a conventional builder on the same plot of land whether scattered site or suburban or whatever, and whether it be single family, rowhouse, detached houses, semidetached, low rise, high rise, you can beat a conventional builder, you hope, by as much as 25 percent and maybe better. Is that a fair summary?

Mr. PRICE. We are doing that right now.

Representative REUSS. So that you would——

Mr. PRICE. We go a lot better than that.

Representative REUSS. You would not sit still for the allegation that industrialization is suitable only for the larger conglomerates of homes——

Mr. PRICE. No; I can give you many examples.

Representative REUSS (continuing). To wit: apartments?

Mr. PRICE. I can give you one. Denton, who was chairman of the Melon National Bank in 1957, called me by phone and said that he had an architect to design him a home, they took bids on it and it ran $325,000. He had read in a national publication that I had Goodman as an associate and wondered if they could come to Lafayette. He wants to see if we could use our systems to produce the home with the style, the space, and the feeling that he wanted. To make a long story short, we did. It was turnkeyed out to him for $125,000.

I can give you another minor example. In 1966—that has not been very long ago—my son David Price started what we call National Homes Construction Co. I might say without any prejudice that he uses only National Homes components in his construction. He has risen from zero to the 11th largest homebuilder in the United States in that length of time. How do you think he got it done?

Representative REUSS. Thank you very much.

Thank you, Mr. Chairman.

Chairman BOLLING. There are a couple of fill-in questions that I would like to ask. They will inevitably jump around because they come from the total of the contribution that all of you have made.

You were talking about one aspect of the financing that we could meet the need at the present ability to produce and cost of the $10,000 income man by increasing the mortgage from the 30 to 40 years. Now, that gets me into the financing end of it pretty obviously, and it also leads me back into the durability end of the products. And it also raises this whole question of the relationship of the product to the maintenance and so on and so on. It raises a whole flock of questions as to that one, and I would like to get at some of them. What is the increase in cost, total cost to a theoretical home buyer who in one generation or two is going to pay off a 40-year mortgage, from a 30-year mortgage to a 40-year mortgage?

Mr. PRICE. I want Frank Flynn who is my finance man to answer that question.

Chairman BOLLING. I just want a general answer in gross terms. And I am perfectly well aware that there are very few people, very few families that will own the house from beginning to end, but I am curious as to the theoretical question.

Mr. FLYNN. Well, in theory, Mr. Chairman, between the 40-year loan and the 30-year loan, the interest, approximately, will be in excess of 25 percent because the term is increased. Of course, we know that this is the inevitable result of lengthening the term. I think it important from an economic standpoint, and I believe the individual himself is not concerned with the total cost of that product but with the monthly cost and how it fits into his budget and his ability to pay.

I think the best example of that is the fact that our whole economy is based on credit, credit involves interest, and interest is money. The 40-year term will create a higher total eventual cost but it will permit this individual to own a home, buy a home now, pay for it later.

Chairman BOLLING. Well, that, of couse, leads back to the point that I think Mr. Price made when he said that one of the advantages of homeownership is that the individual sometimes consciously and sometimes less consciously builds an equity which has a very significant, a very significant effect on the individual and the future of that family.

And that is the reason I raise the question. There is no argument about your point that a great many people look at the monthly payment and not the overall cost, and they do not look at the equity. But I am curious about the thing—we started out, as I stated earlier, with an anthropologist as our first witness in the first of our hearings, which are intended to be broad ranged, and I am curious as to your reaction to that equity aspect of it.

Mr. PRICE. I have another statement to add to what Frank has already said. I want to point out, No. 1, that in your subsidized programs you have 40-year terms now. We have the same quality product whether you are putting it under your 203(b) regular FHA or your 221(d)(2) or any other program. The quality level is the same. So if in special funded programs you use a 40-year term, I see no reason then why we do not apply the 40-year term to programs the Government does not have to fund, that do not affect Federal budgetary matters. Here is the reason people buy mobile homes. They shut their eyes to that, because they need living space. We have people in income brackets from $7,500 to $10,000 that are in no man's land. We have been very fortunate since our product in all cases undersells the general market. In spite of our having supplied 350,000 homes, conventional homes are the majority. Our homes appreciate the day they go on the market rather than depreciate. The first home that we built back in 1940 sold for $3,250; a year ago it sold for $14,000. One of the reasons we have sold 350,000 houses is because of consumer referral. I learned a long time ago that if we sold a house for $7,000 and the normal market was $8,000, when it sold secondhand it sold at $8,000. We are not the predominant in the market. So I do not worry about equities. They have got ability in appreciation, yet everyone assumes that in homeownership you have got to consider it not as an investment but as a place to live, an environment and a family-raising center.

Chairman BOLLING. Thank you. The whole question of the level of interest would make a further interesting discussion. If the interest came down a point or two points, or we got it to what we call a more normal interest rate. That would have a tremendous impact, too, obviously.

Mr. PRICE. Now, you are talking about things you don't have any control over.

Chairman BOLLING. I understand that. Some people think the Congress does and some people think it does not.

Mr. PRICE. I decided no one does.

Chairman BOLLING. Well, so obviously you are not concerned about the life of your product in terms of a 40-year mortgage?

Mr. PRICE. Well, no, I am not because our product has been given the longest economic life assignment assigned to any construction in the United States by the Bureau of Standards.

Chairman BOLLING. Now, one more specific question. You have talked a good deal about costs. What has been the impact of your costs

of the general economic situation? And I know that includes a lot of different factors?

Mr. PRICE. Well, it is a known fact that building costs have been raising at the rate of 1 percent a month for the last 18 months.

Chairman BOLLING. Continue please.

Mr. PRICE. We have been able, through automation, crane setting, and so forth, to avoid raising prices by an 18-percent increase in 18 months. Our price rise has probably moved up closer to nine, because we are able to do more automation, more systems, more planning to augment some of these things that seem to be unresolvable.

Chairman BOLLING. Well, clearly, Mr. Price, you have had a success in terms of producing a product that has found acceptance and has given pleasure. I am sure that you have not been in business this long without having other aspects of success. Have you had any experiences that might be helpful to us where you did not have a success, where you built a product that did not happen to suit the environment that it was in? I am asking the question because we often learn from the nonsuccesses as much as we learn from the successes. What are the difficult areas, the most difficult areas that you run into in this kind of thing—building a product that will suit a group of people in a given area? Is the sociological, architectural aspects the most difficult to master? Or is it more difficult than the technology of mass production? What are the most acute problems that you face?

Mr. PRICE. Well, in answer to your statement, the reason I have not run into any such problems as you have outlined is for one simple reason: It is the company marketing policy. We have carefully searched and thoroughly examined every facet before we go to the mass market with products. I use Forest Products Laboratories, and have ever since the founding of National Homes, to assist us with their findings and research, and to test our products before we ever put them into the market. I have utilized area architects, and environment people. We warranted our homes long before FHA required warranty. I have warranted our homes unconditionally since we started. We have shipped 350,000 homes, and we have spent an average of no more than $10.50 in taking care of latent defects over that many homes, which speaks pretty well for the homework that we have done before we went to the market.

Chairman BOLLING.. I would say you did, Mr. Price.

Mr. Price and your associates, we are grateful to you for your contribution to the society, and also to the hearings of this subcommittee, and we wish you well. Thank you very much.

Mr. PRICE. Thank you very much.

(The prepared statement of Mr. Price follows:)

PREPARED STATEMENT OF JAMES R. PRICE

As Harold B. Finger, HUD's Assistant Secretary for Research and Technology, has testified before this Committee, the subject of industrialized housing "generates very clear reactions—pro and con—in industry, in labor, in user groups, in communities, among governmental officials."

DEGREES OF INDUSTRIALIZATION

Let me identify some of the different types of factory-manufactured products used to provide shelter.

The "conventional" builder operates on-site, but is increasingly calling on the factory for finished windows, doors, wall sections, cabinets, roof trusses, and the

like. Virtually all housing built in this country contains one or more of these factory-built components. This type of construction requires skilled labor which is in short supply; the labor shortage alone would make it impossible to increase the volume of housing starts to the level of the National housing goal of 2.6 million units a year. This type of construction is also wasteful of financing resources; at current rates, it costs seven dollars a day in construction loan interest over an average building period of five months. In the inner city, security costs alone are seventy dollars a day.

The National Homes Corporation does not build conventionally. It works with two basic systems, or technologies:

(1) The first technology (sometimes referred to as a closed system) uses large sections of wall, floor, and truss, which are designed and built in an integrated system. The components are unique and are not interchanegable with any other system.

This technology has two variations: (a) when a living unit is delivered unfinished with only exterior doors and windows installed in the plant, leaving to be installed on-site the plumbing, heating, wiring, and the like, it can be ready for occupancy in 4 to 6 weeks, compared with 6 to 8 months for conventionally built houses; (b) when one of our homes is completely prefinished, inside and out, including plumbing, wiring, heating, carpeting, and furniture, it can be erected in a day by our Teamster driver, using a specially designed crane mounted on a tractor-trailer, and 3 to 4 building trades laborers, and occupied 4 days later.

(2) The second technology is a totally finished, three-dimensional module, or sectional, unit which can be ready for occupancy the day after it arrives at the site. The mobile home industry is the principal user of this system. The National Homes Corporation, although it delivers thousands of mobile homes each year, is currently concentrating on developing this second system into a sophisticated approach quite different from a mobile home, to meet our National housing goals, especially the goal of providing adequate shelter for low and middle-income families in our urban centers.

The totally industrialized house is not new to this country. As early as 1943, the National Homes Corporation manufactured and delivered 1,000 modules on a Federal Government contract to house atomic energy personnel in Oak Ridge, Tennessee. More recently, in 1965, we delivered 1,350 factory-finished 2-story units on a Federal Government contract to military bases all over the world.

Both of these industrialized housing projects were feasible because (a) land was controlled by the Federal Government and therefore free of any code and zoning restrictions, and (b) the size of the order was large enough in volume to take advantage of industrialization.

In 1968, we built a new factory especially designed to produce the totally manufactured house for the inner city, and our first delivery was to Chicago.

50TH AND BLACKSTONE

The following excerpts from TIME magazine and BETTER HOMES AND GARDENS describe the National Homes' initial delivery of industrialized housing units to 50th Street and Blackstone Avenue, in Chicago, on August 20, 1968:

HOUSING

LOW COSTS THROUGH INSTANT BUILDING

The fleet of trucks rumbled out of National Homes Corp.'s prefabrication plant in Lafayette, Ind., shortly after midnight, laden with six-ton sections of ready-to-live-in housing. Their destination was a Chicago ghetto 125 miles away. Less than 24 hours later, tall cranes had plucked the sections from the trucks and stacked them into eight two-story, four-bedroom homes ready for occupancy.

The instant homes were the first of 200 being built in Chicago ghetto neighborhoods by National Homes and by Guerdon Industries. Equipped with factory-installed kitchen appliances, one-piece glass-fiber bathrooms and even air conditioning, they sell for only $14,500. In high-cost Chicago, similar-sized homes built by time-consuming conventional methods would ordinarily carry price tags of about $25,000. Thanks to such easy terms as $350 down and monthly mortgage payments of $125, National's module homes will reach families with incomes as low as $6,500 a year.

The Chicago project symbolizes today's expanding effort by both government and private enterprise to reach the long-elusive goal of providing good low-cost dwellings for the nation's poor and near poor. Over the past three decades, Wash-

ington has poured some $6.5 billion into housing subsidies and urban renewal, committed at least another $13 billion as yet unspent to the same controversial programs. Yet one recent White House report estimated that 8,300,000 Americans still cannot afford a decent place to live.

The attempt to close that gap is part technological, part financial, part political. In big cities, building-trades unions have long been a major obstacle to fully industrialized housing—buildings with huge parts preassembled in a factory instead of handcrafted at the site from myriad bits and pieces. That money-saving process increases the employment of industrial workers but reduces the need for highly paid (up to $7.30 an hour) building craftsmen at the site. When Chicago's Mayor Richard Daley started flexing his political muscles, however, the unions agreed not only to erect factory-fabricated units which had long been excluded from Chicago, but to hire neighborhood residents (most of them Negroes) as apprentices on such work.

(*Time Magazine.*)

A Promising Step Forward in Assembly-Line Housing*

(By Jerry Reedy, Special Assignments Editor)

Visit a house construction site today and you might find yourself doing a double take—if not scrambling for cover. Instead of seeing workmen banging away with hammers, you may well view giant boxes swaying beneath cranes. The boxes are "modules"—the building blocks of a small, but progressive and growing segment of the housing industry. Stacked on top of each other or inserted in huge frames, modular components create housing in a fraction of the time required by traditional methods of construction.

At San Antonio's Hemisfair, for example, cranes put together a 21-story modular hotel for Hilton in only nine months. Conventional construction time for such a project is about a year and a half.

The mobile-home industry also joined the trend by creating stronger mobile homes and stacking them up in what became known as "instant housing." In most cities, however, mobile homes have found this construction route tough, if not impossible, because of zoning ordinances, building codes, and loan restrictions.

Much new building technology has been employed only in large, multi-family public housing, or in experimental showcases such as "Habitat" at the Montreal World's Fair. By contrast, single-family housing remains largely a board-by-board operation, with few innovators and even fewer innovations. At a time when housing is both scarce and expensive, the situation cries out for a solution.

Fortunately, a few have heard the cry. One such man is Jim Price, chairman of the board and co-founder with his brother of National Homes Corporation, the nation's largest prefabber. National has been manufacturing prefabricated houses since 1940; this month the Lafayette, Indiana, concern rolled out Number 335,000. Tough and hard-driving, Price has two primary goals: to make National Homes the General Motors of the housing industry, and to put decent housing within the reach of everyone. He may just succeed.

In 1967, after riots in Chicago, Detroit, and Newark, Price approached the mayors of the three cities with a plan to build single-family townhouses on vacant land in the ghettos. Chicago was the first to accept, and the initial eight structures were set in place last August.

A typical approach? Not quite. Each four-bedroom unit is completely furnished, fully landscaped, and air-conditioned. Interior and exterior building materials were purchased from major manufacturers on the basis of quality, durability, and low maintenance. The simple yet smart exterior styling gives little if any hint of "public housing." In back, each townhouse has a private patio, as well as access to a common recreation area with separate sections for adults and children. Grass, trees, and shrubs are included just as they would be in any good suburban development. Total price: $14,500.

When asked how he manages to produce a quality home at this figure, Jim Price spurns such words as "technology," preferring to call it "know-how." Whatever it was, the Chicago project allowed National workmen to perform virtually the ultimate in prefabrication: *They completed each of the eight houses down to the last detail entirely within the factory and in compliance with FHA, VA, and Chicago's own stringent building code. And they did it in only ten days!*

When the houses were finished, they were simply loaded onto trucks in sections taken to Chicago, and lowered by crane onto previously poured foundations. Plumbing and wiring were connected, and the first family moved in the same day. Price says he will build a new factory for these townhouses wherever he can get a large enough commitment to make it worthwhile. National already has plants in the planning stage for Chicago, the Philadelphia area, and Winston-Salem, N.C.

National now produces townhouses at its sprawling main plant in Lafayette, in a completely separate building. The townhouses—or more appropriately, the first or second floors of the townhouses—move down an assembly line on giant dollies through 13 assembly stations. Several large sections—walls and floors, for example—are made ready at sub-assembly areas.

A bare floor arrives at station number one, where it is mounted on the dolly. Before it rolls to station number two, it receives an end wall, a sidewall and a vinyl floor. Workers at successive stations install interior partitions, the remaining exterior walls, plumbing, wiring, and appliances. At station 13, the finished product is wrapped in plastic and loaded onto a truck.

Though terminology has changed, most innovations are direct descendants of the prefabrication techniques of the forties and fifties. The idea remains the same: bigger building blocks *produced off-site* and *assembled on-site.*

Not many years ago, however, "prefabricated" was used to describe dreary, look-alike houses that sat in soulless subdivisions with little prospect of outlasting their mortgages—uninspiring, unimaginative, unappealing, uninviting, unsafe, and un-everything. Many prefabs deserved their bad reputations. Others were simply victims of the general low esteem that—with much justification—characterized all American housing during and after the hectic post-war building boom.

Switch back to the present. Housing prices have soared. Land costs more, labor costs more, lumber costs more. Rigid zoning ordinances and inflexible building codes help perpetuate the spiral; higher taxes twist it still more. Many who elect to pay the price for a new home are stopped before they start: interest rates on mortgage loans have gone up, too. For some, mortgage money is hard to find at any price. The nation's builders lament their third straight year of depressed housing starts, and many smaller operators are out of business.

This housing crisis is all too familiar to builders and homeowners (see the August, 1968, Better Homes and Gardens). Yet we can scarcely begin to suggest the misery and despair that inadequate, substandard housing creates in the teeming urban slums.

Obviously, National Homes can't rehabilitate the ghettos single-handedly. But its efforts demonstrate that totally manufactured housing can go a long way toward lowering costs and reducing construction time. The implications are staggering. Widespread adoption of the technique could provide not only decent housing for the poor, but more reasonably priced housing for everyone. Not ten years from now. Not even five years from now. Right now.

(*Better Homes and Gardens.*)

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29 YEARS OF MANUFACTURED HOUSING

National Homes was started in 1940 with the basic idea that homes could be built better and more economically on an industry assembly line than by conventional methods.

We made an original investment of $12,500 in that idea, and because of the success of our way of building, that original investment has grown in 29 years into a net worth of $48 million.

National Homes has achieved a consumer acceptance that has made our Company by far the largest home manufacturer in the United States. Over the past 29 years, nearly 350,000 American families have purchased new National homes. In 1968, the average retail price to the homebuyer, including lot, was $18,350. The range of price levels was from $12,500 to $70,000.

We will manufacture 24,000 living units in 1969. In the first five months of 1969, we showed a gain of 34 percent over the same period last year, as compared with the 6 percent increase in total housing starts by the industry. Our single family production was up 34.4 percent while the industry was down 5.4 percent.

THE FIRST PLANT

We began our first home manufacturing plant in Lafayette, Indiana, on June 16, 1940. We also started building our first home on that same date. The simul-

taneous start was more than mere coincidence. It was an economic necessity. For we had invested $7,500 of our first capital in the plant. An immediate return on our investment was even more important than a fair return.

The first National home, the first of nearly 350,000 we have manufactured, was erected on July 20, 1940.

The Technical Section of the Federal Housing Administration (FHA) was in Lafayette for the manufacturing and construction of our first National home. It performed the necessary structural analysis tests, which resulted in National Homes obtaining its first FHA Technical Engineering Bulletin, a prerequisite for mortgage insurance. All National homes—then and now—meet or exceed structural and design standards set by the FHA.

A NEW HOME FOR $3,250

Brand new, this first National home sold for $3,250. The buyer paid $350.00 down and made monthly payments of $19.42. This included principal, interest, insurance and taxes. This home has been sold three times in the span of 29 years. The last selling price was $14,000. This is a pretty good return on the owners' investment, plus a rich dividend in good living.

WAR-TIME EXPERIENCE

Our Company's experience in totally manufactured homes—the ultimate in industrialization—came soon after National Homes was founded. In 1941, as war clouds gathered, the Defense Department asked National Homes and others to design and manufacture relocatable homes complying with permanent house standards. The result was that 11 companies, including National Homes, were each given the go-ahead to build 60 homes at Indian Head, Maryland. The Defense Department made the competition interesting. After the 60 homes were erected, the Project Manager was to pick a home at random and the contractor was to disassemble it, move it 90 miles to another pre-selected site and then rebuild it. This test was to determine the feasibility of the relocatable feature designed in each of the competitors' homes.

Since National Homes was the first to get its homes erected initially, we were the first to undergo this basic test of the merits of industrialization. Starting at 7 a.m., we disassembled a home, moved it the required 90 miles and had it erected again by 4 p.m. the same day. Our material loss was less than 1½ percent—primarily nuts and bolts and a few trim items.

The Defense Department rewarded this outstanding performance with National Homes' first government contract to build 500 homes in three different locations. We were to win numerous others before the war was over. Eventually, our company produced more than 8,000 homes during the war for staff officers and civilian workers. For this, National Homes won the coveted "E" award for efficiency.

OAK RIDGE

In 1943, when the Army Corps of Engineers asked National Homes to build totally manufactured homes in our Lafayette plant for an installation at Oak Ridge, Tennessee, we did not know until later that these were for workers on the Manhattan Project that produced the atomic bomb. These were one-story structures, two to four bedrooms. They were built in three-dimensional sections, completely manufactured and assembled in our plant, including wiring, plumbing, heating and appliances. Even the furniture, curtains and drapes were included. These sections were erected by crane on prepared foundations, and could be completed and ready for occupancy six hours after arrival at the site.

This was the first application of mass production technology to home building. Before the war was over, National Homes provided the protoypes for similar housing for workers at the Hanford, Washington, atomic energy plant.

KNOW-HOW

These war-time experiences developed to a high degree our Company's know-how in industrialized housing. They were unforgettable lessons in mass production technology, telescoped into a relatively few years. They led to the highly successful way of building developed by National Homes in the post-war years. More recently, they were quickly recalled when a new and urgent demand arose for industrialized housing to meet the needs of low income families in the nation's cities.

National Homes living units are manufactured in modern plants. They are completely pre-engineered, programmed, and computerized, using highly automated assembly lines. Unskilled labor works under ideal conditions year round. This mix of man and machine makes possible a building system of high quality because of in-plant quality control.

NATIONWIDE SCOPE

Builders franchised by National Homes Corporation are independent businessmen. Today, there are more than 1,000 of these builders, serving major markets in 37 states East of the Rocky Mountains.

To serve its builders, National Homes Corporation operates home manufacturing plants in Lafayette, Indiana; Tyler, Texas; Horseheads, New York; Effingham, Illinois; Martinsville, Virginia; and Thomson, Georgia.

WIDE RANGE OF CAPABILITIES

Although basically a manufacturing operation, National Homes has developed over the years a wide range of capabilities including: land acquisition and development, site planning and environmental design, construction, merchandising and sales, governmental relations, construction and permanent mortgage financing, business management and marketing services.

The financing service given builders, the largest of its kind in the United States, is operated by National Homes Acceptance Corporation. It was started in 1947 to ensure builders construction money and permanent mortgage financing.

Substantially all home loans accepted by the Acceptance Corporation are FHA-insured or VA-guaranteed and are sold to institutional investors. Since its founding, it has accepted mortgages on homes valued at $2.5 billion. The mortgage portfolio serviced for its investors amounts to more than $780 million today.

DESIGN, RESEARCH AND DEVELOPMENT

Over the years, National Homes Corporation has spent a great deal of time, effort and money developing our concept of home manufacturing. Our Company has never paid a cash dividend to its shareholders. With their approval, we have preferred to plow all the profits back into the business.

This money was spent not only to advance our technological know-how, but also to give our homes an excellence in style, design and quality. To achieve the latter, we have retained over the years the finest of architects, experts in site planning and environmental design and sociologists.

Research into all phases of industrialized housing is conducted in cooperation with the Low Income Housing Research and Development Corporation, which we helped to organize earlier this year.

MOBILE HOMES

While there had been a constant debate whether totally industrialized housing can produce a substantial savings, this point has been well proven in our country by the mobile homes industry. As building standards, space requirements, zoning regulations, labor costs, land costs and material costs have priced our low and moderate income families out of single-family housing markets, the mobile home industry has provided housing for a substantial percentage of our population. Building primarily in areas beyond code and zoning requirements, using construction techniques and space far less than our accepted housing standards, financed by our bank and other lending institutions, this industry has been supplying housing to first-time home buyers who had no other opportunity to procure shelter. Last year, one out of five new homes was a mobile home.

A worker earning $10,000 a year, who would pay the statutory norm of 20 percent of his income for mortgage payments, which includes principal, interest, taxes and insurance, cannot afford to buy a $20,000 FHA-insured house. He can afford monthly mortgage payments of $166, but his payments on the $20,000 house at 7½ percent would amount to approximately $173. At 8½ percent interest, his payments would be approximately $188 a month.

Mobile home production is up 39 percent this year over last year and will provide housing for 400,000 families this year. A great majority of the mobile

homes are sold to young families, transient workers and senior citizens. Also, families earning as low as $350 per month can qualify.

Because we are in the business of providing shelter desired by the consumer, National Homes manufactures mobile homes at Clearwater, Florida; Thomson, Georgia; Gray, Georgia; Columbia, Louisiana; Austin, Texas; Tyler, Texas; Tempe Arizona; and Bicknell, Indiana.

LABOR

National Homes has employed union labor since 1941. In the shelter industry as a whole, 80 percent of all units are built non-union. The other 20 percent that is union-built is in the inner cities of major metropolitan areas, where the greatest need exists.

National Homes plants are organized by the Brotherhood of Carpenters. Its units are transported by the Teamsters.

COMPARISON WITH EUROPEAN EXPERIENCE

The emphasis upon large scale innovations in industrialized building techniques in post-war Europe came from three major factors: (1) the shortage of shelter after World War II, particularly for low income groups; (2) the shortage of skilled building workers; and (3) the expectation that industrialization of building could bring about a significant decrease in the traditionally high cost of construction.

The conditions in the United States today are comparable to what they were in Europe following World War II. We have a desperate need for shelter; we have a shortage of skilled building workers. Large quantities of housing are needed for low and moderate income families. Current housing prices exceed purchasing capability of 65 percent of our families. We therefore must fully exploit mass production to reduce costs, improve quality, maintenance costs, provide good architectural design and strive toward better social environment.

In many countries, there has been opposition to industrialized methods. In the United Kingdom, for example, the opposition at one time took the form of strikes and boycotts against builders handling prefabricated components.

Conventional builders' responses to industrialized building systems have varied widely. Their initial reaction tended to be hostile, but they have generally responded to competition from industrialized systems by improving and rationalizing their conventional methods.

Mortgage banks and insurance companies have also tended to block expansion of industrialized housing. In France, even when new prefabricated materials were officially approved by the Government, they were still viewed with suspicion by insurance companies that had to cover the ten year liability of builders.

Many of the resisting groups in the building industry have been directly or indirectly responsible for the retention of outdated building methods. Local building codes are frequently written in terms of specifications rather than performance, thereby excluding the introduction of new materials.

European countries, because of lack of natural resources to provide a variation in material selections, are forced to concrete systems even when small panel components are used they are limited to a 50 to 60 mile radius from their plant. In the United States, our components, because of light weight, can economically be transported 300 miles.

For the past few years, National Homes has regularly made inspection tours of foreign building systems, particularly European concrete systems, with a view toward adapting any advance in technology to the American market. Up to now, our experience has been that a greater variety of domestic building materials gives us a wider choice of systems.

A NEW BREAKTHROUGH

Our many years of experience, research, and experimentation has led to a further refinement, our latest technological advance and a real breakthrough. With the technology that we had learned over the years, we set out to meet the problem of housing for the inner city.

We have created a wide variety of single-family homes and town houses that have durability, maintenance-free quality, and good architectural design. Our objective was to completely finish the housing in three-dimensional modules in our manufacturing plants before delivery to the site. Sites have been planned

to provide low density. All utilities, foundations, landscaping, and social amenities have been preinstalled, leaving only a crane to set the modules and Building Trades workers to connect the units.

The first deliveries were to 50th & Blackstone, Chicago, described above.

We are now shipping these totally manufactured houses to Chicago and East Chicago, Illinois; Monroe, Michigan, Lafayette, Indiana; East St. Louis, Illinois, and other localities in the Middle West. A second manufacturing plant for industrialized units is underway in Thomson, Georgia, initially to supply 600 units for the Thomasville Redevelopment area in Atlanta and the Southeast generally. The Atlanta units were awarded to National Homes as the result of a nationwide competition. The National Homes presentation and the Report of the Jury are attached.

PRODUCTION CAPACITY

National Homes in 1969 has a 3-shift capacity to produce 72,800 living units a year. By the end of 1970, this will increase to 98,000 units a year. These are divided among our different technologies as follows:

	1969	1970
Technology No. 1 (finished and unfinished panels)	46,000	46,000
Technology No. 2 (3-dimensional modules, excluding mobile homes)	10,800	28,800
Mobile homes	16,000	24,000
Total annaul 3-shift capacity	72,800	98,000

The tabulation shows that our first technology finished and unfinished panels—has sufficient capacity to handle a steadily rising volume of sales. Consumer demand for mobile homes is so strong that plant capacity is expanding substantially. The largest expansion, however, and our greatest investment in the Nation's future, is in industrialized housing in the form of 3-dimensional modules, to serve low and middle-income families in our urban centers.

OBSTACLES TO VOLUME PRODUCTION

I see a number of major problems that must be solved if we are to achieve volume production, especially under HUD's housing programs.

LAND

The scarcity of suitable housing sites for low and moderate income housing is the first important bottleneck to meeting the housing goal.

A total of 4.6 million units of housing for low and moderate income families called for over the next decade are to be newly constructed housing. Land for this volume of new housing is not now available in built-up central-city areas.

We welcome the urban renewal provisions of the 1968 Act that provide that at least 20 percent of the land acquired must be utilized for housing, and at least half of that must be for low and moderate income housing. This is a start back from the policies of the past that have aggravated, rather than solved, the housing needs of inner-city residents, and which have made many communities hostile to urban renewal programs.

Since 1949, under urban renewal, as you go into a city you see a lot of vacant ground. I would have thought that this would have been available for low-income housing. I learned differently. One of the objectives, at the time the 1949 act was enacted, was to take this ground and to improve the city's tax base.

Values were assigned to the land for either commercial, or industrial, or high income multi-family. Thus, the value assigned in all cases would be too high for low-income housing.

As far as I am concerned, something has to be done to make this inner-city land available for low cost housing. Many people that we are trying to house don't want to live out in the suburbs. They want to live in, yet we have a lot of ground that is not available to them because of zoning and high costs. At the time the urban renewal came on the scene, when they tore buildings down, they got the community to recommend an end-use, with the main objective to raise the tax base for the city.

HUD should take the lead in converting a substantial portion of urban renewal land for low and moderate income housing. Since land is going to have to be subsidized, in the inner-city, it might as well be written down to zero with the Federal Government providing 100 percent of the subsidy cost, if used for low and middle-income housing.

WORKABLE PROGRAM

An assumption of the 1968 Housing Act is that many of the 6 million units for low and middle-income families will be in the nation's suburbs as relatively low-density housing—garden apartments, townhouses, or single family houses on small lots. Yet the plain political fact is that most suburbs resist the location of such housing within their boundaries.

This suburban resistance is buttressed, in the case of federally-assisted housing, by the "Workable Program" requirement, (which requires approval by the local legislative body), and by other local approval provisions which attach to public housing and rent supplement programs. These local approval provisions should be eliminated, as recommended by the Kaiser Committee.

The local approval provision of the public housing leasing program is particularly onerous. It prevents the rental of public housing outside the central city. When a public housing authority leases housing in a community, it acts as any private investor or entrepreneur. The housing authority simply guarantees the owner a fixed lease payment over the term of the lease.

In contrast to when a public housing authority purchases or constructs housing units, the leased property pays full taxes. The local community is not called upon to accept a lesser payment in lieu of taxes or to confer any other public benefit. The local approval provision of Section 23 of the Public Housing Law is therefore an unreasonable and unnecessary constraint on the program and should be repealed.

ZONING

Besides exercising vetos allowed by federal housing law, suburban governments use their local zoning power to prevent open communities. The Douglas Commission identifies "fiscal zoning" as large-lot zoning, exclusion of multi-family dwellings, and minimum-house-size regulations as the principal means used by suburbs to exclude unwanted families.

Zoning restricts land uses to those which will return greater property and sales taxes. We propose that for land outside the urban renewal areas a determination be made of the equivalent price of the site as if it were a part of an urban renewal area, under the formula established under Section 107 (b) of the National Housing Act. The Housing Assistance Administration would remit to the local housing sponsor, at the time of permanent financing, a direct grant equal to the net difference between total costs of site preparation and price which has been determined as the amount to be included in the total development cost for permanent financing.

Where federal land acquisition is made, or where a locality takes the initiative, it is our position that the federal government must make it clear that subsidies for sewer, water, highways or loan guarantees will be provided only where it is demonstrated that the needs for low and moderate income housing are a part of a community's undertaking. Such a policy would perform wonders in revealing heretofore unavailable land for low and moderate income housing.

TRANSPORTATION

Much stress has been placed on the need for the inner-city dweller to get to the areas of new industry, usually on the outskirts of the city, but transportation also plays a vital role in determining where new government-assisted housing is to be located. If transportation is available, the land cost is too high; if there is no transportation, land cost is within reach, but is unsuitable to the needs of prospective tenants for shopping, schools and employment. Serious thought should be given to this problem because the expense must be met one way or another. Either the higher land cost must be paid or transportation facilities must be extended to the new housing area. The alternative is to abandon the project and leave the housing needs unmet.

A locally-initiated free shuttle bus to a transportation center as an integral part of the housing cost should be considered as one possibility.

Public transportation—as a life-line to the community and to employment—will more and more make up a critical part of any search for land, and consideration should be given now to its being achieved.

ENCOURAGING LARGE VOLUME

In the last fiscal year, 48,000 units were started under the 221 (d) (3) and Section 202 housing programs. The 221 (d) (3) houses were constructed by 357 sponsors; the average project contained 125 units. They took up to 30 months to complete from start to finish.

Our national housing goals cannot be met unless large volume industrialized housing is brought into the picture.

The government has no program to cover large-scale projects. Most FHA offices are reluctant to insure project sections covering more than 250 units. The developer has no commitments that further sections will be approved, so he cannot plan volume production. The solution is to reserve funds for this purpose, assuring the developer that he can proceed to invest in large tracts.

LIMITS ON CONSTRUCTION COSTS

The limits on construction costs are out of date. The construction cost-limits for both FHA moderate income and public housing programs should be amended to keep abreast of rising construction costs. These cost limitations are set by statute.

Limitations should be at least $1,000 higher for the inner city because of greater density, fire requirements, and unusual site conditions left from wrecking for redevelopment. Special attention should be given to provide 5 and 6 bedroom homes, which are greatly needed in the inner-city.

Because of the continual rise in construction costs, Congress should legislate a statutory construction cost ceiling sufficient to allow wide administrative flexibility under it to cover a variety of cost conditions in different areas of the country. And Congress should provide a statutory procedure for periodic updating of the construction cost ceiling.

FORWARD FUNDING

Congress should authorize and appropriate funds for housing programs for 5 years or more. It is difficult for any entrepreneur with a long-term view to consider entering the housing field on a large scale in the face of the variation in the amounts of funds available for financing these programs from one year to the next.

We are going through a period in which newly authorized programs are funded below authorized levels, and even these limited amounts are late in coming.

With a minimum of five years or more advanced funding, to give the continuity needed to encourage large-scale industrialized housing, we have a fighting chance to meet some of our critical housing needs for low and moderate-income families.

Appendix follows:

APPENDIX

Town House Parks

by National HOMES CORPORATION
The Growth Shelter Company

Wins
National Competition
and
$9.3 Million Contract
for
Development of
Thomasville Area

ATLANTA HOUSING AUTHORITY

December 9, 1968

KECK AND WOOD, INC.

ENGINEERS
DESIGNERS
PLANNERS
MANAGERS

3722 PLEASANTDALE ROAD (404) 939-1334
ATLANTA, GEORGIA 30040

November 22, 1968

The Atlanta Housing Authority
824 Hurt Building
Atlanta, Georgia 30303

RE: Atlanta Housing Authority
Redevelopment Competition
Jury
Our Ref. No. 6821

Gentlemen:

A Jury consisting of the following persons has reviewed the five proposals submitted in the competition for the redevelopment of federal surplus land to meet critical needs in the Thomasville Urban Redevelopment Area -- Ga. R-22.

1. Mr. William M. Alexander, Executive Director, Alpha Phi Alpha Building Foundation, Inc., St. Louis, Missouri

2. Mr. Walter Blucher, Planning Consultant, AIP, ASPO, Arlington, Vermont

3. Mr. Carl Koch, Architect, FAIA, Boston, Massachusetts

4. Mr. Robert M. O'Donnell, Landscape Architect and Planner, ASLA, AIP, Denver, Colorado

5. Mr. Willard G. Rouse, Executive Vice President The Rouse Company, Baltimore, Maryland

A biography of each of the members of the Jury is included in the Appendix.

The following is the unanimous report of the Jury.

Respectfully submitted,

Howard K. Menhinick

Howard K. Menhinick
Coordinator of the Jury

HKM/ab

The Report of the Jury in the Competition for the Redevelopment of the Thomasville Redevelopment Area--Ga. R-22.

This is a report of the Jury selected to judge five proposals submitted in the competition for the redevelopment of federal surplus land to meet critical needs in the Thomasville Urban Redevelopment Area--Ga. R-22.

The five proposals were submitted by:

1. Interfaith, Inc.
2. J.I. Kislak Mortgage Corporation of Florida and Boise Cascade Urban Redevelopment Corporation--A Joint Venture.
3. National Homes Corporation.
4. Pace Development Corporation (A Subsidiary of Cousins Properties, Inc.)
5. The Vector Company, Inc.-Merton Development Company--A Joint Venture.

The five proposals were evaluated by the Jury on the basis of the following criteria:

1. The excellence of the site plan, particularly as it relates to the creation of an optimum living environment.

2. The excellence of the architectural design and the quality of the proposed construction.

3. The financial responsibility and demonstrated capability of the Redeveloper.

4. The manner in which the proposed development meets the goals and objectives set forth in Section 6 of the Invitation for Proposals issued by the Atlanta Housing Authority on June 10, 1968, namely:

a. Housing. Though the object is to serve a cross-section of social and economic groups, the Redeveloper will be required to develop a substantial portion of the housing (at least 300 units) for families of the lowest income group. Building types should be varied and include one to five bedroom units.

b. Education. The Redeveloper will be required to designate land in the area which will be acquired and developed by the Atlanta Board of Education for the following education facilities:

(1) Two Primary School sites of three usable areas each, located on either side of the expressway.

(2) A Middle School site of at least eighteen acres of usable land. This school site may be reduced in size to twelve acres if it is located adjacent to the park.

c. Recreation. The Redeveloper will be required to designate at least six acres of usable land, which will be acquired by the Atlanta Parks Department for the expansion of the existing park into a Neighborhood Park.

d. Commerce. The Redeveloper may designate, acquire and develop a retail commercial area(s) not to exceed six acres of land

primarily to serve the residents of the tract here under consideration.

e. Streets and Utilities: The land designated in the Redeveloper's proposal for public streets conforming to City of Atlanta standards will be acquired by others and street improvements and utilities will be installed, all at no expense to the Redeveloper.

f. Rentals--Amenities Relationships. The relationship between the rentals to be charged and the number of rooms per unit, the size of rooms and other amenities to be provided by the Redeveloper.

g. Acceptability of Public Facility Sites. The acceptability of proposed public facility sites to agencies involved in their development.

The Jury initiated its work on Thursday morning, November 7, 1968, with an inspection of the Thomasville Urban Redevelopment site and its environs. During the remainder of that day and on the following Friday and Saturday it carefully reviewed the written reports, the plans and the other documents submitted by each of the five Redevelopers.

Each of the proposals had strong points and weaknesses. These were evaluated in the light of the criteria established by the Atlanta Housing Authority for the competition. After careful comparisons, consideration of the relative importance of the various criteria and extended discussion and debate, the Jury unanimously voted that the National Homes Corporation proposal be recommended to the Atlanta Housing Authority as the

best of the five proposals.

An evaluation of the National Homes Corporation proposal in the light of the above listed criteria follows:

1. The excellence of the site plan, particularly as it relates to the creation of an optimum living environment.

A. The site plan of the National Homes Corporation proposal was considered excellent by the Jury, particularly with respect to the creation of an optimum living environment, for the following reasons:

(1) It provides a desirably low overall density of development.

(2) The major tree-covered ravines and adjoining steep slopes are preserved for parks and other public open spaces, thus avoiding the areas where grading and drainage problems would arise.

(3) Buffers of open space and of existing and proposed trees and roadways provide a desirable screen on both sides of the expressway and on the borders of the property with the penitentiary to the north and the railroad to the west.

(4) The north 32-acre portion of the tract, bounded by a perimeter collector road, becomes a self-contained residential super-block with a supporting Primary School and Neighborhood Shopping Center. Within this super-block, automobile traffic is excluded and internal circulation is provided by pedestrian and bicycle paths. The groups of town houses and of detached houses have been well located and are provided with useful lighted malls and other common open spaces. The Primary

School is centrally located within this neighborhood with easy pedestrian access to it. The Neighborhood Shopping Center is well located in terms of both this neighborhood and the proposed shopping center and commercial development at McDonough Boulevard and Moreland Avenue.

(5) The southern 64-acre portion of the tract is served by a collector road that extends westerly from McDonough Boulevard along the south side of the expressway, thus providing a direct connection with the expressway overpass and with the northern 32-acre portion of the urban renewal area. The collector road extends southward along the western boundary of the tract to provide an essential but secondary connection to the existing single-family development to the south.

(6) A combination Primary School, Middle School and park area adjacent to the existing park are excellently located with respect to the needs of the residents of both the 32-and 64-acre tracts and to the probably expanding Middle School needs of the single-family-home area located to the south.

(7) The location of town-house groups on the higher slopes and in both the eastern and western portions of the 64-acre tract and on both sides of Middle School is a logical and wise land-use decision. The more flexible and lower-density single-family houses have been located along the westerly side slopes of the tract within the superblock formed by the collector road and the existing single-family subdivision to the south.

(8) The interrelationship of the 64-acre neighborhood to the existing adjoining park and its association with the larger neighborhood to the south have been commendably solved.

(9) The Jury commends National Homes Corporation for the consideration given by them to outdoor lighting and to landscape planting and for their presentation of specific information with respect to both of these important items.

B. The site plan presented by the National Homes Corporation presents five problems that, in the opinion of the Jury, should be solved in the process of preparing the final plan for development.

(1) The common open space associated with the dwelling units will be owned and maintained by the Cooperative. An equally satisfactory method for the ownership and maintenance of the commendably large amount of open space provided in the plan needs to be developed.

(2) The "potential lake" is not an essential element in the National Homes Corporation proposal. If the lake is included, the question of who will construct it, maintain it and provide the protective measures that will be required in a community with children and particularly in light of the fact that the lake is located near the Primary and Middle schools needs to be resolved.

(3) The parking bays abutting the peripheral collector roadway and serving the groups of single-family detached houses present traffic hazards with automobiles entering and backing out of these bays into the collector road. In the opinion of the Jury, these parking areas

should be recessed into the super-block thus removing the traffic hazard and also bringing the parking spaces closer to the houses they serve.

(4) With respect to the town-house groups, the Jury has two comments.

(a) The three town-house groups in the south 64-acre portion of the tract in their present, precise locations present problems of adaptation to topography. They will require, in some cases, major grading despite the floor-level flexibility commented on below in connection with the architectural design.

(b) Each of the five town-house groups has buildings with no adjoining or near-by parking or service areas.

(5) The site plan for the Primary and Middle School in the southern 64-acre portion of the tract does not show essential playfields for which, fortunately, the site plan has reserved adequate open space.

2. The excellence of the architectural design and the quality of the proposed construction.

A. It is the opinion of the Jury that, on balance, the proposal of the National Homes Corporation provides the best architectural design. This proposal has the further substantial merit of presenting sufficient information to enable the Jury to judge positively the quality of the proposed construction. This opinion of the Jury is based on the following considerations.

(1) The residential development consists of one-and two-story single-family houses with from three to six bedrooms (100 units) and two- and three-story town houses with from two to four bedrooms (500 units) which the Jury believes will well meet the needs of prospective residents.

(2) The flexibility provided in the varying floor levels of the proposed house plans makes possible a better adaptation to the difficult topography than appears obvious at first glance in the placement of the town houses and the groups of single-family houses.

(3) The spacial arrangement of both the single-family houses and the town houses provides separation of common and private spaces, gives each family direct access to the out of doors and reasonable privacy combined with a sense of community on a good scale.

B. The Jury presents the following reservations with respect to the architecture and construction details of the proposal of the National Homes Corporation.

(1) More study should be given to meeting topographic requirements, particularly in the town-house clusters. The general scheme and the unit-plan layout permit this. A grading plan acceptable to the Atlanta Housing Authority should be prepared prior to the initiation of construction.

(2) In studying the town-house groups in detail, the Jury repeats its site-plan finding that a serious shortcoming in the National

Homes Corporation proposal is the walking distance required to reach the town houses farthest from the parking areas--in some cases more than 300 feet horizontally plus a very considerable grade difference.

Likewise, adequate receiving and outdoor storage areas for trash and garbage, garden furniture, bicycles and the like in reasonable proximity to vehicular access and parking areas are required. The Jury recognizes that a portion of this problem may be solved in the sixty bi-level five-and six-bedroom units which contain 1,440 square feet of lower level unfinished space which may serve as indoor storage and play areas.

(3) The Jury is of the opinion that more study and more screening are required to assure adequate privacy between units, especially in the four-house clusters, necessary to keep neighbors on good terms with each other. The Jury expresses a hope that the amenities shown in the National Homes Corporation proposal will not disappear in the final development of plans and in the face of construction costs, as so often happens to amenities shown on competition drawings.

(4) Discrepancies between the front elevations of the houses shown on the boards and the standard National Homes perspectives shown in the descriptive brochure were noted. The Jury approves the unified approach to architectural and material treatment shown on the boards and has based its approval of the proposal of the National Homes Corporation on it, with the further recommendation that the longest lasting

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of the exterior coverage materials be chosen. In this connection, the Jury regretted the lack in this proposal, as well as in all the other proposals, of construction specifications for the higher quality exterior materials that are becoming available and are much needed.

(5) The Jury being unfamiliar with type of roofing proposed for the town houses recommends that the Atlanta Housing Authority satisfy itself as to the satisfactory no-maintenance-longevity of the roofing material before approving it.

C. Architectural and Construction Summary. Despite the above reservations and criticisms of detail, the Jury finds that the National Homes Corporation proposal provides the best architectural design and presents sufficient information to make it possible to determine that, in general, the quality of the proposed construction is acceptable.

3. The financial responsibility and demonstrated capability of the developer.

National Homes Corporation submitted its proposal under the name of the parent company which thus assumes the financial responsibility for the success of the undertaking.

The 1967 Annual Report of National Homes Corporation shows total assets of more than $61 million. On September 30, 1968, its working capital was $25 million and its net worth was $43 million.

The financial resources of the National Homes Corporation are clearly adequate for this undertaking.

National Homes Corporation has a history of more than twenty-seven years of activity in housing and development. During this period it has produced more than 325,000 homes. Its experience in providing housing for families of low income includes projects in Chicago, Ill., Detroit, Mich., Durham, N.C., Elmira, N.Y., Indianapolis, Ind., Lafayette, Ind., Newark, N.J., and Rochester, N.Y. In addition, it is completing 60 single-family homes in the Thomasville Urban Renewal Area, adjacent to the parcels covered in this proposal, thus providing the Corporation with valuable knowledge and experience in this market.

In addition, National Homes Corporation has had experience in working with FHA and is familiar with their policies, regulations and procedures. The proposal states: "All of National Homes designs and materials have earned blanket approval under FHA and HAA Technical Bulletin #254".

This impressive record of experience in housing and development led the Jury to select National Homes Corporation as exceptionally well qualified under the criterion of "demonstrated capability", particularly in the field of housing for the low-income segment of the market.

4. The manner in which the proposed development meets the goals and objectives set forth in Section 6 of the Invitation for Proposals, issued by the Atlanta Housing Authority on June 10, 1968, namely:

a. Housing. Though the object is to serve a cross section of social and economic groups, the Redeveloper will be required to develop a substantial portion of the housing (at least 300 units) for families of the lowest income group. Building types should be varied and include one-to five-bedroom units.

This criterion, which the Jury regarded as one of the most important, was also one of the most difficult to evaluate objectively.

Because of the inadequacy or total lack in some of the proposals of estimated construction costs and economic rentals, it was impossible to evaluate and compare accurately and in depth the proposals with respect to this criterion. For example, some of the proposals simply assumed "rent subsidy" as the basis for the rentals of their units, thus making it impossible to judge the realistic rent of those units. Several of the proposals omitted altogether in their reports and in their specifications any mention of amenities such as landscaping, patios, exterior lighting and the like.

In evaluating the proposals with respect to this criterion very careful consideration was given to the socio-economic characteristics of the low-income tenants indigenous to this area and likely to occupy

the homes in the Thomasville Urban Redevelopment Project--the racial mix, the size of families, their income levels, their education and their sophistication. Against this background, an attempt was made to evaluate the relative acceptance and probable success of single-family homes, town-houses, cooperatives, condominiums, garden apartments and high-rise apartments with units ranging in size from efficiencies to six bedrooms. Fortunately, the members of the Jury had had first-hand experience with low-income families in the various types of housing. This experience was heavily drawn upon in evaluating each proposal, not to establish a desirable goal but rather to evaluate the proposals in terms of the normal pattern of acceptability to the low-income people of this area.

The National Homes Corporation proposal was by far the most complete and detailed with respect to construction costs, economic rentals and amenities to be provided. The types and sizes of housing units met the tests of acceptability to the low-income people who can be expected to occupy them.

The National Homes Corporation proposes a Housing Cooperative embracing the entire residential community to be created on this land as the best answer to the social objectives, the physical planning problems and the financial arrangements necessary to bring this housing within the reach of the lower-income families to be served. The National Homes Corporation proposes that The Foundation for Cooperative

Housing be asked to serve as the organizer and initial manager of the Cooperative.

The Foundation has indicated its willingness to work with the winning Redeveloper.

In summary, the National Homes Corporation proposal meets satisfactorily the many criteria for the accommodation of lower-income families both as to physical plant and socio-economic factors, as well as the required number of units in the low-rental ranges. The Jury finds this proposal superior and acceptable.

b. Education. The Redeveloper will be required to designate land in the area which will be acquired and developed by the Atlanta Board of Education for the following education facilities:

(1) Two Primary School sites of three usable acres each, located on either side of the expressway.

(2) A Middle School of at least eighteen acres of usable land. This school site may be reduced in size to twelve acres if it is adjacent to the park.

As discussed in the site analysis above, the educational criteria are admirably met with three acres allocated for each of the two Primary School sites, one in the north and one in the south portion of the tract, and twelve acres allocated to the Middle School in the south portion of the tract adjacent to the existing park. The site plan for the combined Primary School and Middle School needs further study

to provide the essential play fields for which space is available.

c. Recreation. The Redeveloper will be required to designate at least six acres of usable land which will be acquired by the Atlanta Parks Department for the expansion of the existing park into a Neighborhood Park.

This criterion has been acceptably met.

d. Commerce. The Redeveloper may designate, acquire and develop a retail commercial area(s) not to exceed six acres of land primarily to serve the residents of the tract here under consideration.

The 3.7 acre Neighborhood Shopping Center in the north 32-acre portion of the tract, fronting on McDonough Boulevard, is well located in terms of both the neighborhood it serves and the proposed shopping center and the commercial development at McDonough Boulevard and Moreland Avenue. A 0.3 acre site for a gasoline service station at the southwest corner of McDonough Boulevard and Henry Thomas drive is also well located.

Two acres in a proposed Town Center have also been reserved for possible commercial development including a small "seven-eleven" type convenience grocery, such services as beauty and barber shops, medical offices and office space for attorneys. This brings the total commercial area to the permitted six acres.

In addition to these commercial facilities, the Town Center may contain a day-care center, an office for the management of the cooperative, storage facilities for maintenance equipment and a city "public services" office.

The National Homes Corporation will also seek the establishment of a church in the Town Center and reserves the right to sell a church site there at cost or less, under design and development controls acceptable to the Atlanta Housing Authority.

e. Streets and Utilities. The land designated in the Redeveloper's proposal for public streets which conform to the standards of the City of Atlanta will be acquired by others at no expense to the Redeveloper.

As pointed out in the site analysis, the public street system in the proposal of the National Homes Corporation is an excellent one, providing essential circulation and serving as a buffer along the sides of the tract facing the penitentiary and the railroad and the two sides of the expressway. The fact that the road system provides access to the property on only one side (which may be considered wasteful) is balanced by the fact that the street mileage is low.

No unusual storm-water drainage facilities are required.

f. Rentals - Amenities Relationship. The relationship between the rentals to be charged and the number of rooms per unit, the

size of rooms and other amenities to be provided by the Redeveloper.

The Jury computed the rent per square foot and the total cost per square foot of each type of unit proposed in those proposals that contained sufficient information to make this possible. In the opinion of the Jury, the proposal of the National Homes Corporation provides the best and most economical relationship between the rentals to be charged, the number of rooms per unit, the size of rooms and the amenities provided.

g. Acceptability of Public Facility Sites. The acceptability of the public facility sites to the agencies involved in their development.

The Jury considered it neither feasible nor reasonable to request the School Board to review the five proposals and, in each case, state whether the proposed sites for the two Primary Schools and the Middle School were acceptable to them. The sites for these schools in the proposal of the National Homes Corporation are well located in relation to the dwellings of the prospective students, are of the required size, are located on usable land and have easy pedestrian access. For these reasons, the school sites appeared to qualify for acceptance by the School Board.

The Development Competition statement required the designation of at least six acres of usable land "which will be acquired by the Atlanta Parks Department for the expansion of the existing park into a Neighborhood Park". This acreage has been provided.

The open space associated with the dwelling units will be owned and maintained by the Cooperative. In its site planning analysis, the Jury recommended that an equally satisfactory method for the ownership and maintenance of the commendably large amount of public open space not directly associated with the dwelling units needs to be developed.

Summary

The proposal of the National Homes Corporation has been unanimously selected by the Jury as best meeting the criteria established by the Atlanta Housing Authority for the redevelopment of federal surplus land to meet critical needs in the Thomasville Urban Redevelopment Area--Ga. R-22.

The above report of the Jury is respectfully submitted to the Atlanta Housing Authority.

William M. Alexander
William M. Alexander

Walter H. Blucher
Walter H. Blucher

Carl Koch
Carl Koch

Robert M. O'Donnell
Robert M. O'Donnell

Willard G. Rouse
Willard G. Rouse

Howard K. Menhinick
Howard K. Menhinick
Coordinator of the Jury

BRIEF BIOGRAPHICAL NOTES ON JURORS

WILLIAM M. ALEXANDER

Chairman, Board of Directors, Alpha Phi Alpha Building Foundation, Inc., Memphis, Tennessee

University of Pittsburg BSME

Vocational and Technical Education Teaching, St. Louis School System (38 years)

Mechanical Engineer, St. Louis Board of Education
General Construction Company -- part owner
Manager, Mechanical Maintenance and Rehabilitation, Jeffrey Realty Company, St. Louis, Mo.
Manager, O & A Company, Property Development Engineers, St. Louis, Mo.

Member, Board of Directors, Page Park YMCA, St. Louis, Mo.
and
Chairman of the Building and Housing Committee
(Now developing a Campus-type YMCA in the heart of Metropolitan St. Louis)

Member, American Institute of Housing Consultants

Member, Missouri Advisory Council for Vocational Education

Member, Advisory Committee for Technical Education, St Louis Junior College District

Projects of Alpha Phi Alpha Building Foundation, Inc., include the following:

1. Alpha Gardens Development, West End Urban Renewal Area, St. Louis, Missouri
2. Alpha Town and Alpha Village in same area are about to enter construction
3. Similar programs under 221(d)(3) are in advanced stages of preparation in Akron, Ohio and Los Angeles, California.

WALTER H. BLUCHER AIP

Planning Consultant, Arlington, Vermont

City Planner and Secretary, Detroit City Plan Commission, 1925-34

Executive Director, American Society of Planning Officials, 1934-53

Executive Director, Association of State Planning and Development Agencies, 1946-53

Executive Director, Southeastern Michigan Metropolitan Community Research Corporation, 1959-62.
Member, Michigan Bar
President, American Institute of Planners, 1956-57

Member, Board of Governors, Metropolitan Housing and Planning Council of Chicago
Consultant to numerous city, county, state and national agencies
Visiting Professor of Planning, University of Chicago and University of Illinois
Lectured on planning at more than 30 universities

Current Memberships include:
American Institute of Planners
Town Planning Institute of Great Britain -- Honorary Corresponding Member
Community Planning Association of Canada -- Honorary Member
Alfred Bettman Foundation -- Board of Trustees
Lambda Alpha (International Land Economics Fraternity)
National Industrial Zoning Committee
Visiting Committee, Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University.

CARL KOCH FAIA

Head Carl Koch and Associates, Boston, Massachusetts

BA., cum laude Harvard, 1934
M. Arch., Harvard, 1937

Senior Architect, National Housing Agency, Technical Division, Housing Standards and Prefabrication, 1942-44.

U. S. Navy 1944-46.

Member, AIA Committee on Residential Architecture

Past Member, Federal Housing Agency Demonstration Housing Committee

Consultant to Massachusetts Board of Housing

Lecturer and critic for past 15 years at Massachusetts Institute of Technology

Guest lecturer at numerous Universities

Numerous architectural awards, including
AIA Award of Merit in Residential Architecture, 1949.
Gold Medal in Architecture, The Architectural League of New York, 1953.
AIA Award of Merit, "Best Development House of the Year, 1954.
AIA House and Home Award of Merit, "Contribution to Better Homes for Living", 1956, 1960.
ALA-AIA National Book Committee Award of Merit, Library Buildings Awards Program, 1963.

ROBERT M. O'DONNELL AIP, ASLA

President, Harmon, O'Donnell & Henninger Associates, Inc.
Denver, Colorado

Graduate, Landscape Architecture and Planning,
University of Illinois, 1938.

Technical Advisor, NAHB & ULI
TB 40, "New Approaches to Residential Land Development", 1961.
TB 47, "Comparative Residential Land Use Study", 1963.
ULI TB 59, "New Engineering Concepts in Community Development:, 1967.

Member, FHA Experimental Section 233 Housing Committee, 1962-63.
Member, FHA Honor Awards Program Advisory Committee, 1963-64.
Member, Regional Advisory Committee on Design and Planning for Region V, Department of Housing and Urban Development, 1967 to present.

Member, The American Law Institute Advisory Committee on Public Control of Land Use and Land Planning, 1965 to present.

Member, HUD Urban Transportation Design Award Jury, 1968.

Member of:
American Institute of Planners
American Society of Landscape Architects
American Society of Consulting Planners
Sustaining Member, Urban Land Institute
Former President of
Colorado Institute of Planners
Rocky Mountain Chapter, American Society of Landscape Architects

WILLARD G. ROUSE

Executive Vice President and Member, Board of Directors, The Rouse Company, Baltimore, Maryland

With Equitable Life Assurance Society for 20 years.

Treasurer, Olin Mathieson Chemical Company

Trustee, Urban Land Institute.

Board Member of:
Maryland Fine and Specialty Wire Company
Arlington Federal Savings and Loan Association of Baltimore
Columbia Bank and Trust Company

Vice Chairman, Baltimore Regional Chapter of the American Red Cross

Devotes a large portion of his time to civic activities and community affairs

Elected "Man of the Year" by The Baltimore Advertising Club in 1955.

Has served as:
President, Maryland Chapter of the Arthritis and Rheumatism Foundation
Chairman, Baltimore Youth Commission
Chairman, Community Chest-United Appeal Campaign
President and Member of Executive Committee, Baltimore Area Council of the Boy Scouts of America.

HOWARD K. MENHINICK AIP

Director of Planning and Development, Keck & Wood, Inc., Atlanta, Ga.

B. S. Michigan State University, 1923
Master in Landscape Architecture in City Planning, Harvard, University, 1928

Instructor and Assistant Professor of City Planning, Harvard University, 1929-36

Director of Regional Studies, Tennessee Valley Authority, 1937-51

Director, Headquarters Planning Staff, United Nations, for Selection of UN Headquarters in the US (on loan from TVA) 1946.

Regents' Professor of City Planning and Head of the Graduate City Planning Program, The Georgia Institute of Technology 1951-1968. (Now Regents' Professor Emeritus)

Appointed Member, Atlanta Region Metropolitan Planning Commission, 1956-62

Distinguished Service Award, American Institute of Planners, 1966

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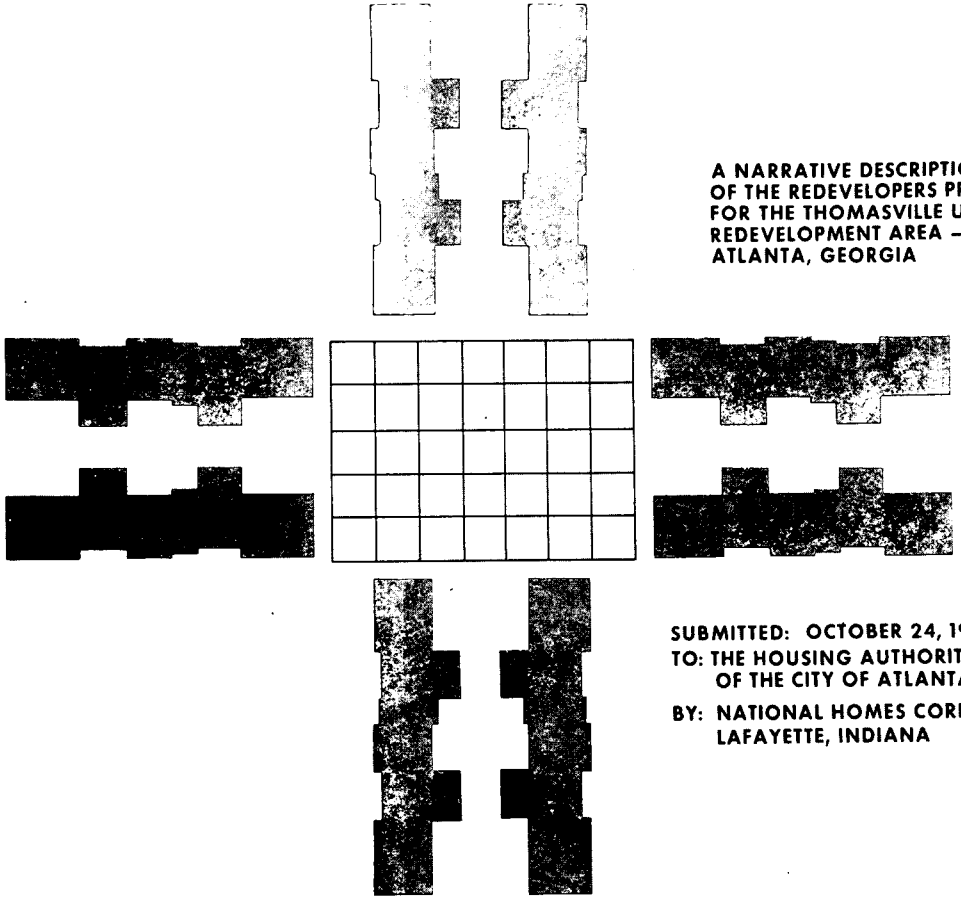


A NARRATIVE DESCRIPTION OF THE REDEVELOPERS PROPOSAL FOR THE THOMASVILLE URBAN REDEVELOPMENT AREA — ATLANTA, GEORGIA

SUBMITTED: OCTOBER 24, 1968

TO: THE HOUSING AUTHORITY
OF THE CITY OF ATLANTA

BY: NATIONAL HOMES CORPORATION,
LAFAYETTE, INDIANA

INTRODUCTION

Believing that neither conventional construction methods nor the simple erection of row after row of housing units can provide immediate solutions to our nation's urban housing problems, National Homes Corporation has concentrated on a "total environment" concept for creating new homes, new neighborhoods, new communities.

As the world's largest builder of manufactured homes, National Homes Corporation has combined its mass production technology with the specialized skills of nationally known urban planning consultants, architects, and landscape architects, to form a Redevelopment team whose proposal for this Thomasville project not only describes the housing facilities Atlanta needs, but also establishes a clear relationship between each unit and a total community pattern.

We appreciate the opportunity to present our proposals which we trust you will find in accordance with the specifications set down by the Housing Authority of the City of Atlanta, and we respectfully submit them for your consideration.

James R. Price

The Redeveloper's Team

The Redeveloper's team consists of:

National Homes Corporation
Lafayette, Indiana

National Homes Acceptance Corporation
Lafayette, Indiana

National Homes Construction Company
Lafayette, Indiana

Kenneth Treister, A.I.A.
Architectural & Urban Design Concepts
Miami, Florida

Professor James Whitehead
Sociological Consultant
Barry College, Miami, Florida

Edward D. Stone, Jr. & Associates
Site Planners & Architects
New York, New York

Kendree and Shepherd
Planning Consultants
Philadelphia, Pennsylvania

This team encompasses all the specialized fields required to plan, design, build and finance a total residential environment in which modern low density housing is the key element related to a complete community plan including educational, recreational, and commercial facilities.

This Proposal has been prepared in response to the Invitation for Proposals prepared by the Housing Authority of the City of Atlanta which (as amended) called for opening on October 24, 1968; and is addressed to:

THE HOUSING AUTHORITY OF THE CITY OF ATLANTA

M. B. Satterfield
Executive Director and Secretary

Edwin L. Sterne
Chairman

Lester H. Persells
Associate Executive Director

George S. Craft
Vice Chairman

Carlton Garrett
Director of Finance

Gilbert H. Boggs
Director of Housing

J. B. Blayton

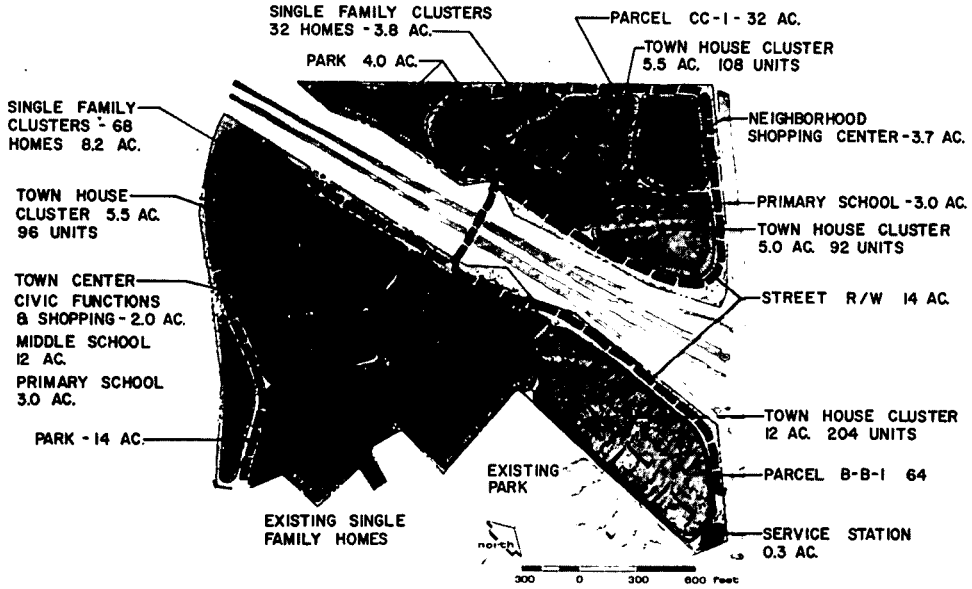
Frank G. Etheridge

Howard Openshaw
Director of Redevelopment

Jack F. Glenn

George R. Sander
Technical Director

GENERAL PLANNING CONCEPTS



REDEVELOPMENT PROPOSAL

National Homes Corporation proposes that the 96 Acres of Federal Surplus Land in the Thomasville Urban Redevelopment Area (Parcels BB1 and CC1) be redeveloped in accordance with the overall site plan shown on the opposite page and summarized on the chart below:

Type of Development	Parcel BB1	Parcel CC1	Total
Town House Units for Cooperative Sale	17.5	10.5	28.0
Single-family Units for Cooperative Sale	10.2	7.8	18.0
Small Shopping Center	–	3.7	3.7
Convenience Shopping Center	2.0	–	2.0
Gas Station Site	0.3	–	0.3
Elementary School Sites	3.0	3.0	6.0
Middle School Site	18.0	–	18.0
Park Site	6.0	–	6.0
Streets and Utilities	7.0	7.0	14.0
	64.0	32.0	96.0

This plan would provide 600 units–with from two to six bedroom. per unit–for low and moderate income facilities. The plan is basically oriented around families with growing children and we concluded that a minimum unit size of two bedrooms would yield the best family profile to fit the community facilities. Should the Housing Authority disagree with the conclusion, we could easily insert the desired number of one bedroom units. One of the unique advantages of our modular town house design is that it provides almost complete flexibility in the mix of units within a given site plan.

Residential Development

Type of Unit	*Sq. Ft.*	*Number*
Two Bedroom Town House	792	112
Three Bedroom Town House	1080	192
Four Bedroom Town House	1200	196
Subtotal		500
Three Bedroom Single-family	865	40
Five Bedroom Single-family	1080 (Fin.)	50
Six Bedroom Single-family	1200 (Fin.)	10
Subtotal		100
Total Number of Units		600

Note: The Bi-level houses used for the five and six bedroom houses contain 1440 sq. ft. Lower level space not needed for bedrooms will be left unfinished to serve as indoor storage and play areas.

Land Sale Provision:

National Homes Corporation reserves the right to sell the residential land at the FHA Valuation to a Cooperative Sponsor before construction, in conjunction with a construction contract to National Homes Construction Corporation calling for completion of development on the parcel sold. We also reserve the right to sell a church site on the town center at cost or less, under design and development controls satisfactory to the Housing Authority of the City of Atlanta.

COMMERCIAL DEVELOPMENT

Shopping Center: A 3.7 acre shopping center site has been planned to front on McDonough Street north of the Expressway Interchange. As now contemplated the center would consist of:

Supermarket	20,000 sq. ft.
Drug Store	8,000 sq. ft.
Misc. small stores	8,000 sq. ft.
Total Stores and a gas station	36,000 sq. ft.

Gas Station Site: A .3 acre site has been set aside for a gas station on the S.W. corner of McDonough Street and Henry Thomas Drive.

Town Center: 2.0 acres of the town center have been set aside for commercial development. The economic feasibility of this development is less certain than that of the shopping center, but tentatively we will try to develop:

A convenience shopping facility	2,400 sq. ft.
Group practice medical center	3,000 sq. ft.
Office and service building	3,000 sq. ft.
Total	8,400 sq. ft.

Land Sale Provision:

National Homes Corporation reserves the right to sell the commercially zoned land at a profit, under design and development controls satisfactory to the Housing Authority of the City of Atlanta.

SCHOOL SITES

National Homes proposal calls for the following school sites:

Elementary School Site on Parcel CC1	3.0 acres
Elementary School Site on Parcel BB1	3.0 acres
Middle School Site on Parcel BB1	12.0 acres

If named as the developer, we would request that planning begin immediately for these schools so that these needed facilities will be available as population builds up in the community.

PARK LAND

The 6.0 acre park site would be adjacent to the existing park and would be south of the school site and our proposed lake.

TIME SCHEDULE

National Homes Corporation proposes to purchase its land on the following schedule:

All the single family unit land	6 months after contract
Town House land north of expressway	1 year after contract
Town House land south of expressway	18 months after contract
Remaining residential land	2 years after contract
Commercial land	2 years after contract

This time schedule will be advanced if market response, allocation of Federal subsidy funds, and construction schedules permit.

SOCIAL OBJECTIVES

In preparing our proposals, the redeveloper's team has defined and worked toward the following objectives, which we believe are essential to the successful implementation of immediate and long-range community living patterns:

1. To bring the reality of decent housing and a wholesome environment within reach of a broad spectrum of low and moderate income families, and to assure that this decent housing will contain ample interior living space, to provide privacy for the individual within large and growing families.

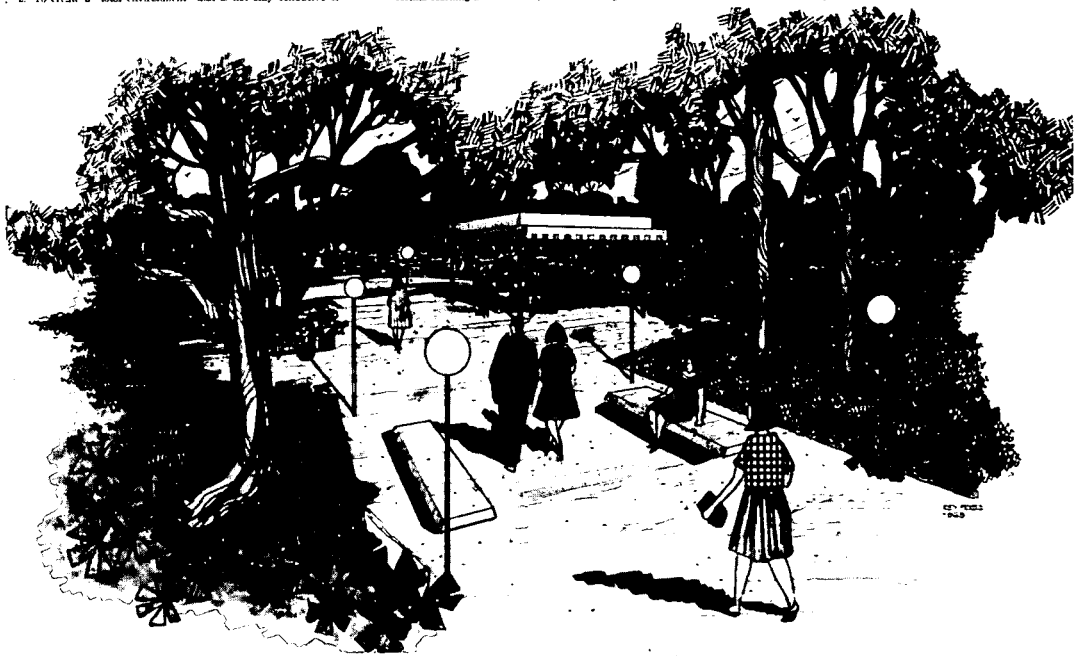
2. To create a "total environment" that is not only conducive to stable family relationships, but which also fosters harmonious interaction among families. The children's recreational facilities, tot lots, day care center, and the central activities spaces promote learning and recreation situations that are safe and can be supervised.

3. To stimulate social interplay among various income levels by establishing neighborhood "sub villages" through the spatial arrangement of the town house clusters. Within the community, these sub villages tend to provide residents with a solid sense of identity.

4. To educate the residents in the broadest sense, not only through formal learning in classrooms, but also through facilities where people can learn to live together creatively and productively. Adult education, youth programs, social service activities with the strong support of the City of Atlanta can enrich the life of each resident, and through them, the life of the community.

5. To create a sense of pride in ownership among the residents to eliminate the disenfranchised feeling that generates the ghetto cycle. With this pride of legal ownership comes a greater commitment to involvement in the total community to help solve its problems and share in its progress.

6. To combine all of the above objectives into a total plan that will quickly provide decent housing while establishing a wholesome environment and eliminating the conditions that contribute to urban decay.



COOPERATIVE HOUSING

National Homes Redevelopment Team has concluded that a Housing Cooperative embracing the entire residential community to be created on this land will provide the best answer to the social objectives, the physical planning problems, and the financial arrangements necessary to bring this housing within reach of the lower income families we hope to serve. If named as the redeveloper, National Homes will begin negotiations with the Foundation for Cooperative Housing to serve as the organizer and initial manager of the cooperative. FCH has organized and manages cooperatives all across the United States and in 13 foreign countries. While unwilling to give any redeveloper entering this competition an exclusive, FCH has indicated their willingness to work with the winning redeveloper.

Cooperative housing is a kind of half-way arrangement between renting and fee simple ownership. The cooperative member owns a share in the corporation which owns the project. The corporation gives each shareholder an occupancy agreement covering his unit which is renewable so long as he pays his monthly carrying charges and keeps the other covenants.

Each member receives income tax credit for the Cooperative's expenditures on taxes and interest, and accumulates a limited share in the equity of the Cooperative as the loan is paid down. The cooperative is democratically run and each tenant has a full voice in managing its affairs. Maintenance of the common areas, building exteriors and structures, and replacement of major appliances and equipment are the responsibility of the Cooperative. It maintains reserves for these items from funds collected each month from the members as part of their carrying charges. The day-to-day operation of the Cooperative will be supervised by professional managers, and the long-run operations are controlled by the FHA. The cooperative member has a deep sense of ownership, but is not subjected to the budget-wracking expenses inevitable in maintaining a single family home.

Rent Structure

Our redeveloper's team has concluded that the best financial program for reaching the low and moderate income families the Housing Authority of the City of Atlanta has indicated should be helped, is a 221(d) (3) Below Market Interest Rate loan, combined with a rent supplement program to bring housing expense within reach of lower income families. While such a program is provided for by law, it will require a great deal of enthusiastic support from the FHA local and regional offices.

If the required allocations of subsidy funds are not available, the program could proceed under Section 236 of the National Housing Act. We cannot be sure at this time that the project would be feasible under this section since the regulations had not been released when this proposal was prepared. If the required loan amount could be achieved, however, we would be faced with the rents shown below. 10% of the units in the project could then be sold to families nominated by the Housing Authority of the City of Atlanta. The Federal government would subsidize their carrying charges so they paid only the housing expense they would incur in Public Housing. The Cooperative could not, however, serve the same broad range of income levels it could under Section 221(d) (3) BMIR with a Rent Supplement.

Type of Unit	*No. Units*	*Repl. Cost*	*Total Repl. Cost*[3]	*221 (d)(3) BMIR Total Monthly Housing Expense*[1]	*221 (d)(3) BMIR With 60%*[2] *Rent Suppl.*	*Sec. 236 Est. Monthly Housing Exp.*[1]
2BR Town House	112	$11,500	$1,288,000	$ 97.00	$39.00	$ 85.00
3BR Town House	192	$15,000	$2,880,000	$125.00	$50.00	$110.00
4 BR Town House	196	$17,300	$3,390,800	$144.00	$58.00	$123.00
3BR Single Family	40	$15,000	600,000	$125.00	$50.00	$110.00
5BR Single Family	50	$19,000	950,000	$157.00	$63.00	$137.00
6BR Single Family	10	$19,500	195,000	$162.00	$65.00	$142.00

Note 1 Total monthly housing expense in this column includes all utilities. In practice occupants may pay utilities individually, in which case the carrying charges paid the cooperative would be reduced.

Note 2 Under our preferred financing plan, cooperative members would pay 25% of their monthly income toward their total monthly housing expense. The Rent Supplement would cover the difference, if any, between 25% of the members income and the monthly housing expense generated by his unit. Clearly this gives the cooperative a chance to serve a far broader segment of lower income families than the increased interest subsidy of Section 236 shown in the last column.

Note 3 Total of all residential replacement cost $9,303,800. Total Residential Construction Cost $7,796,345. Estimate cost of Commercial Construction $750,000.

SITE ANALYSIS

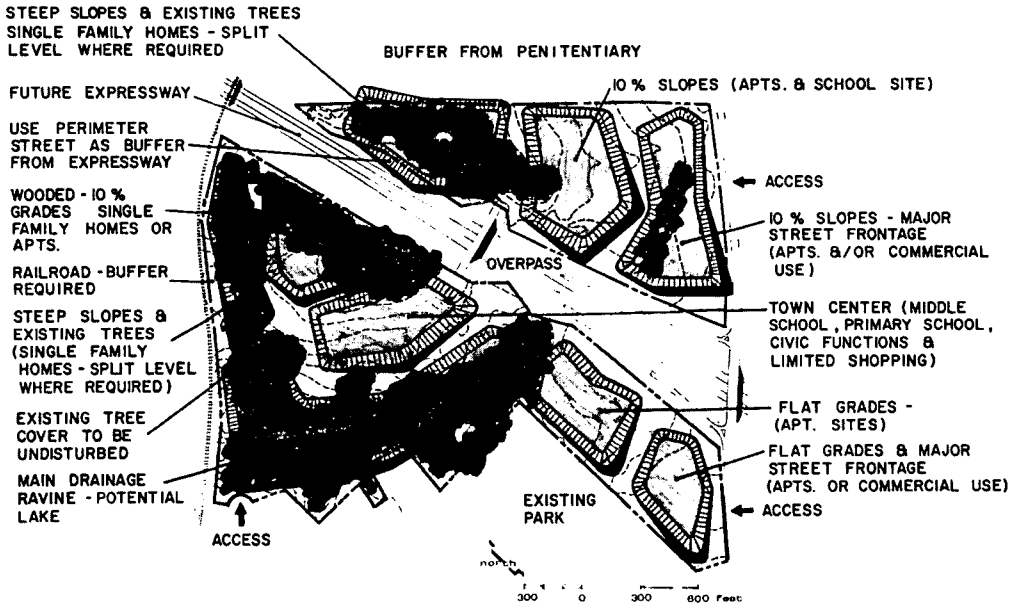
The site consists of two tracts totalling approximately 96 irregularly shaped acres which are contiguous to predominantly residential areas.

It is bounded as follows:

On the south by McDonough Boulevard, an existing park, and a single family residential subdivision; on the west by the railroad, and on the north by the Atlanta Federal Penitentiary.

The two segments of the site, which are bisected in an east-west direction by land allocated for a proposed expressway, will be connected by a vehicular-pedestrian bridge. The topography ranges from flat grades to slopes which, in the wooded areas, exceed 20% grades.

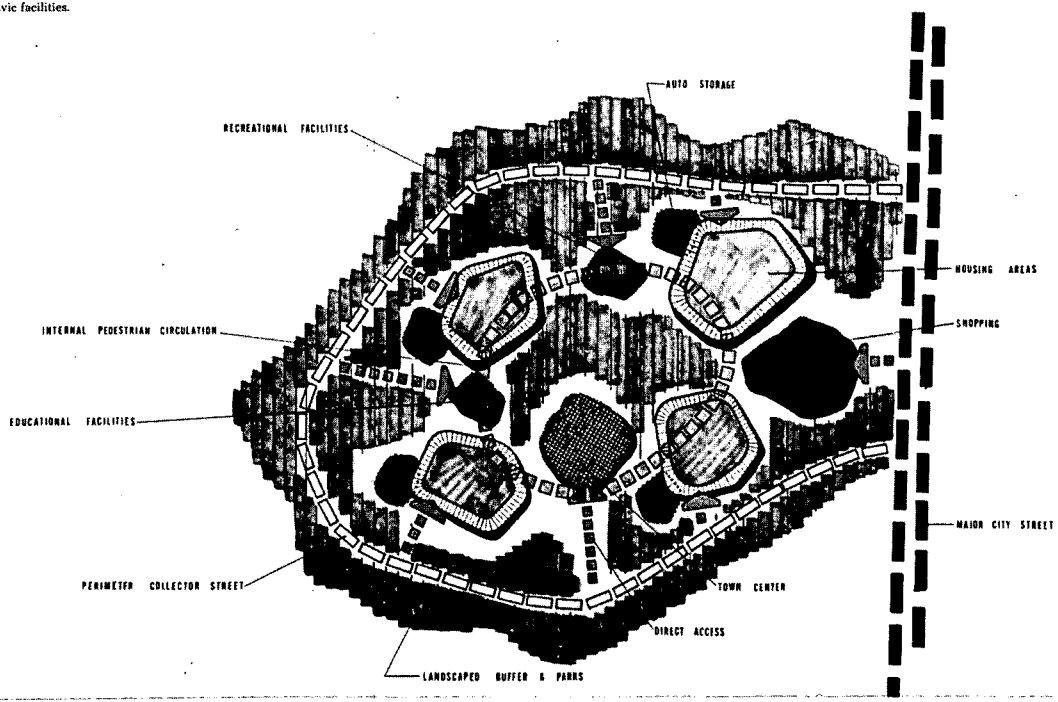
The site analysis map, then, represents the current state of conditions upon which we based our analysis and subsequent conclusions which are depicted in the proposed site development plan.



IDEAL FUNCTIONAL DIAGRAM

The ideal functional format expressed in this diagram includes those criteria which were deemed essential to achieve the programmed requirement of an optimum living environment. This optimum living environment consists of an economically and socially balanced residential complex complemented by harmoniously interacting educational, commercial, recreational and civic facilities.

The perimeter loop road gives the community a totally pedestrian orientation, while direct access to automobile parking promotes safety as well as aesthetically pleasant views from all living areas. A variety of existing spaces and corridors contribute to the community's uncrowded atmosphere and visual attractiveness.

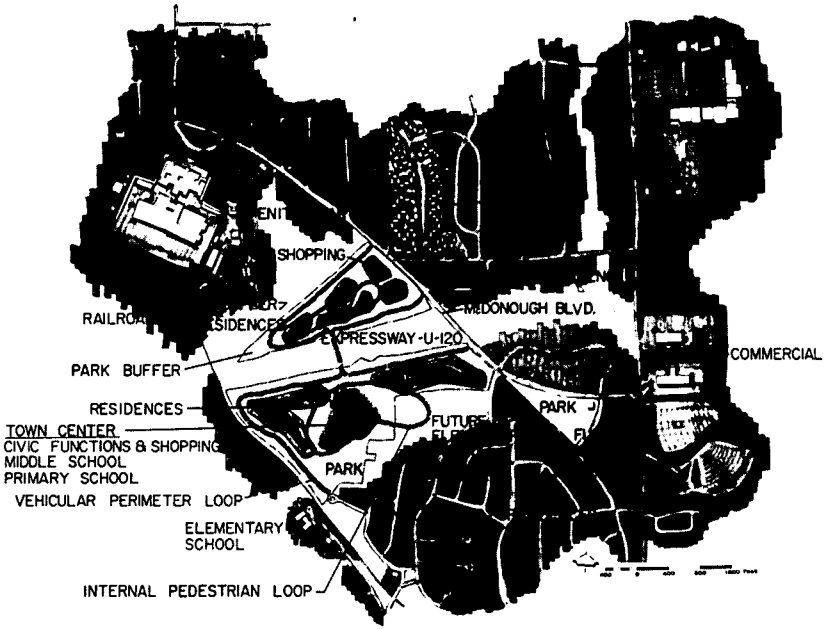


SITE RELATED FUNCTIONAL DIAGRAM

As shown below, the ideal diagram has been adapted to conform to the specific conditions of the site as it now exists.

This new diagram shows our proposed solutions for handling the major problems of the site: the railroad, the expressway, the penitentiary, and the drainage ravines, all of which were given prime consideration during the conceptual phase of the site development plan.

The existing land uses on the south and east have been recognized and extended into the project which, in effect, now makes the smaller neighborhoods an integral part of the adjacent community. The shopping area has been situated to serve as an easily accessible focal point of economic activity that is at once convenient to residents and compatible with the design aesthetics of the community.

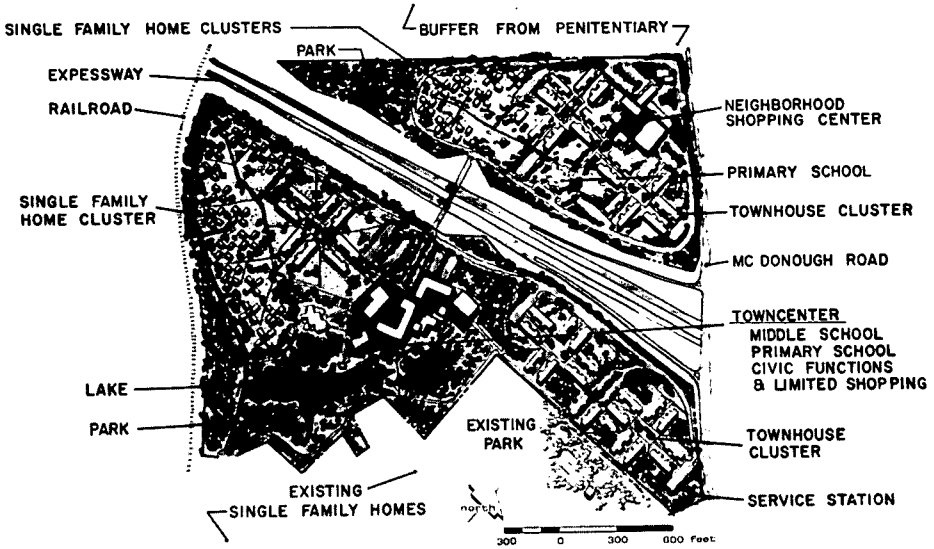


GENERAL CONCEPTS

The plan presents the designers' incorporation of sociological concepts, landscaping architecture, and mass production construction techniques to create a complete, balanced community of six hundred homes with ancillary facilities. Every facet of the total project has been evaluated upon the basis of its contribution to the sustained social, economic, and psychological well-being of the area's residents.

The complex is integrated with surrounding residential areas, but is buffered from the nearby penitentiary, railroad-industry areas, and expressway by perimeter roads and attractive landscaping.

In addition to affording the privacy of individual homes, the "total environment" concept provides the necessary common meeting and shopping places, schools, and recreational areas. The park-matrix—with safe, well-lighted resting and recreational areas—will link the homes to the town center or the shopping village in such a manner that residents will experience both open-park and urban atmospheres.



PEDESTRIAN AND BICYCLE CIRCULATION

The hierarchy of pedestrian flows through the residential clusters has been coordinated with the spatial organization of the architectural elements, the natural slopes and the landscaped areas.

The diagonal minor walks of 3' width answer the needs of running and bicycle-riding children. The secondary walks through the townhouse malls connecting them with the auto storage areas are 10' to 12' wide, both to permit groups to meander along at a comfortable pace and to serve as routes for emergency vehicles. Bicycle paths will parallel the main walks, separated by planting and slopes to minimize pedestrian-bicycle conflicts.

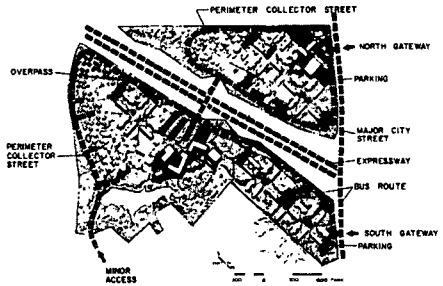
The internal pedestrian ways would increase in width as they progress from the single family homes to the urban spaces of the town center or the shopping village. Along the spine of the park-matrix, schools and play areas will create activity centers. These pedestrian walks will serve as the major linkage of the entire community. This will free residents from depending on automobiles in a community where many families will not be able to afford automobiles.

VEHICULAR CIRCULATION

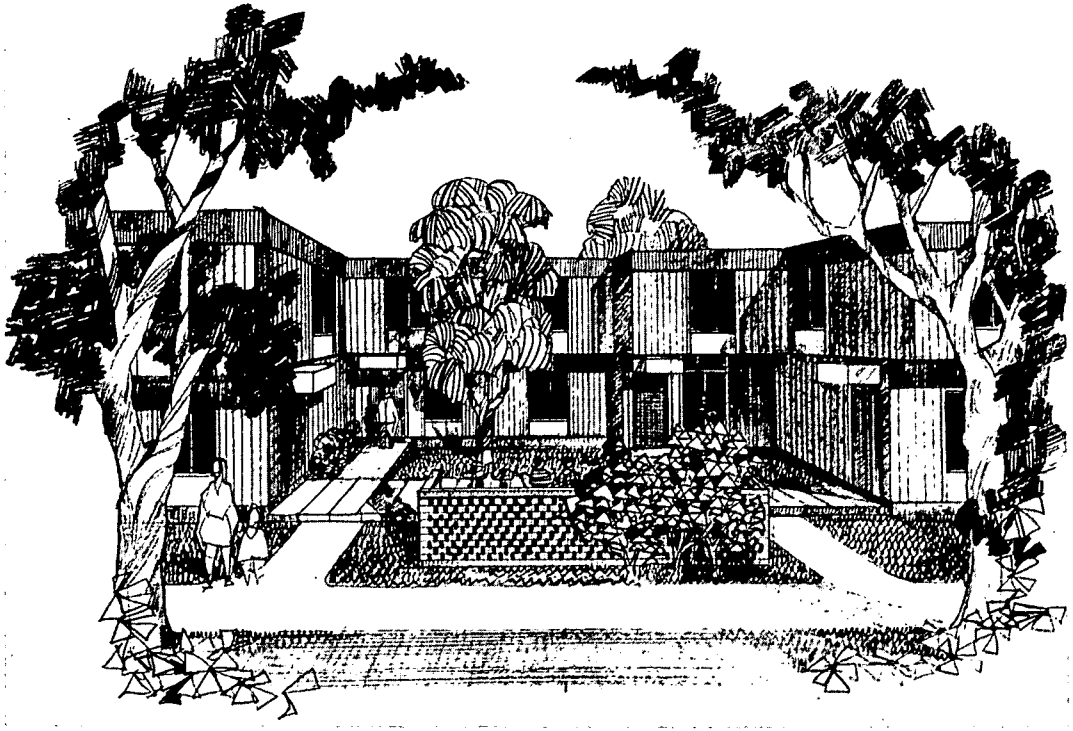
The perimeter loop system was chosen as the basic system of traffic flow for the following reasons:

a. The right of way provides an additional buffer from the non-compatible land uses to the North and West, and from the expressway which bisects the site.
b. The loop maintains a pedestrian oriented internal oasis which can be traversed with complex safety and by pedestrians and by children on bicycles.
c. All auto storage areas and auto arrival areas can be reached directly from the perimeter loop. The auto storage areas can be screened from view to maintain the park-like character established by the architecture and landscaping.
d. The loops, in conjunction with the expressway overpass, provides complete automotive access to all facilities and housing units without necessitating the use of McDonough Road, a major city street.

The bus service that presently exists along McDonough Road would be extended into the site to service the town center and the shopping village as the need arises.



GARDEN COURT ENTRY

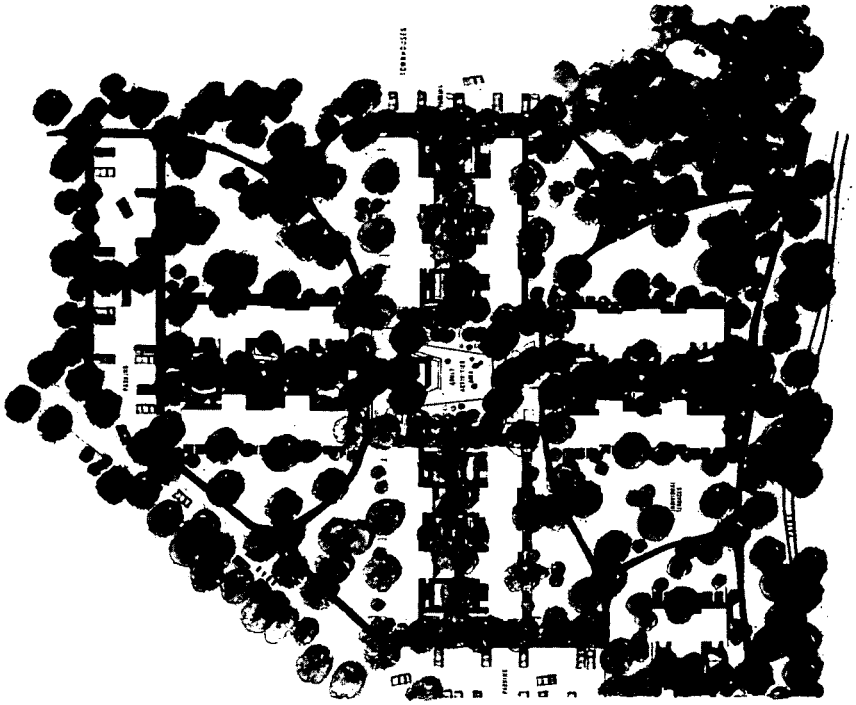


TOWN HOUSES

The 500 town house units are set in groups of approximately 100 units each, creating a series of readily identifiable "sub villages".

The placement of these structures permits an even flow of movement from the activities at the center, through the urban entry gardens, and into the woodland areas of the pedestrian way—creating a sequence of varied experiences.

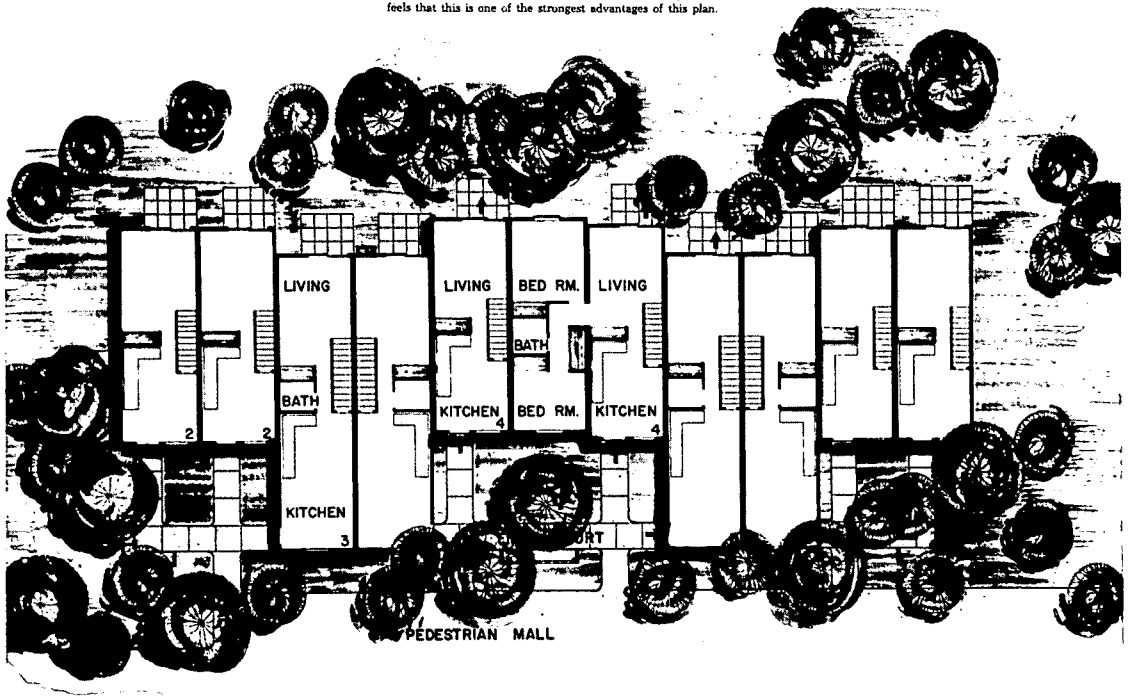
The pedestrian malls formed by the buildings will contain tot lots, sitting areas for adults, and will have residential scale night lighting. This landscaped mall, with its activities and entry gardens, is designed for the busy action of everyday living.



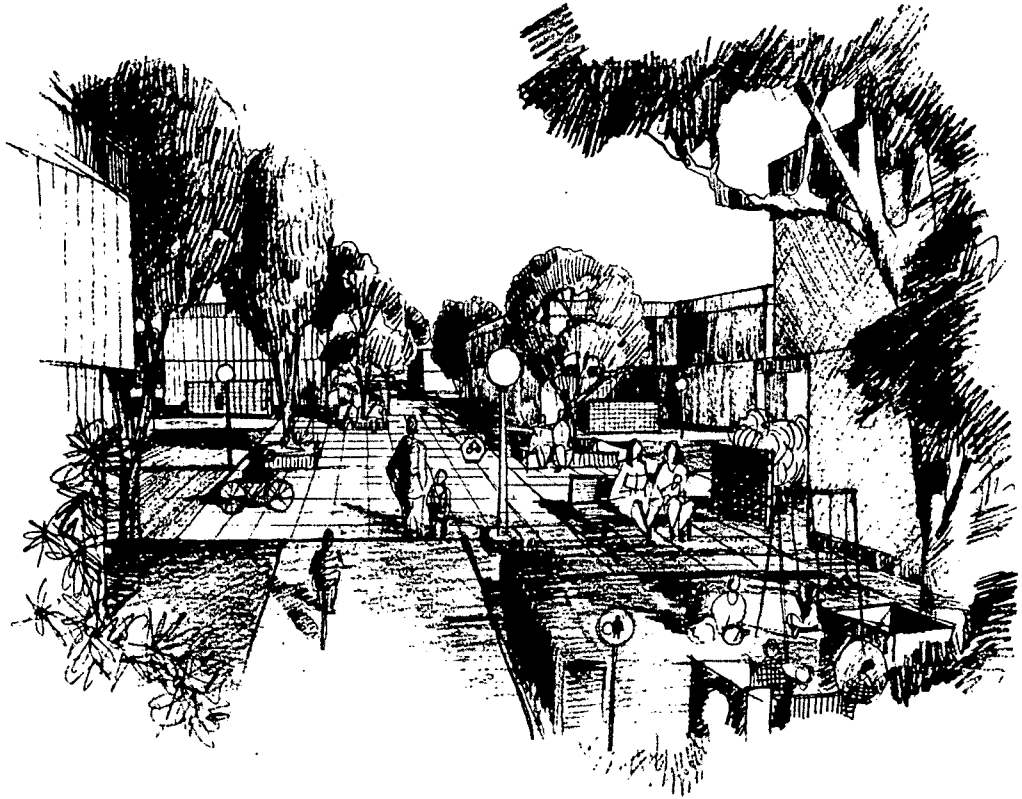
UNIT BUILDING DESIGN

The deep offsets in the mall sides of the buildings form entry gardens which give the sub-groupings of the units their own entity and transitional entry spaces.

On the outside faces, private spaces are created by garden fencing. The rear of each unit opens through glass sliding doors onto large open green spaces. No living space faces the living space of another unit, assuring a level of privacy usually obtained only in more expensive developments. The design team feels that this is one of the strongest advantages of this plan.



TOWN HOUSE MALL



TOWN HOUSE PARKS SPECIFICATIONS

Foundations

Crawl space. Reinforced concrete footings, poured concrete or reinforced floating curtain wall with piers providing a crawl space foundation.

Framing

All lumber complies with American Lumber Standards SPR 16 with specific grading standards. See accompanying specifications for details.

Windows

Sliding industrial grade HS-Al aluminum fin-trim windows.

Exterior Coverage

1. *First Floor*

A. .019 gauge baked finished aluminum vertical impressed batten sheet laminated to ¾ inch grooved exterior glue line plywood sheathing.

B. 1¾ inch natural quarried stone random ashlar pattern applied to ½ inch waterproofed glue line plywood sheathing.

C. Cavrock fiberglas brick mounted over ½ inch exterior glue line plywood.

2. *Second and Third Floor*

.019 baked finished aluminum, either vertical or horizontal impressed batten bonded to ¾ inch grooved intermediate density fibreboard.

Sound Conditioning

Each party wall consists of two separate framing systems. 2⅛ inches apart, firestopped at each floor and roof and resting on separate plates on separate steel I-beams. In addition, there is a total of 2 inches of fibre glass insulation between units.

Fire-Rated Party Wall

Common party walls are one hour fire-rated. Two hour fire-rated walls are provided when required.

Floors

14 mil vinyl sheet covering with vinyl foam inner layer and felt backing sheet, vinyl asbestos tile or indoor-outdoor carpeting.

Walls

Exterior perimeter walls covered with ½ inch fire core gypsum and ⅜ inch wall board with two coat vinyl acetate emulsion system in textured pattern; interior partition ⅜ inch gypsum board with finish as described above. Or, ¼ inch Lauan paneling with a two coat synthetic resin modified lacquer system. Both are permanent, washable finishes.

Roof

28 gauge sheet metal with 1¼ ounces of zinc per square foot galvanized applied over ⅜ inch plywood. .032 thick 5" aluminum gutters and downspouts with baked on vinyl enamel finish.

Interior Trim

Baseboard, ceiling cove, corner board, door jambs, stop and trim prefinished west coast pine. Baseboard in bathroom areas is 4" rubber.

Exterior Trim

Baked finished .019 gauge aluminum bonded to ⅜ inch exterior glue line plyscord.

Hardware

Exterior and interior lock and latchsets are Weslock 1100 Series meeting Federal Spec. FF-H-106A Series 160.

Insulation

Exterior walls/4" fibre glass with vapor barrier
Roof/6" fibre glass with vapor barrier
Lower floor/2" fibre glass with vapor barrier
Party wall/2" fibre glass with vapor barrier

Ceilings

Same as exterior perimeter gypsum walls.

Plumbing

Copper supply and brass waste piping, fibre glass tub and shower enclosures, porcelain toilets and lavatories, 40 gallon electric hot water heater.

Kitchen

Twin bowl enameled steel sink, grease trap, 12 cubic foot refrigerator, 30 inch electric range.

Electrical

Thin wall electrical metal tubing with Underwriters' Laboratory labeled devices and accessories.

Medicine Cabinet

Kent No. L1028A with welded shelves.

Also Included

Door bell, mail box, towel bars, toilet paper rollers, door stops, house numbers.

Trees

National Homes will provide three (3) shade and/or ornamental trees for each dwelling unit on the site. Trees will be a minimum of two inches (2") in diameter and 8' to 12' in height. Generally the trees will be placed as follows:

one (1) in front of each unit.
one (1) in each rear patio.
one (1) in general area of the site.

Patios

Each town house will have a 10' x 12' enclosed patio area. The hard surface will be striped asphalt. Wood chips in non-asphalt areas. Fencing will be 1" x 4" redwood or cedar 8" o.c. Each patio has #1—8' bench of 2" x 4" redwood or cedar on edge 3" o.c. and additional ½ bench in play or common areas.

Balance of area is to be sodded.

Exterior Lights

National Homes will provide one exterior light per dwelling unit.

Exterior lights will be placed in front of the dwellings and scattered throughout the site.

Parking

Asphalt parking stalls will be designed to be conveniently accessible to the dwellings and may be scattered or located in one area depending upon the site. Parking areas will be screened with fencing.

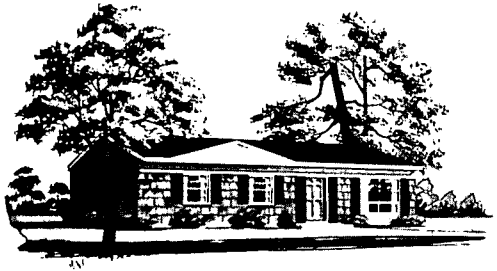
Play Areas

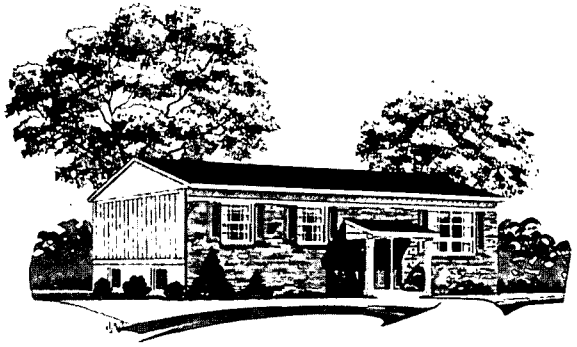
Each cluster will have one (or more dependent upon the number of dwelling units) asphalt paved play area. The play area will contain benches and play equipment.

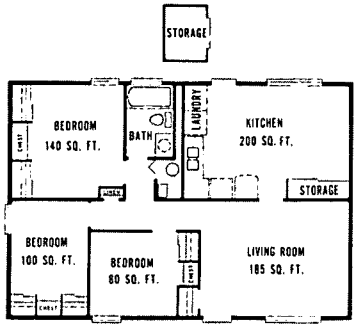
INDIVIDUAL HOMES

The 25 four-house clusters, each of which encloses its own central activities space, have more aesthetic appeal, and function more economically than standard house lots. The acres which would ordinarily be wasted on useless side-yards are put to much better use as common park land.

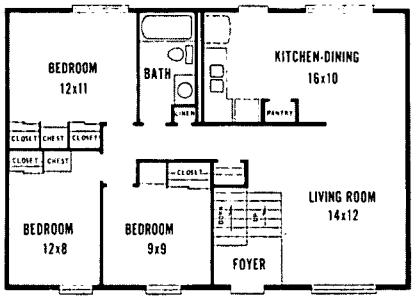
Because the kitchen spaces of every two houses open on to the same view, no unsightly storage areas are imposed on the neighboring house. The central space of each cluster provides a pleasant walk to the homes through garden courts.





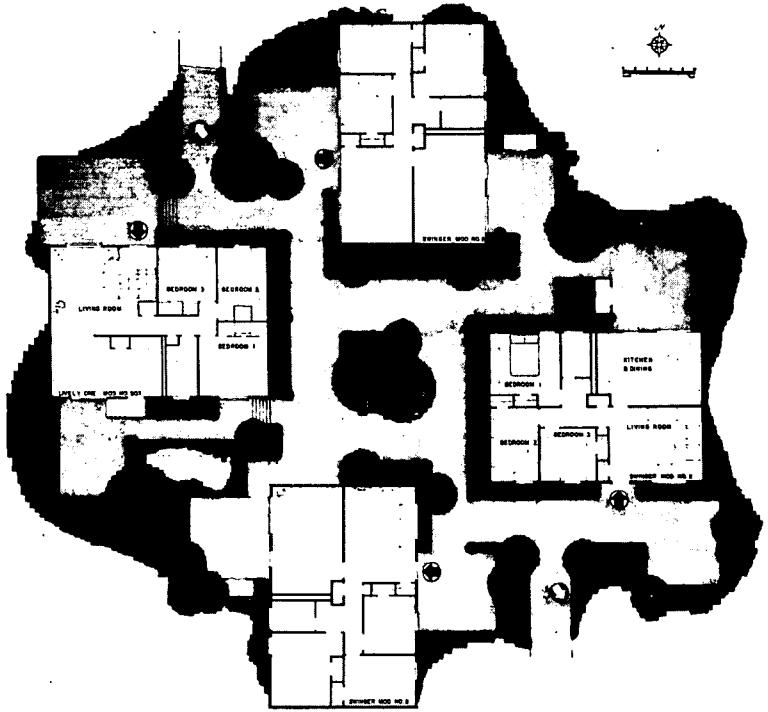


MODEL 500 48 X 24



MODEL 503 36x24

TYPICAL CLUSTER



SHOPPING VILLAGE

While the final design of the center will be dictated by the number and type of tenants the developer is able to interest in leasing space, the character of the center will be a "Mini-Mall," with landscaped pedestrian approaches in keeping with the park-like landscaping of the residential areas. The proximity of the shopping center to one of the town house clusters requires a higher standard of architecture than the concrete block and asphalt of the typical neighborhood shopping center. The major tenants will be a chain grocery and a drug store.

TOWN CENTER

The basic concept of the Town Center is a central mall moving from the parking areas through an "exploded" cluster of buildings to the overlook above the lake. The precise size and location of the buildings in the Town Center will depend on the response of tenants for general and professional office space. The architectural character of the center will be blended with the design of the Junior High School if this can be determined in time. We cannot urge too strongly that the auditorium and gymnasium facilities of the school be architecturally integrated into the Town Center.

The following facilities will be built as part of the cooperative: a day care center, an office for the management of the cooperative and storage facilities for maintenance equipment. Other community facilities we will seek will be a church, a group practice medical office, a small "seven-eleven type" convenience grocery, and general office space for attorneys, a city "public services" office, and services such as barber and beauty shops.

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COMMUNITY ACTIVITY FACILITIES AND RECREATION

The inherent social nature of a cooperative creates constant communication and interaction among residents, and we have evolved a plan which we hope will accentuate this community spirit. This natural socialization process should be constructively channeled into community programs that can contribute, over the years, to a creative involvement that should generate a sense of neighborhood pride and commitment.

We will try to arrange with the School Board to hold business meetings of the cooperative, as well as, formal group meetings such as P.T.A. sessions in the Middle School Auditorium. The churches and the day care center will also serve as indoor meeting places, while the open spaces, the passive recreational areas, and the central activities space of each cluster can serve as informal outdoor meeting areas.

Evening adult education courses in such areas as child care, family services, economics, and house planning can be held in the primary and middle school buildings, while the Middle School gymnasium can be utilized for teen dances as well as for sports.

The malls in the Town Center and at the Shopping Center form natural showcases for local art and, handicraft shows, and could be used for neighborhood carnivals and other festive community activities. Amateur theatre groups could perform at the Middle School Auditorium. These facilities are also suited for band concerts and special programs.

The tot lots, city parks, youth center and school playgrounds will allow for youngsters to play in supervised situations. Young children will also be able to play, under direct parental supervision, in the central activities spaces, while teenagers and adults can use the park areas and open spaces for picnics and hiking.

Of primary importance, we believe, is the establishment of a permanent Municipal Service Office at the Town Center by the City of Atlanta, not only for the purpose of helping the residents with their problems, but also to spark continuing participation by residents in the community's social and recreational programs.

NATIONAL HOMES AND SUBSIDIARIES

NATIONAL HOMES CORPORATION

Lafayette, Indiana

Founded in 1940, National Homes Corporation has produced more than 325,000 homes—far more than any other company in the world. Through nearly three decades of growth, the company has generated mass production techniques that have enabled it to create homes that meet state and national requirements for well below conventional construction costs. It has now evolved a new concept of factory-built modular components that enable the company to complete a new home at its site within one day.

National Homes employs more than 3,500 men and women, in capacities encompassing the entire spectrum of housing, manufacturing, construction and financing.

Town House Parks

With the urgency of our nation's urban housing problems accelerating each year, National Homes has directed a substantial amount of its corporate planning and construction energies into providing practical and immediate solutions in this field.

The first tangible result of this effort, which combines National Homes' mass production techniques with the environmental planning of a team of experts in site planning, urban architectural design, and landscaping, is to be found in Chicago at Town House Parks Homes at the corner of 50th and Blackstone, where a group of model low-density homes, complete with trees and landscaping, have been erected as prototypes, and have been viewed by more than 40,000 visitors in less than two months.

All of National Homes designs and materials have earned blanket approval under FHA and HAA Technical Bulletin #254.

Assets

National Homes working capital at September 30, 1968 amounted to $25,000,000. The ratio of current assets to current liabilities at September 30, 1968, was 4.62.

Net worth of the Company at September 30, 1968 was $43,000,000.

Ownership of the Company

National Homes Corporation is a publicly-held company. Its stock is listed on the Midwest Stock Exchange. No individual shareholder owns more than 10 per cent of the outstanding common stock. Holdings of the Price family represent 21 per cent of the shares.

Corporate Structure

The parent company has its general offices and main plant at Lafayette, Indiana, and divisional operations at Horseheads, New York, and Tyler, Texas. Its manufacturing subsidiaries are: Knox Homes Corporation, Thomson, Georgia; W. G. Best Homes Corporation, Effingham, Illinois; Lesco Homes Inc., Martinsville, Va.; and Sportcraft Mobile Homes, Inc., Clearwater, Florida. The company also owns and operates a cabinet plant at New Albany, Indiana.

Directors

James R. Price, Chairman

Roger D. Branigin, Governor
State of Indiana

H. Wallace Evans
Retired Treasurer
E. I. Dupont de Nemours
& Co., Inc.

Frank P. Flynn, Jr., President
National Homes Acceptance
Corporation

Leigh R. Gignilliat, Jr.
Rodman & Renshaw

O. C. Grimes
Realtor and Builder

Karl H. Kettelhut
General Contractor

Guy C. Kiggo,
Retired Vice President
First National Bank of Chicago

Julian Kiser, Chairman
Kiser, Cohn and Shumaker

Frank McKinney, Chairman
American Fletcher National Bank
& Trust Company

George E. Price, President
National Homes Corporation

Michael T. Ricks, Partner
Stuart, Branigin, Ricks and
Shilling

Dr. R. B. Stewart,
Vice President, Special Projects
Purdue Research Foundation

Dr. Arthur M. Weimer
Special Assistant to the President
Indiana University

NATIONAL HOMES ACCEPTANCE CORPORATION

Lafayette, Indiana

NHAC, one of the largest mortgage bankers in the nation, provides construction loans and permanent mortgages on single family, multi-family, and commercial projects throughout the country. It has consistently given qualified borrowers access to mortgage financing, no matter how tight the existing money conditions.

Founded in 1947 to see that no National Homes project would lack financing, National Homes Acceptance Corporation and its wholly owned insurance subsidiary now service approximately 300 investors with more than 70,000 mortgages at a total value of over $700,000,000.

This servicing requires NHAC to collect the borrowers' monthly payment, pay the principal and interest to the investor and maintain escrow accounts—for payment of taxes and insurance due on the property.

To maintain accurate and readily accessible records of the thousands of loans, NHAC utilizes the most advanced electronic data processing equipment.

A wholly owned subsidiary of National Homes, NHAC has its headquarters in Lafayette. Regional offices are located at: Orlando, Florida; Jacksonville, Florida; New Orleans, Louisiana; Atlanta, Georgia; Columbia, South Carolina; Louisville, Kentucky; Martinsville, Virginia; Kansas City, Missouri; Columbus, Ohio; Detroit, Michigan. Branch offices are located at: Davenport, Iowa; Joliet, Illinois; Danville, Illinois; East St. Louis, Illinois; Gary, Indiana; Indianapolis, Indiana; Toledo, Ohio; Dayton, Ohio; Warren, Ohio; Cleveland, Ohio.

NATIONAL HOMES CONSTRUCTION CORPORATION

Lafayette, Indiana

A wholly owned subsidiary of National Homes Corporation, National Homes Construction will build more than 1,100 single family homes in 1968, and has plans for increased production in 1969. NHCC's 18 building operations include locations in Cobb, De Kalb, Clayton and Fulton Counties in the Atlanta, Georgia area.

National Homes Construction's pattern of growth clearly indicates increased concentration in the construction of multi-family homes and manufactured schools, as evidenced by the $20,000,000 worth of business the company has contracted for in these fields in 1968.

PLANNERS' TEAM

Professor James W. Whitehead, B.A.; M.A.; M.S.W.

Sociological Consultant
Miami, Florida

Masters Theses:

The Negro Population of Atlanta, Atlanta University, August 1958. *A Descriptive Analysis of the Administrative Structure and Process of Germantown Settlement, Philadelphia, Pennsylvania, School of Social Work,* Atlanta University, May 1960.

As Executive Director of the Greater Miami Urban League (1962-1964), Professor Whitehead's duties included agency supervision of programs in housing, employment, education and health and welfare service.

Working with the Intergroup Relations Department of the Dade County Renewal Agency (1964-1967). Professor Whitehead had direct responsibility for social service programs, intergroup relations, and special relocation problems. He maintained close liaison with leadership in the Negro community for the purpose of keeping Negro leaders informed of project developments while working toward successful execution of the Urban Renewal Program. His responsibilities during this period also included planning and relocation services for families displaced by all forms of governmental action. In this capacity he also conducted site occupant and housing resources surveys. He also coordinated activities with the local Housing Authority and with all governmental agencies contemplating displacement of families.

Kenneth Treister, A.I.A.

Architectural & Urban Design Concept
Miami, Florida

In addition to designing many residences featured in national media, Mr. Treister has been active in the institutional field. He has designed a Municipal Park for the City of Miami, and two elementary schools for the Dade County School Board, one of which received recognition in Nation's Schools and several other national publications.

Commercial work includes many professional, medical, general office buildings, hotels, and condominiums.

As Chairman of the City of Miami's Citizen's Advisory Committee in 1965, 1966 and 1967, Mr. Treister has been active in guiding the city's policies concerning slum clearance and neighborhood rehabilitation; advising the city on the proposed Urban Renewal Program; and advising the City's Planning Department concerning the Community Renewal Plan. As the architect for the Elizabeth Virrick Village for the City of Miami, Mr. Treister not only was the architect for the facilities, but designed a long range sociological program for the upgrading of the slum area in Miami's Coconut Grove area, which has served as a model for community development. This project received a Gold Medal Housing Award from NAHRO.

Mr. Treister's experience in low cost urban housing with the Housing Corporation of America Turnkey Program qualifies him as one of the nation's most authoritative architects in this field.

Edward D. Stone, Jr. & Associates

Site Planners and Landscape Architects
New York, New York; Ft. Lauderdale, Florida

Edward Stone, Jr. & Associates has enjoyed a distinguished international reputation for projects ranging in scope from detailed site and landscape development, to comprehensive master planning and design for educational institutions and urban areas.

The firm's creative planning team is comprised of architects, landscape architects, civil engineers, ecologists, and specialists in related fields.

A random sampling of the company's projects would include: *Governmental and Civic Projects:* New York Civic Center, New York, N.Y.; National Arboretum Entrance, Washington, D.C.; North Carolina Legislative Building, Raleigh, North Carolina; United States Embassy in New Delhi, Ambassador's Residence, Auxiliary Office Building and Staff Quarters, New Delhi, India; Electronic Research Center, National Aeronautical Space Administration, Boston, Massachusetts; State Office Building Complex, Providence, Rhode Island; President's Palace and Secretariat Complex, Islamabad, Pakistan; United States Post Office, Washington, D.C.

Hospitals: Valley General Hospital, Renton, Washington; Armed Forces Institute of Pathology, Washington, D.C.; Eisenhower Medical Center, Palm Desert, California.

Parks: Las Piedrecitas, Managua, Nicaragua; Walt Whitman Park, Washington, D.C.; Rinconada Park, Palo Alto, California.

Cultural Centers: John F. Kennedy Center for the Performing Arts, Washington, D.C.; Garden State Arts Center, Woodbridge, New Jersey.

Highway Beautification: Baltimore-Washington Parkway, D.C. Line to South Dakota Ave., Washington, D.C.; Rock Creek Parkway (Relocation), Washington, D.C.

Educational Institutions: Alaska Methodist University, Anchorage, Alaska; State University of New York at Albany, Albany, New York; Brooklyn College, Brooklyn, New York; Von KleinSmid-Center, University of Southern California, Los Angeles, California; New York Institute of Technology, Old Westbury, Long Island, N.Y.; Peabody Institute, Baltimore, Maryland; Dormitory Complex, University of Kentucky, Lexington, Kentucky; Nova University, Fort Lauderdale, Florida; Pakistan Institute of Nuclear Science and Technology, Islamabad, Pakistan; University of Islamabad, Islamabad, Pakistan.

Museums and Expositions: Inter-American Trade and Cultural Center (INTERAMA), Miami, Florida; Julimar Farm Exhibit, New York World's Fair, 1964-1965, Flushing Meadow, New York; Museo de Arte de Ponce, Ponce, Puerto Rico.

Commercial Projects: Bank of America, Salinas, California; General Motors Building, New York, N.Y.; Pepsico Corporate Headquarters, Harrison, New York.

Apartment Developments and Sub-Divisions: Town Plaza Apartments, Lubbock and Midland, Texas–Roswell, New Mexico; Housing for the Elderly, Miami, Florida; Nassau View Apartments, Nassau, Bahamas, B.W.I.

Kendree and Shepherd Planning Consultants

New York

Charles C. Shepherd, AIP, Partner-in-charge.

Kendree and Shepherd Planning Consultants was organized in 1955 in Philadelphia, Pennsylvania. The firm now employs approximately fifty personnel, the majority of whom have degrees and experience in City Planning, Architecture, Landscape Architecture, Engineering, and other planning related backgrounds including Economics and Sociology.

The firm currently maintains offices in Philadelphia and Pittsburgh, Pennsylvania; Newark, Delaware; Jamestown, New York, and Miami, Florida. Previous offices included Ponce, Puerto Rico and Frankfurt, Germany.

Kendree and Shepherd Planning Consultants provide a wide range of services including Master Planning, Urban Renewal and Housing Consulting, Site Planning and Site Location Studies, Economic Feasibility Studies, and Campus and Military Facility Planning. The firm has been Consultant on Urban Renewal and Housing programs to over 250 communities including many major cities such as Philadelphia, Pittsburgh, and Chester, Pennsylvania; District of Columbia; Chicago; Wilmington, Delaware; Roanoke, Virginia; Camden and Trenton, New Jersey; and Ponce, Puerto Rico. The firm has also served as Consultant to several major corporations who are primarily engaged in the provision of housing both in the United States and abroad.

COMPARABLE PROJECTS

National Homes Has 7000 Urban Housing Units Now In Process

The following list of current low income housing projects shows the scope of National Homes' commitment to housing our urban population. The projects listed are being constructed with National Homes' manufactured components, are being constructed by National Homes Construction Corporation, and (in most cases) are being financed by National Homes Acceptance Corporation.

Chicago, Illinois

National Homes is completing the first 100 units of a series of Town House Parks to be constructed for the Chicago Dwelling Association, and which will ultimately encompass some 2,000 units.

Indianapolis, Indiana

One of the first Public Housing Turnkey Projects in the country, Salem Village, is nearing completion. 250 units.

Planning and zoning for a Planned Unit Development covering a 160 acre tract, complete with schools and convenience shopping, are nearing completion. 1,500 units.

Lafayette, Indiana

The financing for a moderate income rental project on a nine-acre parcel in National Homes totally planned community, Vinton Highlands, is being processed through FHA. 162 units.

Newark, New Jersey

Under the auspices of the Prudential Insurance Company, National Homes Corporation is erecting a demonstration Town House Park. We are site planning a 7 acre Urban Renewal Site, and eventually expect to develop 100 acres in the City of Newark. 2,500 units (estimated).

Elmira, New York

National Homes has been named as the Preferred Redeveloper on 12 acres of residential land in the Heritage Park Urban Renewal Area. This will be a moderate income cooperative sponsored by the Foundation for Cooperative Housing. 210 units.

Detroit, Michigan

National Homes is one of five manufacturers erecting demonstration projects for the Metropolitan Detroit Citizens Development Authority. First prize: 800 units; second prize: 200 units.

Rochester, New York

A 221 (d) (3) Below Market Interest Rate project is nearing completion under the sponsorship of the Metropolitan Rochester Foundation. 101 units.

A second project is now under way for Metropolitan Rochester Foundation. These units will be leased to the Rochester Housing Authority. 74 units.

Durham, North Carolina

Construction is under way on a turnkey project of single family homes for the Durham Housing Authority. 77 units.

Atlanta, Georgia

National Homes Construction Corporation is winding up construction of 60 single family homes in the Thomasville Urban Renewal Area, adjacent to the parcels covered in the proposal.

Chairman BOLLING. Our next witness will be Mr. Richard H. Rosen, President of Urban Systems, Inc., of Boston, Mass.

Mr. Rosen, we are glad to have you with us and grateful that you came, and you may proceed as you wish.

STATEMENT OF RICHARD H. ROSEN, PRESIDENT, URBAN SYSTEMS, INC., BOSTON, MASS.

Mr. ROSEN. Thank you very much, Mr. Chairman.

I think before beginning my opening remarks, I would like to refer in part to some of the comments that Congressman Reuss made earlier in his questions to the other gentlemen.

It is my experience that there are a number of confusions which mitigate against sensible analysis of the entire urban problem, especially with respect to housing. The first of these is a complete misunderstanding of the whole concept of economies of scale. In this respect I would like to refer to the point which Congressman Reuss made and to attempt to attribute the areas of potential economy to their actual source and to refer perhaps even more specifically to the question that he raised with regard to single-family homes.

First, it seems to me that economies of scale can be derived from three sources. The first source is just a pure economy owing to quantity purchasing power. If you go the General Electric Co. small appliance or housing appliance division and say I will buy that production run for a given period of time, you will probably enjoy a substantial cost savings. Everyone likes a reduction in uncertainty and everyone likes to operate at an optimum level of production. The general efficiency of the large single family homebuilders in the United States whose costs range from my experience between 6 and 11 dollars a square foot for pretty damn good housing is significantly due to their ability to enjoy mass purchasing economies.

I did not have an opportunity to read the testimony that the gentleman that you had here from Levitt gave, but I have enough personal experience with Levitt and other individual homebuilders to recognize that at least half of any possible economies derive from that effect specifically.

Secondly, I think that the single-family homebuilding industry, the large builders (I am not talking about the 106,000 small homebuilders in the United States, most of whom build fewer than 15 or 20 houses), like Levitt, like Ryan Homes, like some of the others who enjoy substantial managerial efficiency largely as a function of being able to afford professional management in terms of job organization. It is clear that professional management is really the second source of saving independent of any particular technology.

Now, to the extent that a particular technology might enhance that saving, it can be of real interest. I think from some of the remarks that appear in your own documents of this committee of the April proceeding and certainly in what has been published in the literature in general that the opportunity for cost saving in systems per se as opposed to job organization and material supply are a function of the size of the job itself.

What I am going to say here in the next few minutes is really an indictment of potential large-scale building systems development in

ing rules, so that where land is cheap, generally speaking, density is United States. It will be a description of natural inefficiencies owing to very primitive industrial organization of the housing industry in this country.

I also would like to preface my opening remarks with a feeling that there is not going to be any real housing industry in the United States unless we do something about stabilizing that industry from interest rate fluctuation. I think that the cyclical variability which affects construction in general and housing in particular causes such a high level of instability in the industry that it makes it almost impossible for any kind of managerial overhead to be developed sensibly.

Representative BOLLING. May I interrupt you at that point to get your suggestions as to what kind of things should be done, what type of approach should be used to insulate the housing market from the cyclical impact of interest?

Mr. ROSEN. OK. Well, one opportunity might be for the Government to produce essentially a housing bank which would agree to purchase a certain number of housing units each year above and beyond some given average number, and I am not specifically sure now that formula could be determined off the top of my head. But it seems to me that there is an opportunity in that respect to insulate the industry.

I think a second way is to provide some capital security. One of the problems that Mr. Price referred to which I also refer to in the testimony that I shall deliver here, is the problem of land acquisition. It is clear to me that you are not going to get any extensive large-scale development in the United States unless in one way or another we make it easier for developers to assemble parcels of land large enough to develop economies on site. There is a natural reticence on the part of any developer, who tends to be capital poor under the present structure of the housing industry, to make these kinds of investments. Essentially the problem of the job of land assembly is largely one of option trading as a means of essentially minimizing capital requirements. What this shortage of land does is to present so much instability to developers that they have no opportunity to make manufacturing investments per se which might in effect lead to the adoption of a particular industrialized system.

Representative BOLLING. Again, do you have an idea as to what kind of approach?

Mr. ROSEN. There is a lot of talk, about air rights for example, but it seems to me that a large number of potential sites in the future in urban areas are going to be air-right sites, and there is no real mechanism in many places to use these sites. Where these mechanisms exist they are in the hands of municipal authorities or quasi-public bodies or perhaps under the jurisdiction of the bureau of public roads or the State departments of public works or what not. It seems to me that all the air rights ought to be in the public domain because they are fundamentally a public good, and there should be some rational way of distributing these air rights to the public. I think that is one source of potential sites and I think that that is a real source which could be relatively insulated against any speculative uncertainty that is generally associated with land prices.

When I conceived of viewing housing as a production process, really finds that the cost of land in any one area is directly a function of zon-

ing rules, so that where land is cheap, generally speaking, density is low. Where land is high, density is high. I did a study a year ago for the New York State Urban Development Corp. which looked specifically at opportunities for site development in Metropolitan New York and I found that the economic theory which says that prices should be equated at the margin for land of given use was in fact true if you just translated the density differences existing in one part of Metropolitan New York to another. So that there really was no effective difference in land zoned for one purpose in Metropolitan Manhattan, the Bronx, all the way out, 50 or 75 miles on Long Island and up into Westchester County. I think this is very interesting because it effectively confirms that the change in land prices is a function of the change in rules associated with the use of the land itself.

Now, with respect to one other thought I have as far as specific recommendations are concerned, it is my experience, again as a result of dealing with a large number of our clients, who represent several of the major corporations of this country, the prime inability, or the prime lack of willingness on the part of companies or firms to adopt new technology is that there is a high level of uncertainty associated with it, and managers of large-scale institutions are risk adverse. To the extent that they are risk adverse that means that any potential saving which might accrue as a result of the use of an industrialized technology must be substantial (it has to represent a substantial saving, maybe 30, 40, or 50 percent) before any manager in a large-scale institution is going to risk his job for the sponsorship of that system.

Now it is clear from the European experience that these savings will not be much more than 20 to 30 percent, perhaps 35 percent, once well developed. Well, once developed in the case of the European system has meant for example in the Czech situation 15 or 20 years and in some of the other situations 10 or 15 years. So it is unlikely that you are going to get any natural adoption by companies of industrialized systems, given the relationship between risk and uncertainty and the relative level of available cost savings with respect to the time period required for its realization.

I can allude specifically to a very large client of ours who is faced with this dilemma right now. They will, I am sure, enter the housing industry not with a true system per se so much as they will enter the industry with their managerial capability and financial resources, because with 8.5 percent, 9.5 percent interest, the ability to offer all kinds of innovative financing gives one a substantial comparative advantage over someone who certainly has no access to that kind of financing.

Well, with those few statements in mind, I would like to introduce myself, perhaps a little bit more formally, and say a couple of things with respect to what I feel is a sensible way of viewing the housing problem in terms of formulating useful public policy.

I have the good fortune to work along with John Collins, who was mayor of Boston and had some success in rehabilitating the city of Boston when he was employed in that responsibility. As you know, he is now associated with MIT and is chairman of the board and very active in the management of our company. In addition to my duties as president of Urban Systems, I also teach at Harvard University.

When I conceived of viewing housing as a production process, really as a means of developing sensible policies to encourage the adoption

of technology in housing, I noted that there were two ways to generate improvement and efficiency. The first was to change the relationship of inputs—capital, labor, and materials—while the second was to determine the constraints which operate on the production process and develop ways and means of relaxing these constraints so as to effect an increase in output and a decrease in cost.

I discarded the first, a purely technological view of the problem, as being inadequate because housing is much less a problem of technology than it is a social process. Many people ask why we can employ technological resources and systems analysis to get us to the moon in a relatively short period of time and cannot similarly apply these resources to the problem of efficiently housing the people of the United States.

The constraints on the moon flight were almost exclusively resource restraints: money and trained personnel. Economists have known for a long time that an increase of resources in a particular area will relatively quickly develop the required technologically competent people to earn the high wages.

Improvements in the housing process do not depend on the commitment of resources alone. They depend on the ability of the Government to provide sufficient incentives along with the required resources to encourage the people who comprise the political and social institutions, whose behavior constrains efficient housing, to change their actions to those which will enhance efficient housing development. And I think we have some models for these to which we can refer. I think that given our specific objective here of really reorganizing the industry, allowing the industry to operate within a market context and efficiency basis, that we really have to look almost completely to a system of public policy which examines the incentives that are opened to the various parts of that particular industry.

I feel that analysis of housing must proceed from the constraints that impede the production of low-cost housing and inhibit the development and application of technology to improve efficiency. At this point I might say that if there were so many opportunities for tremendous cost saving, at least a few of the 106,000 firms who make up the homebuilding industry in America would be smart enough to realize that there were these improvements in efficiency possible. Given a number of reasonably intelligent and perceptive people believing that these improvements do exist and finding evidence that there are opportunities for cost saving, one must look almost exclusively to the constraints which impede their adoption and hope to develop the incentives to relax those constraints.

Now the constraints to which I will refer not only impede production and inhibit technological progress, they also act for the substantial variability of the cost of various aspects of the housing process because of their local character. In the course of this testimony I will refer to the impact of the very local nature of housing in many respects and what it does to one if one is really concerned with industrializing that process and in what the trade-offs are both from a policy and an institutional basis.

The work that we have done over the past several years has identified nine constraints as crucial. The first is industrial organization of the housing industry which I have mentioned in some of my earlier

remarks. The second, and a very important constraint, is the inability to interpret sensibly the preferences and behavior of potential homebuyers and users. We do not deal very well with obvious preferences of people. In Kansas City, for example, there is a housing project which is a model for the benefits of homeownership, one that was established by the Reynolds Co. It sits adjacent to one of the most difficult public housing projects in America. And yet at the same time the people who live in the Reynolds project are model citizens, although they are for all intents and purposes not very different from those who dwell in the public housing project. I argue that because of the homeowner opportunity, this particular project, the Reynolds project, provides a substantial change in the behavior of persons.

It is clear on the one hand that we do not bother to deal with the fundamental preference, homeownership, in any kind of useful way, but beyond that, we do not deal with any of the other preferences. We do not really know whether people want a lot of variability in the architectural exterior or whether they want a low rent as a function of low variability. We do not know, for example, whether or not people who live in houses want cheap furniture as part of the housing opportunity as opposed to paying substantially high costs for non-massed-produced furniture and have substantially higher interest rates on that kind of furniture purchases, for example, than presently accrue to housing even though there are high-interest rates for mortgages.

The third constraint, which I have mentioned before, is the problem of the multiplicity of ownership of available sites and the problem of site assembly, and I think you are all sufficiently familiar with that so I will dispense with any additional remarks in that respect.

The fourth is the inability of the design profession to deal with building technology on a performance basis and similarly provides a substantial constraint. I have recently had an opportunity to work once again with a dozen of the leading architectural firms in the United States on a major project. It is completely clear to me that the present training of architects precludes their being able to work in any kind of a useful fashion with a systems approach to building. They have no sympathy with it. They have no rewards and they have no incentives to participate in this particular respect.

I also want to remark in the next few minutes about the fifth constraint, inefficiencies of the housing marketplace itself. I think the fact that there are diverse preferences, and that there are a large number of housing consumers, and that their needs are not uniform, make it very difficult to use a truly rigid system in any American urban area. Some research which I have been conducting with some of my colleagues at Harvard this past year revealed explicitly the dimensions of the problem of industrialized housing in typical metropolitan areas. Mr. Price's comments that there are only really two markets in the United States that lend themselves naturally to industrialized housing I think is a very accurate one, because in Boston, for example, where the number of housing starts per year is 10,000 to 15,000 a sensible size factory to provide an optimum level of production would need to produce roughly in the vicinity of 2,000 to 4,000 units on the basis of the European experience. It is highly unlikely that one out of five housing buyers is willing to live in the same type of structural entity. So then we are talking about a suboptimization in terms of the

available systems alternatives that we might derive from the Europeans. With the exception of such places as New York, and possibly Chicago, and possibly the opportunities which might be provided by either new towns or new towns in form, few markets for truly industrialized systems exist.

Federal and local government rules and regulations, the sixth constraint, are often talked about by people in the housing business as being a major disincentive to the efficient adoption of any new technology.

It is clear to me that the plethora of rules and regulations that characterize FHA processing is, in fact, a disincentive to any individual entrepreneur. It is almost a hopeless situation to proceed sensibly through these unless the proceeding leads to a major subsidy which allows a substantial profit for you and provides a sufficient incentive to put up with much of the trouble that is involved with that particular process.

But I think that there has been substantial development in terms of building codes, although less in terms of zoning codes which largely will in the next few years, I think, just by natural pressures and general community awareness mitigate against the inefficiencies of restrictive building codes.

But more particularly, I don't know how we are going to get around the individual action taken by enforcers of building codes who may enforce the code independently of the way the code is written in a particular situation, and this is an individual problem that probably wasn't faced when you went to the moon; nobody said, you can't land here. There wasn't anybody there to preclude such an arrival.

But there are, in fact, many people who interpret the rules and regulations in a way that is less than clear in terms of their original intent.

Now the seventh constraint, environmental considerations, is important because I think that on the one hand we are concerned with the clean and desirable environment, on the other we are unaware sometimes of what costs that will produce.

Restrictive work practices and financing provide the eighth and ninth constraints. What I would do, rather than read these remarks, is have the statement included in the record, if that is convenient, and answer your questions about any of these particular areas.

Representative BOLLING. That will be done. The full statement will be included in the record.

(The complete prepared statement of Mr. Rosen, above referred to, follows:)

PREPARED STATEMENT OF RICHARD H. ROSEN

My name is Richard H. Rosen. I am president of Urban Systems, Inc., a corporation which I manage along with John F. Collins, former mayor of Boston and now distinguished professor of urban affairs at the Massachusetts Institute of Technology. In addition to my present duties, I also teach at Harvard University.

When I conceived of viewing housing as a production process, as a means of developing sensible policies to encourage the adoption of technology in housing, I noted that there were two ways to generate improvement and efficiency. The first was to change the relationship of inputs (capital, labor, and materials), while the second was to determine the constraints which operate on the pro-

duction process and develop ways and means of relaxing these constraints so as to effect an increase in output and a decrease in cost.

I discarded the first, a purely technological view of the problem, as being inadequate because housing is much less a problem of technology than it is a social process. Many people ask why we can employ technological resources and systems analysis to get us to the moon in a relatively short period of time and cannot similarly apply these resources to the problem of efficiently housing the people of the United States.

The constraints on the moon flight were almost exclusively resources constraints: money and trained personnel. Economists have known for a long time that an increase of resources in a particular area will relatively quickly develop the required technologically competent people to earn the high wages.

Improvements in the housing process do not depend on the commitment of resources alone. They depend on the ability of the government to provide *sufficient incentives* along with the required resources to encourage the people who comprise the political and social institutions, whose behavior constrains efficient housing, to change their actions to those which will enhance efficient housing development.

Housing Developments Constraints and Incentives

Analysis of housing must proceed from the constraints that impede the production of low-cost housing and inhibit the development and application of technology to improve efficiency. These constraints not only impede production and inhibit technological progress, they also account for the substantial variability of the costs of various aspects of the housing process because of their local character. These constraints include, but are not limited to:

1. Industrial organization of the housing industry;
2. The inability to interpret the preference and behavior of home users;
3. The multiplicity of ownership of available sites;
4. The inability of the design profession to deal with building technology on a performance basis;
5. The inefficiency of the marketplace;
6. Federal and local government rules and regulations;
7. Environmental considerations;
8. Restrictive work practices;
9. Financing.

Some of these constraints are more readily relaxed than others, but no changes happen accidentally. Either the natural processes of economic growth provide appropriate incentives for the industry to change its methods, or these incentives must be implanted from outside. The appropriate incentives do not exist at present, so it falls to the national government, particularly to HUD, to formulate and implement an appropriate incentive system. In place of disincentives like the relatively low returns at high risks that now face potential mortgage lenders for low-income ghetto housing, the long pay-out periods, the uncertain and highly cyclical demands for construction, a set of positive incentives to progress is the order of the day.

I. Industrial organization of the housing industry

The inability of the housing industry as presently organized to develop, modify, and accept for regular use sensible technological innovations is limited by the scarcity of trained managers who elect housing as a career. The high level of instability in the construction industry in general and in the housing industry in particular is derived directly from the use of monetary as opposed to financal policy as a means of regulating the economy. This high level of instability has made it necessary for firms to minimize their fixed overhead with the obvious consequences that little or no technical staff capability has been developed in the industry, except where the demand for housing has been somewhat isolated on an individual or regional basis.

The report of this committee issued in April of this year suggests clearly why few home builders have adopted building systems as a means of lowering their costs of production. Most building systems derive economies when the scale of the project itself is large. In particular, your report points out that unless a project consists of four or more floors, conventional construction is likely to be no more expensive than systems construction. Since most home builders erect low-rise housing, their actions are obviously prudent and sensible.

The few large-scale home builders who have derived economies of scale have done so as a result of their ability to purchase the required inputs for housing at low costs and to schedule the delivery and allocation of resources on the job in as efficient a manner as possible. These firms, such as Ryan Homes, Levitt, Schmidt Bros., and others, derive managerial as opposed to production economy. Many home builders, for the reasons mentioned above, are unable to obtain these savings.

What this committee should be concerned with is not so much the present organization of the construction of the industry, but its likely future organization as a result of having to satisfy the housing needs of the American city. It is clear in this respect that much of the new housing which will be built in urban areas will be higher rather than lower in density, and in addition, it is likely in many respects, on the basis of cost considerations alone, to be high-rise. High-rise technologies lend themselves nicely to the use of building systems and, in fact, experiences in other countries clearly show that systems may be obtained where they are employed for these purposes.

What then must be asked is whether the present organization of the industry is capable of accepting technological innovation and whether or not it is likely that these innovations will develop the desired result of low-cost construction. At present all the incentives for efficient performance in this business have rested with the development of technological innovation, and this has been largely isolated against high costs; and in fact, in large part, there has been incentive to spend the maximum mortgageable amount as a result of the fee structure employed by the Department of Housing and Urban Development. It is clear that one of the first serious examinations of the present systems of incentives and disincentives should occur with respect to the role of the developer.

In no sense do I mean to minimize the importance of this responsibility, nor to suggest that developers should not be well compensated. What I mean explicitly is that the system for compensation of developers should not impose on them incentives which are in the absolute worst interest of the public at large. Developers should share the benefits of cost-saving and pay the price of higher costs than are necessary to satisfy the requirements of the marketplace.

The appeal of the mobile home is its low cost, and is evidence of the fact that if a low-cost alternative is available, the market will accept it. This does not mean, however, that low-cost housing should be confined to low-income groups. What it does mean is that the public at large should have the opportunity to benefit from cost saving and to economize on housing as they see fit. The present organization of the housing industry mitigates to some extent against heterogeneous demand for housing in a particular area. High-cost housing clearly keeps out poor families. Low-cost housing may let in many middle or upper income persons. Most private development reflects the general pattern of income segregation in housing. There must be an incentive developed to insure that developers do not continue this practice when it may be avoidable. At present there are few opportunities for profitable development on industrialized building systems. The experience of the prefabrication industry over the past several years illustrates this in their low rates of return. Efficient industrialization of housing requires large and continuous production. At present the market is not yet organized to encourage firms to make investments in these systems. It is clear that unless firms begin to make investments in these systems that the national housing goals will not be satisfied. So the question then becomes, "How and in what way can an incentive plan be developed which will encourage firms to invest in these systems." The behavior of the members of most large organizations suggests that if risks were minimized (i.e. the level of uncertainty associated with acceptance of a system of production) that members might be interested in sponsoring investments. A measure of business-risk insurance is needed, unless the profit opportunities in this area become more clearly indicated.

II. The inability to interpret the preferences and behavior of home users

Housing developers are at a complete loss when asked to comment on the trade-offs perceived by potential housing consumers between an amenity or group of amenities and lower or higher rental levels. No well established procedure for determining the preferences of potential inhabitants of housing exists. There are several reasons for this.

First, anybody who has built low cost housing has had no trouble renting it as a result of the condition of the housing stock in American urban areas. When people have little, what is clean and new will be very highly valued over that which is filthy and old. In the future, however, it will be very important

to be able to sensibly make these determinations, as the features that are or are not included in housing will determine its rental level on the one hand and the cost to the community who provide public services on the other. In this respect, what I am suggesting is that the users of housing are not only the residents of the units themselves, but also include neighbors and other citizens of the community at large.

User analysis then should include the mechanisms for evaluating individual demands as well as the means of understanding how and in what way the cost of community operation can be affected by the decision of the developer. With respect to the former, the present practice of not reimbursing developers for analyses of this type should be discontinued and a mechanism for performing these analyses in particular market areas should be developed. Under no circumstances do I mean to suggest that wholesale interviewing should begin immediately. There are innumerable technical difficulties associated with obtaining useful information of this type and these must be dealt with first before any regular program can be sponsored.

Another very important aspect of this constraint is the present inability to involve useful members of the community in the management and operation of real estate and construction. There is a shortage of skilled persons from the various minority groups of concern to policy makers who have the required training to become contractors, developers, or real estate managers. Some formal mechanism is necessary here in order to involve them meaningfully in the process. Large developers and contractors should be encouraged, as some have already done on a regular basis, to train ghetto residents in these skills.

III. The multiplicity of ownership of available sites

The scarcity and multiplicity of ownership of available sites for large-scale industrialized housing projects imposes a substantial constraint on the willingness of anyone to invest heavily in industrialized building factories. For efficient operation, a building systems factory must be able to produce several thousand units per year. Few American cities have available appropriately zoned sites for a sufficient production schedule which would permit the operator of the factory to write down his investment. As a result, when a building system is considered for a particular project, frequently the entire fixed cost is allocated to the single project with the obvious consequence that the building system appears to be more expensive than the conventional construction. If large-scale housing is to be developed in American cities, much of the speculative uncertainty associated with land must be eliminated. Here, either the federal or state governments will have to play a role, for only they can offer a sufficient commitment to a prospective housing factory building that a given number of sites will be available over a given time period.

IV. The inability of the design profession to deal with building technology on a performance basis

Architects, at present, do not obtain the requisite training which would permit them to sustain a system of any type in terms of its performance characteristics. Recently, I have had the opportunity to work with a number of technically competent and professionally respected architects employed by large and small architectural firms. This experience confirmed the view which many of our staff have had with respect to the barrier imposed by conventional architectural training on the efficient analysis of prospective building systems. An architect derives no personal reward from the creation of a building system. In fact, it involves a substantial increase in his normal work load without a likely contribution to his professional reputation as determined by his peers.

Building systems already developed offer the architect routine work. Those yet to be developed offer him only higher operating costs. Together with his predilection for individualism and his lack of analytical capability in a systems sense, these factors make his participation at present difficult, if not negatively useful. Now architects build few of the homes in America. The bad design in housing in many suburban areas has been attributed to this lack of involvement. But by the same token, the private home builder, when he has been able to organize, has constructed the lowest cost housing units in the country.

The technological requirements imposed by higher density will mitigate at least initially in favor of the participation of architects and other professionals, unless this participation involves competent persons who will continue the present high cost of "architect designed" construction. The inherent monotony of a building system must be dealt with, but in so doing, efficient operation must not be lost.

V. The inefficiency of the marketplace

From the standpoint of industrialized housing, the marketplace is inefficient in that demand is not homogeneous. Ideally, from the standpoint of cost minimization, everyone should be willing to live in the same type of structure. This would promote the maximum level of purchasing economies and technological efficiencies. It is completely clear, however, that people wish to individualize their homes, and unless the cost savings which could be offered to them were enormous, it is unlikely that this individualization would be sacrificed.

Additionally, the demand for housing is structurally diverse in that the requirements of young persons differ from the elderly, those of large families differ from small, and certain ethnic groups may wish special features to be included in the structure itself. By the time one gets through chopping up the housing market into all its relevant pieces, one finds that the number of housing units in demand in any particular metropolitan area for which any given technology is applicable may be below the minimum efficient size for a production facility.

The planning economists need not worry about this problem, as they can legislate the available housing stock. Once again some incentive must be developed to encourage people to give up structural individuality, perhaps. An exchange for individualized interiors for the low cost factor might provide a sufficient incentive, and this is likely to affect a behavior change.

Other remaining constraints

The remaining constraints, government rules and regulations, environmental considerations, restrictive work practices, and financial institutions have been discussed elsewhere by myself and others concerned with the housing process. Most of these problems seem to be working themselves out.

Labor unions in many places have a commitment to participation in improving the efficiency of the housing process. Here, the incentive is more jobs and higher wages. Few union men in construction are unemployed in America today. A substantial increase in the number of housing units built especially when many of them will be constructed in urban areas, will increase union membership and union wages far beyond any time loss as a result of productivity changes.

The Department of Housing and Urban Development has begun to encourage communities to shift to performance codes. If they are intelligently developed, these will substantially alleviate many of the difficulties created by local rules. Environmental considerations both add to and decrease cost of housing. Pollution control provides an example of the former, while increased densities are an example of the latter. Peoples' standards for environmental quality changes their preferences. Where it is important to housing low-income families, zoning changes can be effected. Where there is hostility to the persons of low-income families, densities will not be reduced without changes in the law.

The last constraint with which I deal is the financing of proposed housing construction. Low-income families have lately been unable to live in new housing in urban areas, except when there was a commitment to produce cheap housing, such as the tenements of New York that provided housing to immigrants and workers. At present, there is no incentive to build housing which low-income families can afford unless the development is effected by some form of subsidy. Even with efficient operation of building systems, subsidy will be required. If it is a matter of public policy to house low-income families in new housing, then subsidies will have to be substantially increased in order to encourage the development of a large number of units.

Technology can pay part of the subsidy bill, but it can't pay all of it. Efficient assimilation of technology will require the development of incentives which must extend beyond the construction industry itself. Improvements must focus on the relationships of all the costs of the housing process and a system of incentives must be similarly directed.

Chairman BOLLING. I, as chairman of the subcommittee, am interested in essentially what I gather you are interested in and that is looking at this problem in its total, in all its aspects. Having spent some years on the House Banking and Currency Committee, I have had some familiarity with the "housing" approach to housing. I think it is clear that I would not have had as the first witness that we heard an anthropologist if I were not interested in a broad approach.

And thus I clearly agree with your view, as I understand it, that we are dealing with what you might call a social problem, or you might call it a political problem.

Mr. ROSEN. Right.

Chairman BOLLING. It is a societal problem, whatever that word means, if that includes the two. You have mentioned some of the many difficulties, and I think you are accurate in your judgment, and certainly you are more expert in the literature than I.

What are the steps that need to be taken to solve the broader gage problems that you raised? Are they steps that involve the political process, the educational process, the building process, the what?

Mr. ROSEN. Well, I think the first step is the one that everybody talks about but nobody does anything about, and that is establishing a market for a large quantity production of housing.

Chairman BOLLING. Now, stop right there, and let's say I agree with that. How do we go about it?

Mr. ROSEN. Well, I don't see any way of going about that particular process—and I am dealing not only specifically with low-income housing, but housing in general——

Chairman BOLLING. I'm not either.

Mr. ROSEN (continuing). Unless we find essentially somebody who would buy a large number of housing units in particular areas and receive bids for the fixed price installation of large numbers of housing units over particular periods of time. And at the moment we have no agency of that type and at the moment none of the firms within the industry are large enough to produce even 1 percent of the total industry output.

So when you start talking about large-scale technological efficiency, or even manufacturing efficiency that would be represented by, let's say, a traditional oligopoly like we might have in automobiles or some other industry, we are talking about production of 5, 10, 15 percent of the entire demand by a single organization.

And in that respect, I think we are talking in housing between 80,000 and 160,000 units, which is eight to 16 times the production of the largest housing company in the United States today. So the only person, only one institution or group of institutions capable of even creating that kind of market—and I am not sure it has to be done directly—is clearly governmental.

Now, to the extent there has to be some sponsors, maybe it can take the form not of direct purchases but of risk guarantees of approved quantities of housing.

I think that the big problem we have in getting growth in the housing industry from a managerial standpoint is all the risk that is involved in that industry, and I think that any program or system of incentives should deal rather specifically with the risk problem itself.

Chairman BOLLING. Jim Knowles of our committee staff raises the question of, Why not insurance companies? Aren't they big enough to take on the risk?

Mr. ROSEN. Well, I think that they are managerially incompetent, if you want a frank opinion. I don't know that any insurance company is represented here.

Chairman BOLLING. I am sure they will find out.

Mr. ROSEN. I think that they are perfectly competent to protect their policyholder's interest and maintain their positions of authority in mutual companies.

Chairman BOLLING. You are suggesting that they have not had to use very much imagination to do what you have just described they are doing competently?

Mr. ROSEN. I think that is correct. I think that the number of imaginative insurance companies can be counted on the fingers of one hand. They are thought of by housing developers as greedy and miserable people because they want to share in the profits of a good deal in the form of participations.

Chairman BOLLING. You have in mind something that would ultimately be Government sponsored and in some fashion guaranteed from some of the risks that are potential to this size of an operation, but on the basis of your comment about the "red tape in HUD," you are clearly not talking necessarily about a Government-run organization.

Mr. ROSEN. No; I am not.

Chairman BOLLING. You are talking about a management process that involves Government guarantees somewhere along the line.

Mr. ROSEN. That is correct, but they have to be more than guarantees for just the financing.

Chairman BOLLING. They have to be incentives.

Mr. ROSEN. That is right. And they have to be real incentives and they have to be real guarantees. They are to be for risk guarantees, they are to be for all the risks and not some of the risks, because people who are on the side of the risk game don't want 75 percent of the risk taken care of, or 85 percent of the risk, because they don't understand that might be a sensible think for them to do in large part.

Chairman BOLLING. I have noticed just that in the years I have been in Congress in the attitude of the people who talk so much about free competition toward sharing risk in competition. I have noticed that problem.

Do you have any sort of a theoretical design for some such institution that would perform this function?

Mr. ROSEN. Well, I have thought a lot about an institution of that type, and I think that it has to be regional in character, perhaps even, in some cases, metropolitan in character.

I also think that there has to be an institution which concerns itself with rural housing, with the rural housing problem.

Everybody talks about the expansion of the mobile home industry. Well, one of the reasons that the mobile home industry is expanding in the rural area is because there are not a lot of rural regulations that impede development on the one hand as exist in urban areas, and most importantly, they are cheap.

A lot of people in rural areas do not have much money and so they buy mobile homes because they do not have many alternatives.

Chairman BOLLING. Well, I chair this Subcommittee on Urban Affairs. I have no illusion that "urban affairs" is a good title for anything. I grew up in the area from which came most of the problems of the cities today. I grew up in the southern highlands in the Southeast, and I am well aware of what the implications are of what you are saying.

Urban problems are not urban. They are the result of the failure of a national policy in the 1920's and 1930's, and earlier.

So that as far as I am concerned, you can't treat any aspect of any major problem as an urban problem as opposed to a rural problem. I think clearly they have to be treated together.

Mr. ROSEN. You asked me about a particular institution, and I mentioned it should be, certainly, regional, probably regional in character. It will probably have to essentially act, I think, as a housing bank, because it is going to have to own a lot of the housing stock and be willing, I think, to expand the housing stock beyond its present sort of match with the housing demand.

Everybody starts thinking about, oh, we have all this housing problem and the place to deal with the high cost of housing is clearly by building new housing.

Well, I think we have two dimensions to this problem, and the most important dimension is cost. I think it is clear to anyone who has looked for a long time at housing that the crucial determinant is people's ability to pay for housing, and what they are willing to pay is a function certainly of their income.

In many cases people are being asked to pay a lot of money for housing that is by everybody's definition substandard. So, one of the most important things I think could happen as a result of any expansion of the housing stock as a result of new construction is an opportunity to have perhaps some unemployed housing resources in certain urban areas where—which would encourage perhaps a general decline in rental levels in those areas.

So, on the one hand, we might be talking about high cost for new construction but to a large extent I think we can argue, at least on a public policy basis, that a substantial total reduction in cost might accrue as a result of some filtering and trickle down.

No, I think we have never had that because we have never actually built in any respect ahead of the housing demand in the United States, except for a few rather confused instances where I think that the data does not really clearly indicate that this was actually more housing available than was occupied to any large extent.

Chairman BOLLING. Wouldn't such an institution, whatever its design, have to do a series of things that might have a very healthy effect on the members of the society that enter into homeownership?

It seems to me that one of the major problems that we are supposed to be having is a taxpayers' revolt today.

Mr. ROSEN. Right.

Chairman BOLLING. Well, unless I guess wrong, this is in part based on the fact that a great many people have come to the stage where they are homeowners, and have discovered that the costs of homeownership are substantially different than the cost of paying the mortgage.

Mr. ROSEN. Right.

Chairman BOLLING. And if you had the kind of social institution that you are talking about—which would create a market and create the resources—it would also have to take into account all the different costs of owning home.

Mr. ROSEN. That's correct.

Chairman BOLLING. This might in turn educate people to know what they are getting into when they get a home.

Mr. ROSEN. A lot of people talk about law and order in America, and I think one of the ways to reduce the costs of crime, per se, is to start looking at the relationship between housing structures, for example, and the potential robberies and break-ins, and all sorts of other acts against persons.

It seems to me that the best place that I know of to commit a crime is a high-rise building, because it is really pretty much away from police forces and away from inspection and whatnot.

I think we also should think about construction in general in some of these respects. The best place I could think of to make money, if I were a crook—and clearly the number of incidents in this respect seem to indicate those who pursue this line of endeavor have not been blind to this opportunity—is in large-scale office buildings; you just go up and you kind of get in the building and then you sort of take one floor's worth of equipment, valuable equipment and sell it in the office equipment black market, or whatever.

It seems to me that alarm systems, locks, and this sort of thing, should be evaluated in terms of their effect on the cost of law enforcement. If people cannot break into doors or break through doors, or access to a building is slightly more difficult, then it might, in fact, reduce other costs of operating society.

I think that this same analogy can be used when one considers the solid waste problem and when one deals with the general questions of pollution.

We don't know to what extent, for example, we should store wastes onsite, whether the problem is as I recently observed that New York is having with the air pollution control law of ordering the closing down of nonoperative or purely operative incinerators, for example, to reduce particulate matter in the atmosphere which resulted in many landlords having to operate their garbage incinerators which the residents of these homes complained violently of because, for the first time, they had the smell of garbage in their neighborhoods because the houses, as such, became a storage depot for garbage.

Now, that on the one hand reduces the cost of garbage collection and pickup, and produces social costs in terms of the reduction of particulate matter, but the other creates a new cost of the reduction of certain esthetic preferences or esthetic values that the people may have.

And I think we have to look at all these tradeoffs, because it seems to me that the design of housing is inextricably related to the design and management of an urban area or a community as a whole—fire protection, I mean, I think I could just go on, education, day-care centers.

I don't know why we don't design housing, for example, that includes a lot of facilities and which can be furnished more efficiently in certain kinds of housing than could be furnished in independently, or operated idependently outside of the housing structure.

Chairman BOLLING. In this kind of area, problem and problem solving, how much is there to learn from the experience, if any, of the other developed countries?

Mr. ROSEN. I think one thing we learn is that the American housing problem is different from the European experience. After World

War II when people were walking around on the streets in Europe because they didn't have any place to live, or they were living eight families to quarters that originally housed one because much of the housing stock was bombed out, there was no problem getting people—and I think your own report alludes to this—to live in barren and somewhat austere but livable circumstances.

But you don't find too many people in the United States, except people I think that have suffered heavily from relocation, for example, and from migrants who really are in desperate straits for housing. And much of the housing by definition of substandard is certainly livable, and certainly more livable in Europe than it was after World War II because we don't have anywhere near the kind of crowding that was facing the European experience.

So I think the industrial building experience in Europe, while interesting and useful, is not in effect applicable in any total way.

Chairman BOLLING. What I had in mind, without getting into that particular point, is do we have anything to learn from them on pollution, the various kinds of pollution?

Mr. ROSEN. Oh, you want to get involved in pollution? Yes, I think there is a lot to learn from the European experience in pollution.

I think, for example, speaking with respect to water pollution, I think we go about dealing with the water pollution problem in this country in a completely stupid fashion. We disregard a lot of the natural treatment alternatives and as a result increase the costs of water pollution abatement.

Specifically, I refer to an example. There is a wonderful opportunity in water pollution in many places for a phenomenon called "in-stream aeration" which everybody's study and research show to be a very efficient way of increasing water quality by raising the levels of available oxygen in the stream.

Now, you can bubble or aerate the streams very cheaply and much more less expensively than you can treat waste in many situations. Yet, we don't consider the stream as a part of the system. In this sense, there is an analogous problem between pollution and housing in that we disregard the physical environment, all the aspects of the physical environment that relate to waste control by disregarding the stream, by not realizing that that is part of the waste system as much as a sewage plant.

We see in housing what we do is, we disregard a lot of institutional factors and don't consider them a part of the housing system. And if one takes a systems view we certainly can learn from the Europeans in the sense that they, by and large, have taken a systems view of a number of these problems and they at least considered them, engineers use the term, "with the appropriate free body diagram."

They draw the lines wide enough around the problem so as to develop, at least in my judgment, certainly in many cases one of the best alternatives possible.

Chairman BOLLING. Well, if I correctly read the papers around here, I get the impression that housing in the Washington area is going to be rather severely affected by the whole problem of pollution, water availability, disposal, and so on. And, frankly, I don't see how you can consider the problem of housing in the United States without taking into account the related problems. Clearly, pollution is one of the most

obvious ones, because the houses and the inhabitants of the houses are affected. Waste disposal is the second largest expense, and it is likely to grow because we have not really dealt with it in any kind of complete fashion, if it is likely to grow it is clearly——

Chairman BOLLING. Senator Javits, we are really having a colloquy about some of the broader problems of the society under the guise of talking about housing. I think that is what you might describe what we are doing.

Senator JAVITS. Mr. Chairman, I have unhappily had many conflicting responsibilities. I just came momentarily to pay my respect to the chair, and so just go right ahead.

Chairman BOLLING. Well, I thank the Senator from New York. You have less optimism than some about the ability of the industrialized approach to housing to meet the problem of housing in the United States until other steps that are more of an organizational, institutional, social, and political nature are taken.

Mr. ROSEN. Right.

Chairman BOLLING. Now, would you then reorder this conversation that we have had and make a statement in which you assign priorities to the solution of the total housing problem?

Mr. ROSEN. OK. Well, the first problem is the land problem, because if we do not deal with the land problem and don't essentially have any opportunities for a large-scale development or for essentially having enough land over a given period of time to insure that a given industrial facility that might be used for the producing of housing can be amortized over one reasonable period to a reasonable quantity of units, we are not going to get any housing built because sensible developers, as I pointed out in my testimony, just aren't going to—if they have a plant that requires 20,000 units of production and they only have land for 2,000 units, they are going to try and amortize the cost of the plant over 2,000 units and conclude, as any sensible human being would when faced with those numbers, that they will be unable economically to use industrialized housing. So the first problem is having large enough sites, or enough sites, either large or enough, but mainly, essentially have a capability that is sufficient to insure that a potential industrial housing operator would have an output guaranteed over a reasonable period of time.

The second problem, I think, is really with the industry itself, and I think that the industry managerially is unsophisticated as anyone can find. I find Washington people in government oftentimes have a great regard for the managerial sophistication of American industry. I rather think that the managerial sophistication that is American industry is concentrated in a terribly few firms, and we oftentimes describe in many terms managerial sophistication far beyond that which really exists in general in these firms. But in housing we have the most extreme example of the lack of managerial sophistication and capability with the exception of a few large firms that have literally by plain brains and guts and by understanding good management practices gotten to the point where they do slightly less than 1 percent of the total housing business.

I think that if you look at those managers and you put those same managers in another business, for example, they would probably have 20, 30 percent of the market. Yet in housing they have less than 1 per-

cent of the market, and so I think really the first place we have to go to, we have to get some managerial capability to deal operationally with a number of these constraints. There is enough of an incentive; managers generally can find a way of inducing politicians and other people who are concerned with the social and political aspects to change their behavior, modify their behavior, and to do something which they deem would be sensible.

So I really think the fundamental question is to what extent do we want the scarce managerial and technical resources of the economy transferred to housing from other activities, and to what extent are they, in fact, transferable.

So before we really even talk about how we are going to organize industry, I think the first question is where are we going to get the managerial talent and what are the costs of supplying managerially scarce talent to housing from the other sectors of the economy.

I think that is really one basic problem. And I think next to land, without dealing with that one, we really have little or no hope at all for major improvements. We might maintain the given present housing over time, but we are not going to get any cost reductions or changes in operating efficiency without that kind of adjustment.

The third problem is one of insulating the industry from the fiscal, from the monetary instability. I don't think that we are going to have a housing industry unless we have either a mechanism or a direct insulation of the industry from interest rate variability. I think that specifically it seems to me that almost all the instability that characterizes this industry, characterizes it over the past 30 years results directly from the use of monetary as opposed to fiscal policies as a means of regulating the economy in general. And so we are not going to be able to do anything about that unless we provide a mechanism—and I am not saying we have to abolish monetary policies but by God, we certainly have to provide a mechanism to insulate the industry in some sense. And I am not a producer of housing per se so I think that I have no special reason for wanting to maintain my own production facilities in any respect.

I would say, though, that these are the three crucial problems. I think all the other problems fall out. I think that labor unions, you can negotiate with labor unions. There aren't too many construction workers in the United States that I know that are unemployed. And beyond that I think that the problems are jurisdictional first in terms of the use of systems, and I think those can largely be worked out as long as somebody gets something for it. The problems of lost work I don't consider a real problem because if we are serious about building a lot of houses, much of the housing in the United States is going to be in urban areas and union labor is going to build it. Up to now union labor has built only about 30 percent of the housing in the United States, or 20 percent. I forget the exact figure.

So I think that is going to be an increase in the general demand for labor, and I think the labor unions are going to be bargainable with. I don't think that they are going to provide the prime roadblock as long as there is a clear public commitment to build a large number of housing units.

I note that in New York, for example, one of the large construction industries, construction unions, has recently tacked on a recent agree-

ment 1 cent an hour for manpower development and training of underprivileged groups in order to essentially increase the skill level of Negroes and Puerto Ricans so that they can become members of that union.

Well, 1 cent an hour amounts to a million dollars a year for that local, on the one hand, and if the Federal Government doesn't have that much money for the training of construction labor in the area of that local, if he wants to—well, I think it is very interesting if you just think that all he has to do is add 1 cent an hour every year for 5 years and he is spending $5 million for manpower development and training in a particular jurisdiction. So I think that the unions are behaving in some respects quite sensibly and reasonably. And I think that a lot of the practices that people abhor about labor unions are going to sort of dissipate as a function of management being able to deal sensibly with the unions on the one hand and the Federal Government having a commitment and the unions being assured that there is a commitment of a large number, a large amount of construction.

Chairman BOLLING. You are talking about a real commitment instead of a series of verbal commitments that are fractional.

Mr. ROSEN. You don't fool labor leaders.

Chairman BOLLING. The Senator reminds me that I should look at one example of systems management that recently has been a great success, and that is the splashdown.

We thank you very much, Mr. Rosen. It has been very stimulating.

Mr. ROSEN. Thank you.

Chairman BOLLING. And with that, the subcommittee will stand adjourned at the call of the Chair.

(Whereupon, at 12:15 p.m., the subcommittee adjourned subject to the call of the Chair.)

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